

Expanding ICT Infrastructure for Rural Areas in Korea

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Abstract— The digital divide between urban areas and rural areas has been expanded continuously in several reasons. One of the reasons is the difference of the Information Communication Technology (ICT) infrastructure between those two areas; the difference is mainly originated from the business situation where broadcasting-communication operators are reluctant to investing on the rural ICT infrastructure which seems much less profitable. Korea Communications Commission (KCC) has conducted the projects on building BcN in rural areas in cooperation with private telecommunication companies since 2010. The projects aim at eliminating the digital divide between urban and rural areas, promoting the balanced development, and enhancing the welfare in rural areas. In this paper, we analyze the current status of ICT infrastructure for rural areas in Korea and the governmental policies for expanding the ICT infrastructure. We also analyze the various convergence services on the rural ICT infrastructure, for which the pilot projects have been conducted. Based on the analysis, we propose future directions for expanding the ICT infrastructure more successfully.

Keywords— digital divide, BcN, NGN, network policy

I. INTRODUCTION

With the rapid development of digital information technology, it is expected that digital convergence will be in common in the near future. Digital convergence means that a variety of all types of information such as data, voice and video are integrated through convergence terminals and services. It is also expected that the digital convergence will lead us to a smart society in which anyone can use personalized services anywhere anytime he wants.

In order to respond to these changes actively, the Korean government has promoted the construction of Broadband Convergence Network (BcN) since 2004 [1]. BcN is the next generation integrated network, on which broadband multimedia services fused with telecommunications, broadcasting, and Internet can be used safely and seamlessly anywhere anytime.

The Korean government had conducted the national BcN deployment project since 2004, with the goal of building the world-best broadband networks for providing broadband multi-media services. The government has supervised projects for discovering new service models, commercializing the discovered services, and building and operating BcN quality

based infrastructure. The BcN projects of Korea have been deployed in 3 steps: the phase of fostering the foundation of BcN from 2004 to 2005 [1], the phase of full-scale construction of BcN from 2006 to 2007 [2], and the phase of completion from 2008 to 2010 [3]. As the result of continuous BcN projects of the Korean government, as of the end of 2011, 90% of the Internet subscribing households had the benefit of BcN services of more than 50Mbps [4]. The Internet environment of Korea can be considered to be in the top level of the world.

However, the digital divide between urban areas and rural areas has been expanded continuously. The difference is mainly originated from the business situation where broadcasting-communication operators are reluctant to investing on the rural ICT infrastructure which seems much less profitable. Korea Communications Commission (KCC) has conducted the projects on building BcN in rural areas in cooperation with private telecommunication companies since 2010 [5], [6]. This project is targeted at the small rural villages with less than 50 households, and the project aims at eliminating the digital divide between urban and rural areas, promoting the balanced development, and enhancing the welfare in rural areas.

In this paper, we analyze the current status of Information Communication Technology (ICT) infrastructure for rural areas in Korea and the governmental policies for expanding the ICT infrastructure. We also analyze the various convergence services on the rural ICT infrastructure, for which the pilot projects have been conducted. Based on the analysis, we propose future directions for expanding the ICT infrastructure more successfully.

The paper is organized as follows: in Section II, we analyse the current strategies of the Korean government for expanding the ICT infrastructure. We will discuss the major achievements and the main issues of the governmental strategies in Section III. The future direction we propose will be presented in Section IV, and the conclusion will be given in Section V.

II. STRATEGIES FOR RURAL BCN

The current strategies of the Korean government are classified roughly in 3 directions: constructing physical subscription networks, developing services on the constructed

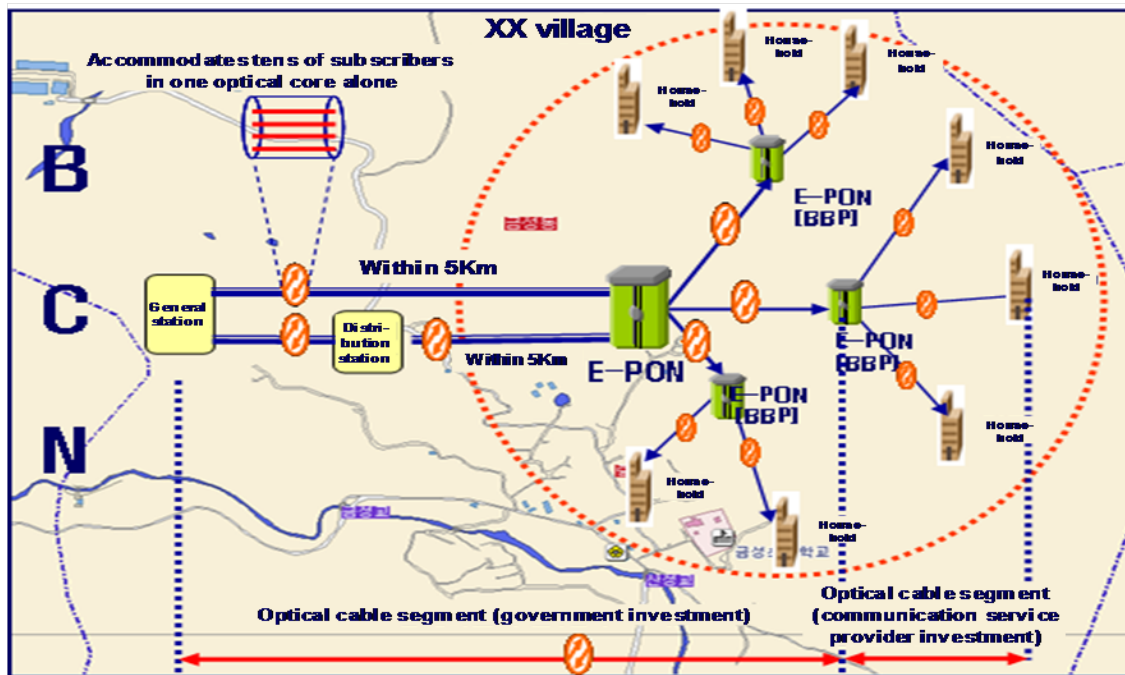


Figure 1. Physical configuration of rural BcN

networks and stimulating the utilization of the networks and services with institutional support plans. In this section, we analyse the governmental strategies in these 3 categories.

A. Subscription Networks

Rural BcN project has constructed BcN in rural towns, each of which has less than 50 households. The project aims at providing the environment of universal broadcast communication services in rural areas by building BcN in those areas step by step. The construction of BcN in rural areas is matching-funded by the Korean government, local autonomous governments, and private communication operators with the ratio of 25%, 25%, and 50%.

FTTH (Fiber To The Home) approach is applied in order to provide broadband Internet services in rural areas, in which the fiber-optic cable is extended, configured or newly installed to the subscribers' premises. Figure 1 shows the configuration of rural BcN networks.

In 2010, 658 villages in 10 local autonomous governments across the country participated in constructing rural BcN with 9.2 billion Won expenses. In 2011, 925 villages in 8 local autonomous governments across the country participated in constructing rural BcN with 12 billion Won expenses. Table 1 shows the number of villages in which the deployment of BcN was completed by year [7].

The council of local autonomous governments and communication operators was established in the year 2010 for the successful accomplishment of rural BcN project. The council has created a system in which all the stakeholders collaborate, and discussed the issues related to encouraging the participation of local autonomous governments and private communication operators.

B. Pilot Services

With the deployment of rural BcN networks, the Korean government and National Information society Agency (NIA) of Korea have pushed for pilot projects of developing BcN convergence services, which are specified for rural areas. In order to stimulate the utilization of rural BcN, activities contributing to the community have been recommended: ICT service training and related infomercials to the residents of rural areas in conjunction with the relevant agencies or institutions.

In 2010, 7 specialized services for rural community were discovered and implemented: rural information service based on video phones, greenhouse control service, CCTV surveillance service, snowfall monitoring service, and so on. In 2011, 5 specialized services for rural community were added to the previous services: home keeper service, agricultural facilities control service, agricultural education service, extended CCTV surveillance service, and remote health care service. Those specialized services are estimated to be effective and successful at enhancing the security of households during daytime working hours, providing educational and professional information to the rural residents in a timely manner, and increasing the convenience of living of elderly and vulnerable groups.

We summarized the pilot services for rural BcN in Table 2.

C. Institutional Support Plans

To lead the rural BcN project to a success, the cooperation of the government, local autonomous governments, private service providers and related organizations is essential. KCC motion Council' including all the relevant stakeholders of

TABLE 1 Number of towns equipped with rural BcN

Area	Number of Villages		
	Total	Year 2010	Year 2011
Ulsan City	10	10	-
Gyeonggi-do	81	10	71
Gangwon-do	182	71	111
Chungcheongbuk-do	205	71	134
Chungcheongnam-do	190	81	109
Jeollabuk-do	313	145	68
Jeollanam-do	207	103	104
Gyeongsangbuk-do	193	86	107
Gyeongsangnam-do	199	78	121
Jeju-do	3	3	-
Total	1,583	658	925

rural BcN for the successful and close cooperation of related organizations.

The council has played its role in consulting and adjusting related issues such as expanding the scope of rural BcN, the direction of BcN-specialized services, or examining the short-term plan. At the same time, the council is reviewing a variety of technical issues for constructing BcN for the future direction of efficient rural BcN construction.

III. ACHIEVEMENTS AND ISSUES

The goal of rural BcN deployment project is to provide universal and unbiased network infrastructure to all citizens. It is expected that eliminating the digital infrastructure divide will increase the opportunities of information access of rural residents. The elimination of digital infrastructure divide will contribute to resolving the polarization problem between urban and rural areas in income, education, welfare, etc., by lessening the digital divide between these areas.

It is also expected that rural BcN will contribute to the rural economic revitalization by the productivity improvement of local industry and the industrial induction to high value-added and eco-friendly industry through the effective utilization of nationwide BcN.

IV. FUTURE DIRECTION

The Korean government has a plan to expand the rural BcN deployment. We predict that the fiber optic network built by the rural BcN network plan will be used as an important resource for upgrading to Gigabit Internet in the future.

We think stimulating the rural BcN networks which has been already built by the governmental plan is the most urgent task of rural BcN network project. To stimulate the utilization, a variety of services must be provided. The environment for

broadcasting and communication convergence services specialized for rural areas should be finely configured, and the model for those services should be continuously updated. In addition, the development of useful commercial services must follow the current pilot services. The newly services should be designed in order to improve the quality of rural residents' lives by considering various user demands, and regional characteristics and circumstances.

With the recent advent of smart devices such as smart phones and smart TVs, the importance of wireless networks has been significantly increased; we predict that the limitation of using smart devices will cause another kind of digital divide in the near future. Hence, we strongly propose that the rural BcN plan should consider improving the wireless communication environment in rural areas. The wired rural BcN will be an important resource for upgrading the wireless communication environment.

V. CONCLUSION

Korea Communications Commission (KCC) has conducted the projects on building BcN in rural areas in cooperation with private telecommunication companies since 2010. The aim of rural BcN projects is to eliminate or lessen the digital divide between urban areas and rural areas, which may be one of the serious social problems in the end.

In this paper, we analyzed the current status of ICT infrastructure for rural areas in Korea and the governmental policies for expanding the ICT infrastructure. We also analyzed the various convergence services on the rural ICT infrastructure, for which the pilot projects have been conducted. Based on the analysis, the future directions for expanding the ICT infrastructure more successfully were proposed.

TABLE 2 Pilot services for rural BcN

Year	Name	Contents	Towns
2010	Rural information service based on video phones	(Rural information service) news of rural areas, training for IT and rural management, weather information, and price trend of agricultural products	931
		(Image-based consulting) health counselling and medical consultation with video calls in conjunction with local health centers, agricultural technology and management counselling in conjunction with local agricultural technology center, and law and cultural adaptation counselling in conjunction with multicultural family support centers	
		(Financial services) a wide range of financial services from the bank's ATM machine terminals with rural BcN service terminals	
	Agricultural facilities control	Monitoring intrusion or theft for agricultural and livestock facilities	20
	CCTV surveillance	Prevention of agricultural theft and accidents and residential safety	7
	4View	24/7 monitoring and image storing based on IP cameras	20
	Greenhouse control	Remote-controlling and monitoring the cover and side windows of green houses	20
2011	Snowfall monitoring	Monitoring snowfall of farming facilities to prevent property damage	2
	Embankments and landslide monitoring	Monitoring and alarming the landslide or ground collapse in the event of a natural disaster	2
	Home Keeper	A house security service which sends the captured images of a house to a registered mobile phone via MS/SMS if motion is detected by the camera attached to a KT Wi-Fi phone. The event images are stored in the u-Cloud of KT and can be retrieved by Web browsers or mobile phones later. The service also provides the facility of viewing real-time video with Web browsers and mobile phones.	50
	Agricultural education	Training services which are Web-based, online, and real-time. The topics of training program include agricultural information on food and livestock, and agricultural management.	1
	Agricultural facilities control	A service which provides intrusion detection based on infrared sensors and temperature control of the barns. When the temperature anomaly is detected by the sensor in the barns, users will be notified by SMS. The images captured by the dome type CCTV inside the barns are stored at local DVR, and they can be used as evidence of intrusion accidents.	13
	Extended CCTV surveillance	A surveillance service with high-resolution CCTVs, which equipped at the agricultural plantations or towns' main facilities. The service concentrates on preventing the theft of agricultural products and acquiring the evidence for intrusion criminals.	8
	Remote health care	A service which provides remote health education through a videoconferencing system installed at public health centers and village halls in the rural areas. This service includes remote interdisciplinary health services the elderly residents of certain diseases in the rural areas.	11
Total	12		1,085

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