Research and Demonstration of Next Generation Network and Service National Testbed of China

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Abstract. This paper introduces the China National testbed and experimental environment and its characteristics. The paper especially presents reconfigurable, service and NGB testbed aspect of their function and value for research and demonstration of China next generation network and service. Furthermore it summarizes research and experimental achievements and resources available for experimentation and formulates suggestions for the future network construction and international cooperation.

Keywords: China National Testbed, Network Architecture, Reconfigurable Testbed.

1 Introduction

Next generation network and Service National Testbed are funded by Ministry of Science and Technology of the People's Republic of China (MOST) and implemented by National Engineering Research Center for Broadband Networks and Applications of China. The objective of this project is to provide innovative technologies and a demonstration environment of new services for National High Technology Research and Development Program of China (863 program) and National Key Special Funds.

China national testbed supports network institutional reformation, tests new networking technologies verifies new network equipments and demonstrates emerging services. Through the above approaches, it provides indoor and outdoor experimental environments, experimental networks in designated areas and a basic environment for large scale experimental demonstration networks. It is able to meet the requirements of experiments and tests of equipments for various types of networks and nodes on different developing stages.

2 Architecture of National Testbed Network

Next generation Network and Service National Testbed of China are classified into three catalogues, namely reconfigurable testbed, service testbed and NGB testbed, according to their functions. China national testbed covers Yangtze River Delta region, Pearl River Delta region, across Shanghai, Zhejiang province, Jiangsu province,

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Anhui province, Guangdong province and Hainan province. The total length of the backbone network is more than 4000 km. It serves for more than 1 million users, including residents, enterprises, governments, schools and other subscriber groups. It also has international portals.

The overall architecture of next generation network and service national testbed of China is shown in Figure 1.

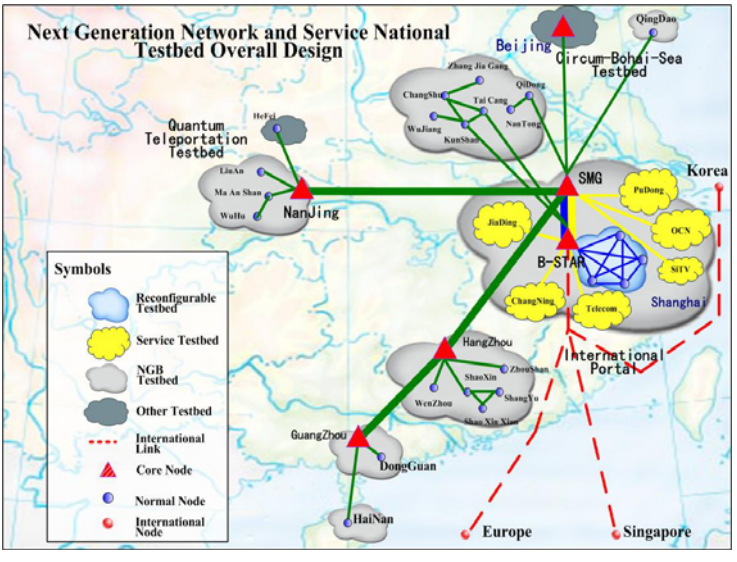

Fig. 1. The overall architecture of next generation network and service national testbed

(1) Reconfigurable Testbed

863 program teams in China have put much effort into exploring the solutions for these problems by constructing reconfigurable testbed, proposing service-oriented technical frameworks, and developing and experimenting reconfigurable equipments.

The basic idea of the technical framework of a service-oriented network is addressed in the following. First of all, network service consists of resource sharing layer, reconfigurable edge layer and logical carrier layer. Secondly, resource sharing layer can provide reconfigurable network services. Logical carrier layer aims to offer bearer services generated from the logical carrier network, according to the individual requirement of different classes of services. While reconfigurable edge layer makes use of the reconfigurable network services provided by the resource sharing layer, which will facilitate the construction of the logical carrier network in the logical carrier layer [1].

The basis of open-reconfigurable routing and switching platform is component-based process technique [2]. There are three aspects of its characters. First of all, a component is the basic process module. The platform provides reconfigurable running support environment for various module, while module provides reconfigurable environment to various components. Secondly, platform, module and component all comply with a serial of common standardized specifications. The standardized module

provided by any third party are able to participate and implement a given task on the same platform and the standardized components provided by any third party are able to participate and implement a particular function on the same platform. Last but not least, the platform level and module level both have the ability to upgrade and reconfigure functions, distribute codes and configure management layer. The component has good maintainability (e.g, install, uninstall, upgrade and update) [3].

The reconfigurable testbed consists of five reconfigurable routers which are connected by optical mesh links which have constructed in Shanghai. Large scale experiment is carried out on it.

(2) Service Testbed

The main function of the service testbed is to carry out new services and set an example. It can implement functions such as replay, VOD, record, search and recommendation etc. The development of the service platform will facilitate new services like interactive program and value-added services. Currently, 3D technique is employed in live broadcasting on this testbed at Shanghai Expo 2010 [4].

One of the challenges with the service testbed is to setup an effective rule for service evaluation in the experiments which can be achieved by embedding evaluation plug-in at the terminals, compiling statistics of Business Operations Support System (BOSS) service behavior and service income and behavior perception of the network devices.

(3) NGB Testbed

NGB is based on the achievements of China Multimedia Mobile Broadcasting (CMMB) and digital cable television. It uses key technologies in "High performance broadband information network −3TNet" to construct the next generation broadcasting (NGB) network which is featured with "Triple-play", wired or wireless and controllable. Compared with traditional Internet, NGB has more advantages such as safe, controllable and reliable. As infomationization promotes industrialization, the public service will be safer and securer in NGB.

The goals of NGB construction are: Transmission bandwidth of 1Gbps access bandwidth of 40Mbps. The digital interactive information consumption on broadband network will become as popular as other utilities services.

3 Conclusion

This paper presents the overall design and network architecture of the ongoing next generation network and service national testbed in China. We illustrate respectively the functions and characters of three types of testbeds, namely reconfigurable testbed, service testbed and NGB testbed. The development and the demonstration of the testbeds are innovative for network system reformation and the planning of next generation network testbed. It will provide a good platform for testing and verifying various techniques and devices. It is the basis in designing and verifying for future networks in China. We welcome oversea visitors and look forward to international collaborations.

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