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IoT Ecosystem of Chinese Telecom Operators Based on Osterwalder Business Model

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Abstract

The development of the Internet of Things has made a tremendous impact on telecom operators, and there have been many changes in the business scope and companies operations. As the related technologies of the Internet of Things become more and more mature and the standardization degree is increasing, the Machine-to-Man and Machine-to-Machine will play a key role in the future. Telecom operators, as an important promoter of the Internet of Things industry, should seize the opportunity, maximize the value under the era of the Internet of Things, and maintain sustainable development. The article refers to Osterwalder 's business model theory and combines the model with the characteristics of the Internet of Things industry chain to establish a nine-elements model including customer segmentations, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure, etc. Based on Osterwalder 's business model, this article proposes to design the ecosystem of Chinese telecom operators and give advises about the role of Chinese telecom operators should play in the era of Internet of Things. Thus, the predicament faced by current telecom operators will be resolved.

Key words: IoT Ecosystem, Chinese operators, Osterwalder Business Model

1.Introduction

With the prosperous development of the Internet companies, the global telecom operators are generally facing problems such as market saturation and weak development, etc. Concurrently, operators' growth depends on the connecting pipe business, so the telecommunication industry is gradually in deep trouble of increasing quantity without compatible revenue. The number of mobile telecommunication terminals between human and human has also reached the ceiling. Under the control of

the government policy like raising speed for free, Chinese telecom operators are facing the same challenges. Consequently, the operators are continuously weakened and marginalized from the original comprehensive telecommunication service platform to the ordinary pipeline operators. Thus, Changes are extremely urgent for telecommunication operations in China.

The Internet of Things (IoT) is bringing fundamental changes in economic, environmental, healthcare, social and political realms in the developing world (Kshetri, 2016) [1]. The development of IoT technologies such as 5G, cloud computing, big data and eMTC provides solid technical support for establishing the communications with everything. Therefore, the IoT will be the main profit growth point where Chinese telecommunication operators are to develop. According to Sterling (2013) [2], China has the most developed IoT industry and related infrastructure among current developing countries. Regardless of the PC revolution in U.S. and the cellphone expansion led by Europe in the early stage, Chinese telecommunication operators are likely to emerge as global leaders in innovation and adaptation of the IoT (Friedman, 2014) [3]. Chinese telecom operators should promote business transformation and economic development by innovating an appropriate mode of development under the current market circumstances, so as to firmly grasp the chance of the IoT. Based on data charges and connection charges, operators should open up their platforms to develop new business models for providing applications and services. Only in this way, can operators develop to the upstream and downstream based on the pipeline instead of being the pipeline in the era of the IoT once again. Therefore, referring to the experience of international telecom operators in the layout of the Internet of Things, it is particularly important to design an appropriate business model for Chinese telecom operators based on the international countries' experience.

2. Business model

A good business model is the cornerstone of success. The current popular explanation of business model is business originality, which comes from the abundant and logical opportunities. And the business originality may eventually evolve into a business model. The constructive process of logistic is that the opportunity is the possibility of delivering a clearer market requirement through a combination of creative resources. And it is the undefined market requirement or undeveloped resources and

capabilities. Although the term “business model” first appeared in the 1950s, it did not begin to be widely used and spread until the 1990s. It has sparked heated debates by entrepreneurs and venture capitalists.

According to Stewart et al, the business model is a logical statement that a company can obtain and maintain its revenue stream [4]; Rappa believes that the fundamental connotation of the business model is the way in which the company operates its business in order to maintain itself and earn profits [5]. This clearly illustrates how the company can position itself on the value chain (value system) to obtain profit; Mahadevan believes that the business model is a specific combination of value stream, revenue stream, and logistic stream between enterprise, business partners and buyers [6]; Afuah and others define the business model as a method that the enterprises acquire and use resources to create more value for customers for earning profits than competitors [7]. To sum up, the scholars’ consensus at this stage is that the core of the business model is value creation, that is, how companies make money.

Although the definition of “business model” is varied, the core elements of “business model” have been widely recognized. The elements are customer segmentations, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure, etc. At present, the most accepted model by the management community is the Osterwalder’s business model, which covers nine elements in four main aspects of business. This article will build the IoT business model for Chinese telecom operators base on the Osterwalder business model.

3. Experience in international telecommunications operators of IoT

The Internet of Things is an information carrier based on the Internet and traditional telecommunication networks, allowing all independently addressed physical objects to realize interconnection networks. It has three important features: making common objects into equipment, interconnection autonomous terminal, and intelligent universal service.

The appearance of IoT makes the future of telecommunication operators clearer: in the future of IoT the value proportion of the device layer, connection layer, platform layer, and application layer will be 21:10:34:35 (from the McKinsey data). In 2020, the scale of Chinese IoT market will be 1.5 trillion yuan (from China Information and

Communications Research Institute data). Based on these data, we can conclude that in 2020, the scale of China's IoT industry equipment will reach 345 billion yuan, the scale of the connecting layer will reach 150 billion yuan, the scale of the platform level will reach 495 billion yuan, and the scale of the application level will reach 525 billion yuan.

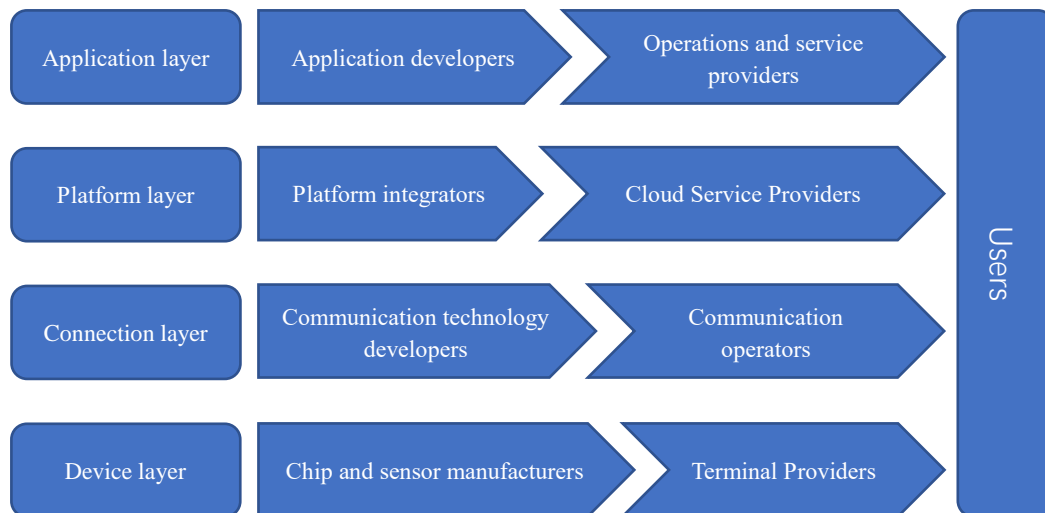


Figure. 1 A model of IoT ecology

With reference to the international operators' layout of the IoT, three major areas can be summarized.

3.1. New connection: providing faster and more stable communication technology support;

The active development and promotion of NB IoT (Narrow Band) technologies and multi-network collaboration are the primary tasks for operators to seize new opportunities about connections. The machine-to-machine communication is different from machine-to-man communication, which is mainly reflected in business continuity, concurrency, and low-volume data transmission. The traditional cellular network has high costs and power consumption against the large-scale development of new connections. In order to solve the bottleneck of network technology, international operators actively promote NB IoT technology with low power consumption and low cost. International operators represented by Vodafone, AT&T, and Deutsche Telekom are actively promoting NB-IOT technology. At present in preparation of IoT, telecom operators in various countries are actively promoting the 5G technologies. According to the development of 5G now, 5G is expected to be commercially available in 2020.

3.2. New equipment: cooperating with other terminal manufacturers in modular development model, integrated development model, or focus Vertical industry development model:

The main factors including high cost and poor performance hinder the development of the device layer. According to the development experiences of international operators, there are three development models:

3.2.1. Modular development model.

The core of the modular development model is functional and strategy segmentation. The operators can divide the terminal functions into a number of modules, to provide users with building blocks options. The Spanish telecommunications (Telefonica) is a successful case of applying this development model. Telefonica cooperated with Samsung, taking advantage of Samsung in terminal, chip, sensor technology with their own advantages in communications network, security and other. Telefonica launched a set of low-cost modular devices. Each module has a different function, which includes the environment, location, power, information and others. Users can randomly mix those modules, and different combinations correspond to different charges.

3.2.2. Integrated development model.

The core of the integrated development model is standardization and total cost priority. Operators will integrate a variety of functional modules into a terminal box to provide users with integrating solution. Vodafone has introduced a series of integrated M2M terminals, a multifunctional router represented by MachineLink3GPlus. These routers have multiple interfaces and functions such as connectivity, location, security, diagnostics, remote configuration, hardware upgrade, cloud adaptation and other functions to provide users with convenient as well as one-stop terminal services.

3.2.3. Vertical industry development model.

The core of the key vertical industry development model is differentiation strategy. Operators are targeting the specific users in vertical areas, cooperating with the relevant equipment manufacturers to implement targeted layout. The Deutsche Telekom is a successful case to apply this development model. Deutsche Telekom cooperates with Philips, Osram, Miele, Samsung, Huawei and other companies to launch intelligent home products, including smart sockets, smoke alarm, doors and windows monitoring, heating control and so on.

3.3. New platform: gathering the industrial chain partners for the collaborative innovation and development.

The platform layer is not only the largest layer in the value of the industrial chain, but also the center of data collection. It is also a concentrated area for business model innovation. According to the development experiences of leading international operators, the integration of industry chain partners and collaborative innovation have become the core idea for telecom operators to provide platform services. AT&T provides platform services such as M2X, Flow, and Connection Kite to partners, providing capabilities including network, storage, testing, and certification. In addition, AT&T established the Vehicle Network Research Lab, which unites with Samsung, Voice box, Jasper, and Accenture, etc. They focus on innovation and established a platform named AT&T Drive. This platform has currently collaborated with more than 10 car manufacturers including Audi, BMW, GM, Ford, Tesla, Nissan, Volvo.

4. IoT Ecosystem of Chinese Telecom Operators Based on Osterwalder Business Model

According to the experience of international telecom operators in the layout of the IoT, it can be seen that operators have great potential along each layer of IoT industry chain. In order to better explain the possibility to maximize profits and integrate resources, a good business model is going to be reviewed as an example.

With reference to the Osterwalder 's business model, the business model of Chinese operators in IoT is as follows:

4.1. Customer segments

The customer is the core of the business model. Based on the traditional telecommunication market, customers concentrate in the downstream of the industrial chain, including public users, business users, and key accounts. Operators mainly provide communication services for them. Telecommunication market customers in era of IoT will be extended to the entire industry chain, including the device layers, connection layer, platform layer, and application layer, such as various partners in vertical segmentation, B2B, B2B2C, and B2B2B customers. [9]

4.2. Value propositions

The value proposition is a series of products and services used to describe the creation of value for specific customer segments. In the era of telephone and Internet network, operators provide standardized services for personal/home users, such as

voice calls, mobile networks, and value-added services; provide professional services for commercial customers, such as one-stop solutions for voice, data, and network communications; and provide personalized services for key accounts, such as designing of networking solutions. In the era of IoT, operators can not only provide foundational network service, but also provide business services, IT infrastructure services, supporting services. Operators use their comprehensive service tools, technologies, credibility, and customers base to play a key role in the development of IoT.

4.3 Channels

The telecommunication sales and distribution channel are formed by a series of circulation links that telecommunication products or services circulating from telecommunications companies to consumers. [10] Through the development of the telephone network and Internet, operators have established their own channel systems, including self-owned channels, social entity channels, and electronic channels. However, these channels are facing the downstream customer groups of the original industrial chain. In the era of IoT, operators need to focus on the development of new channels—connecting partners in the entire industry chain. Because the entire industry chain includes four layers, the professional platform sale method is required.

Marketing of M2M solutions is done mainly by using professional sales. The degree of customization and provider-customer coupling is so high, that the buying process is similar to large information systems process. However, cloud-based M2M platforms provide a channel between the operator and the M2M user. The cloud-based M2M platform can be used as a channel, via which value proposition is delivered efficiently, scalable and customized to customers' requirements. This obliterates the need of constant human service channel. If M2M platforms include application development capabilities, M2M users can create their own M2M applications using the platform without conventional buying process.

4.4. Customer relationships

Due to the changes in customer segmentation and channels, operators need to change from traditional business-oriented to value-oriented customer relationship management. The types of customer relationships will also change from traditional basic type and passive types to responsible and partner type.

4.5. Revenue streams

In the era of the telephone and the Internet network, operators' revenue comes from

the services fee charged from downstream customers in the industry chain. These are monthly charges and service usage fees. In addition, the telecom operators are pricing based on the traffic, so ARPU is more concerned. But in the era of IoT, there are two changes. Firstly, the operators can not only charge to users (downstream of the industry chain) but also charge to business partners (upstream). According to the experience of Internet companies' free model, operators can even reduce fees for downstream users by charging upstream partner more fees to attract more users. Secondly, the ARPU of M2M transmission is lower since M2M transmission traffic is less than the traditional communication data traffic. As a result, if operators continue to use the single charging mode based on the traffic, they will not earn enough profits. Instead of the traditional charging mode, revenue will increase by providing professional services such as one-stop solutions, project management, and personalization services.

4.6. Key resources

The communications network infrastructure is the most important tangible asset of an operator [11]. In addition, the core resource of Chinese operators over some international operators is that Chinese network is not separated. The lack of network separation means that operators have a range of resources, including infrastructure and the network services. The quality of IoT is heavily dependent on the quality of the network. Therefore, Chinese operators have great advantages in constructing the IoT ecosystem.

In addition to communications network, customer base is an important intangible key resource connecting MNOs to the M2M market. They can leverage on different vertical customers, some of which have specific requirements for IoT-applications. MNOs also possess information about end-users and their communication statistics, which proves valuable especially in B2C markets [12].

4.7. Key activities

Device layer and connection layer: Providing secure and reliable access networks is the core business of operators. The information transmission of IoT needs to rely on the mobile and Internet network, and it needs to achieve seamless network coverage and heterogeneous network convergence. The key issue of Chinese operators is the establishment of a heterogeneous ubiquitous network in the future.

Platform layer: The converged service platform based on the mobile Internet is an important space for the development of IoT. One of the major advantages of operators

is their business management and operational support capabilities. Through the construction of the IoT operation support platform and service system, operators enable the sensor equipment and terminals to communicate with the service platform and industry application platform through the IoT support platform. This platform can provide convenient means for application integration and build the foundation for the interconnection between networks and services.

Application layer: On the basis of the platform layer, operators build IoT applications with cooperative partners. Operators should open their existing basic telecommunication service capabilities for the IoT application development and promote innovation through the application integration. Only in this way can operators change the role from transmitter of information to the aggregator of application services.

4.8. Key partnerships

In the era of the IoT, the mission of operators is to form an unimpeded channel for the entire business application and a complete IoT ecosystem by introducing and synergizing the industry chain. Operators should actively construct an IoT business support and management platform and service system. At the same time, operators should cooperate and open up to work together with all parties along the industry chain. So that the cluster will be formed by taking full advantage of operators' IoT support platforms. More valuable IoT applications will be excavated to achieve a win-win situation in the industrial chain.

4.9. Cost structure

At first, the infrastructure construction cost is the major component of cost structure. The second is the cost of platform's research, deployment, operation, and maintenance. Therefore, in the initial stage of the IoT sensing technology, the problems cannot be avoided including the simplex service functions, the small-scale user group, high costs, and price. Finding approaches to break through the initial cost barriers of users has become the top issue in opening this market. Therefore, the development of IoT will be limited by the cost. Operators should support the development of IoT service-related technologies and terminals in low cost and power consumption.

5. Conclusion

Chinese telecom operators as the core participants of the IoT should focus on identifying the key needs of the market, giving full use of the network connection

ability as the core competence, connecting to the IoT downstream industry chain with cooperative partner, and adapting the appropriate development model to lead the industry ecology. Thus, the business transformation and economic development can be driven by industry promotion. Current operators should firmly grasp various opportunities in the era of IoT and make achievements for creating enterprise's IoT brands under the assistance from the national IoT platform.

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