

Practicing Digital Transformation by Developing New Smart City Business

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Abstract: Sparkled by the development of clouding computing, big data, Internet of Things, and mobile computing technologies, digital transformation becomes an important theme across all industries. First, this conceptual paper analyzes the trend of digital transformations within the telecommunications industry both in China and around the world. It points out that broadcast television providers should focus on transitioning to the next-generation network and smart city businesses as main practices of digital transformation. As a case study, the challenges and opportunities ahead of China Radio and Television Network Co., Ltd. (CRTN) under the digitization trend are identified. Secondly, the paper proposes a SMART strategy for digital transformation and argues that the strategy applies well to corporations like CRTN. Thirdly, the paper studies the concepts, standards, and technologies of Smart Sustainable City proposed by ITU and the New Smart Cities being developed in China. Finally, the paper presents the Fiberhome's Smart ICT 2.0+ solutions and states why they are suitable for CRTN's digital transformation.

Keywords: Digital Transformation, Smart Sustainable City, New Smart City, ICT, Broadcast Television Network

1. A Strategy of Digital Transformation - SMART

A new round of technological revolution is emerging around the world. Featured by cloud computing, big data, Internet of Things, and mobile computing technologies, this revolutionary digital transformation has been accelerating the reconstruction of the global division of labor and reshaping the competitive landscape of businesses. The fact that everything is undergoing digitization leads to dramatic changes in production methods and lifestyles. As a modern organization, enterprise or a government agency, the digital transformation strategy of utilizing new information and communication technologies (ICT) in reforming product services, business models, organizational cultures, operational structures, and IT processes becomes an inevitable choice to maintain their competitive advantages [1, 2, 14, 15].

In such a context, global telecom operators have transformed their network, businesses, operations, and management [3, 4]. AT&T is moving to a software-focused

company from a telecommunication provider: it incorporated Software Defined Networking (SDN) to streamline network management and has leveraged their data-centers to run on-demand services with virtualization technologies, both of which allow a new business chain to be established. Telefónica has been reinventing itself into a 'digital telco'. It increased the agility of its networks by applying an SDNFV stack and reduced their capital expenditures (CAPEX) and operating expenses (OPEX) by 1.5 billion EUR. It digitized many services and boosted the percentage of cloud service revenues from 5% to 10%. China Mobile is executing its 'NovoNet2020' strategy. The key ideas are new architectures - software-defined, virtualized, and programmable; new operations - centralized network management brings agility and maximizes resource usage; new services - more open on-demand services, and more inventions in capabilities and businesses.

As the fourth largest telecom operator in China, CRTN also needs to implement digital transformation, upgrading the traditional radio and television network to the intelligent open network defined by the next generation of software, and putting more weights on new ICT projects such as the smart

city services.

In general, CRTN faces both opportunities and challenges in its digital transformation.

The opportunities for CRTN: (1) CRTN was established as a state-owned company and was granted a special license to operate Internet services, with which it has become the fourth largest telecom operator in China. (2) The mandate to rapidly construct an intelligent and integrated national cable TV network is proposed in the 13th Chinese National Five-Year Plan, which is promoted by Chinese Publicity Department, the Ministry of Finance, and the State Administration of Radio, Film, and Television. (3) The Ministry of Industry and Information Technology has issued a Three-Year Plan for IT infrastructure construction to support some communication and information enterprises including CRTN, with a total investment of more than 800 billion Chinese Yuan. (4) Smart city construction is in full swing and the construction of smart radio and television network for smart cities has developed rapidly across China. Many provinces have managed to develop digitized projects: smart families, smart communities, smart governance, smart surveillance system across cities, towns, and rural areas.

The challenges for CRTN: (1) The traditional major network operators coupled with Internet companies have produced a variety of streaming video services, which have great impacts on the traditional TV and radio live broadcast services. As a result, their customer retention rate is at the all-time low. (2) CRTN's broadband business development failed to meet expectations. So far, the user penetration rate is low and the business experience needs to be improved. (3) The traditional video service is not well operated and its revenue cannot beat the continuous needs for basic network constructions (4) The ICT solution technology and product integration capabilities for the smart city and related industries are insufficient. (5) The internal management mechanism is not flexible enough [13].

Fiberhome, as an ICT industry expert, has proposed a unique digital transformation strategy – SMART [14, 15], for organizations to cope with the trend of digital transformation. SMART includes:

Synergetic ecosystem: Share the values of new ICT ecosystem with customers, operators, business partners, and employees.

Matching organization: Accurately respond to external changes and rapidly make informed decisions by forming flexible units with cohesive information technologies and industrial applications.

Agile operation: Treat big data as important production capitals to achieve agile data-driven operations.

Revolutionary application: Develop novel APIs based on next-generation infrastructures (NGI) so that customers are empowered to create applications suitable for their own transformation requirements.

Tailor-made service: Keep customers as the center of the business and provide services geared towards their demands.

The SMART strategy condensed the observations on the trend of digital transformation. It is not only the guideline for

Fiberhome itself but can also be promoted to other information industry and enterprises, including corporations like CRTN.

2. The Development Trend of Smart Cities

The ancient Greek philosopher Aristotle once said that people come to the city to live, and people live in the city to make life better. By 2050, 66% of the world's population will live in urban areas, and by 2030 it is expected that there will be 41 megacities with more than 10 million inhabitants in the world. "Smart city" is a new concept and a new model that has flourished with the rapid development of ICT.

ITU, an international technical standards organization, has formulated the concept of Smart Sustainable Cities (SSC): "A smart sustainable city is an innovative city that combines the use of ICTs and other means to improve the quality of life, improve urban management and service efficiency, and enhance urban competitiveness while protecting the economic, social, cultural and environmental needs of future generations with respect to economic, social, environmental as well as cultural aspects." [5] The steps of building Smart Sustainable City includes: (1) set the vision for your SSC venture, (2) identify your SSC target, (3) achieve political cohesion, (4) build your SSC, (5) measure your SSC, and (6) ensure accountability and responsibility.

China has proposed the concept of New Smart City which has similar effect to SSC. The main goals of the New Smart City are to achieve full-time civil service, efficient and orderly urban governance, transparent and inclusive sharing of data, sustainable and open economic development, and solid cyberspace security. Its methodology also resonates with its SSC counterpart: vision, objective, participants, spans, and building steps.

In China, constructing New Smart Cities is highly recognized, whether in the National 13th Five-Year Plan, in a series of documents issued by the state and local governments, or in the declaration of "New Era, New Thought, New Journey" advocated by the 19th National Congress. The construction of a New Smart City is the need to improve the quality of urban living experience. It is the main direction for accelerating the application of scientific and technological innovation and an important way to accelerate economic transformation. There are more than 300 cities across China that are building or planning New Smart Cities. The development of China's New Smart Cities is in sync with the world.

China has contributed to many of the international standards of smart cities. Taking Fiberhome as an example, it served as the vice chairman of the ITU-T "Internet of Things and Smart City and Community" research group (SG20). 11 international technical reports and technical specifications were led by Fiberhome, who also participated in the completion of other 21 international technical reports and

technical specifications, such as *Smart Sustainable Development of Urban Standardization Roadmap, Integrated Management of Smart Sustainable Cities, Cybersecurity, Data Protection and Network Recovery in Smart Sustainable Cities, Smart Water Management in Cities, Key Performance Indicators in Smart Sustainable Cities*. At the same time, Fiberhome took the lead or participated in the formulation of 9 Chinese national standards, such as *Smart City Terminology and Definitions* [16].

The new smart city framework can be viewed as a 4-layer-overlay. Some smart city standards and smart city security principles connect all layers. From top to bottom, the four layers are smart application layer, smart platform layer, smart networking layer, and smart perception layer. The perception layer samples city information using ubiquitous devices such as mobile devices, surveillance cameras, NB-IOT terminals, and RFID tags [6, 7]. Getting holistic and real-time city status is the very basic of New Smart City. The networking layer refers to the physical network (Fiber/4G/5G/WiFi), Ethernet, and Internet of Things, which are the ubiquitous channels for city-wide information flow [8, 9]. The platform layer consists of the virtualized cloud platform, big data storage and analytics platform [10, 11]. The applications running on the top layer should be data-driven; they provide digitized services for public sectors, private enterprises, and citizens. Examples are e-governance, smart transportations, smart campus, smart educations.

The ICT required for developing new smart cities can be summarized as 3S-ABCT [12]. 3S is short for Soft definition, SDNFV, and open source; ABCT is short for artificial intelligence, big data and block-chain, cloud computing, Internet of Things. Cloud computing is the foundation of service delivery. Big data and data analytics inform decision making. Artificial intelligence gives smart applications more intelligence. 3S-ABCT forms the connectivity of physical network and the interactions between human network.

3. SMART Empowered by Fiberhome Smart ICT2.0+

For Fiberhome itself, the SMART-strategy can be expressed as: Fiberhome is always customer-oriented and focused on the development of optical communication and ICT business, providing customers with smart network and comprehensive Smart ICT2.0+ solutions to facilitate the movement of digital transformation and smart society.

Smart ICT 2.0+ involves a collection of technical architectures, solution framework and end-to-end services with the following features: (1) It provides the integration of cloud and network as well as software and hardware. (2) It applies the "IP+Optical+Cloud+AI" philosophy to help operators upgrade their network to become ubiquitous, ultra-wide, minimal, and on-demand, and smart (also known as Fiberhome FitNet) (3) It unifies solutions from cloud data center infrastructure, cloud operating system, cloud

management platform, big data platform, smart ICT products, to smart city applications. Customers can use specific solutions at all tiers of their cloud: hardware infrastructure layer (FitSever for physical servers, FitStor for storage stacks); IaaS/IaaS+ layer (FitOS for operating system, FitVM for virtual runtime, and FitMgr for service management), PaaS layer (FitDP for developing and running applications), Big Data platform (FitData), and application layer. (4) It adopts OpenStack, Cloud Foundry, Docker and other open source technologies to integrate with third-party platforms and applications. The flexibility allows customers to build a new ICT ecosystem (5) The "+" here has two meanings: one is to continuously evolve the product platform, and the other is to freely interact with the broader ICT ecosystem. Fiberhome's Smart ICT2.0+ products and solutions support the network transformation of broadcast operators in all directions [15].

Fiberhome's Smart ICT2.0+ products and solutions have emerged in the market: three major Chinese telecom operators, renowned international telecom operators, Hubei Chutian Cloud, Chinese National Optoelectronics Industry Cloud, Chuanghui Cloud, Hubei Education Cloud, and TravelSky Enterprise Cloud etc. Remarkably, the Chutian Cloud Project is the biggest data-sharing platform in China and the first state-owned cloud application in central China region based on OpenStack architecture. The platform uses big data to digitize government work. It unifies the service infrastructure across country, province, city, and county level, serving as an information exchange hub. More than 500 applications from 50+ ministries in Hubei province run on Chutian Cloud. This is an example of digitization: saves costs, improves productivity, and provides strong support for constructing smart Hubei province.

Facing the trend of digital transformation and the rare opportunities lying ahead, CRTN should join the constructions of smart cities. It has the infrastructure foundations. The transition is not only a need for its business development, but also a response to the current theme of digitalization. Standing on the foundations of the new era, CRTN has a promising future for moving to the next-generation networks and expanding the smart city businesses. As a long-term strategic partner of CRTN, Fiberhome will support in earnest its network transformations and smart city business constructions.

4. Conclusion

In summary, the tide of digital transformation across all industries is still unfolding. The strategy of SMART proposed by Fiberhome is not only the methodology for Fiberhome's internal transformation but also a general guideline to organizations in IT and other industries. Using the next-generation infrastructure to reform networks and getting involved in smart city constructions is the best way to carry out digital transformation.

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