

# SPECIAL TOPIC

## 3G-oriented Business and Operations Support System

### Abstract:

The diversity of services of Third-Generation (3G) wireless systems, the rapid development of new services and the big number of entities on the value chain would be the new challenges when building and operating 3G networks. A solution to these challenges is to build a new Business and Operations Support System (BOSS). Considering the numerous varieties of 3G services as well as the QoS requirements, it is suggested that operators should integrate the existing Business Support Systems (BSS) and Operations Support Systems (OSS), perfect the Customer Relationship Management (CRM), make the systems adapt to the life cycle of data, information and services, and make steady progress in standardization work.

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The Third-Generation (3G) wireless systems usher in a new era of mobile communications. It is bringing fast, feature-rich, high-definition and ubiquitous mobile broadband applications. After ten years of technology research, product development, interoperability tests and trial operations, the 3G dream has come true and commercial 3G systems have been deployed in some countries and regions. The construction for 3G and its operations support system is such a broad and complex concept that this article merely addresses several aspects to be concerned for telecom operations support system based on 3G service requirements and the situation in China.

As an integrated management system of telecom networks and services, the telecom operations support system consists of Business Support System (BSS) and Operations Support System (OSS). BSS provides billing settlement, business accounting, customer service, decision support, and other functions, while OSS serves as a management and maintenance support system for telecom networks. BSS and

OSS can be combined to form an integrated telecom business operations and management platform, which is sometimes called Business and Operations Support System (BOSS) in China.

The 3G systems would have a wide variety of services, with a quick metabolism rate, which presents a new challenge to BOSS. Nowadays, an urgent task for China's telecom operators is to build an effective BOSS for their 3G systems. Since the monopoly in China's telecom market was broken up two years ago, all operators have been evenly matched and locked in fierce rivalry. They have encountered many difficulties, such as saturated markets, increased cost of competition, growing customer loss rate, reduced average retained time per user, and decline of Average Revenue Per User (ARPU). Moreover, as China has joined the WTO for several years, the operators have to face an opening market. China's operators still need to narrow the gap with foreign operators in network operations and management, and economic efficiency, although they have

taken the lead in network coverage and technologies. In response to current situations, it is necessary for the operators to offer effective and standard operations support systems<sup>[1,2]</sup>.

### 1 3G Services and BOSS

#### 1.1 Status Quo and Trends

In 3GPP specifications, R99 and R4 have mature products and corresponding market applications, while R5 is under the R&D and tests. R5 provides a unified IP core network and application environment. It is independent of access and terminal types, and can support a variety of network access modes, thus paving the way for diversified mobile data service applications. With the development of multimedia technologies, it will be an inevitable trend to allow triple play of three networks, i.e., telecom network, radio and TV broadcasting network, and Internet. Therefore, a variety of media services will be further converged to enable feature-rich applications<sup>[3]</sup>.

According to the research reports

concerned<sup>[4]</sup>, voice has still been a major service required by users for quite a long time after the commercial launch of 3G, but the demand on it will continue to decline and finally mobile data services will become major concerns of users. This way of gradual development is affected by both people's living standards and development of terminal technologies. The value-added service market would be a new field with a high growth rate, and vendors in this field shall cooperate with mobile operators to achieve a win-win future.

As for OSS, most of the available systems in running still follow the old practice. Their Operations Administration and Maintenance (OAM) systems fall far behind the development of the networks. Due to many restrictions such as multi-vendor environments, and differences in equipment support levels and operation modes, it is impossible to enable unified management and centralized monitoring for them. As a result, it causes a great investment in network operations and maintenance, and fails to meet the requirements for 3G business operations. The new BOSS should provide effective management, fast response to market demands, and make it easy to manage all kinds of services.<sup>[5-8]</sup>

### 1.2 Mobile Data Services

Compared with 2G and fixed networks, 3G systems have a leap in quantity of

services. Among those services, mobile data ones are the most important, involving information download, music download, streaming media, video, TV show, Location-Based Service (LBS), Push-To-Talk (PTT), Internet resources, enterprise databases, business system, and more. The mobile data services provide Quality of Service (QoS), a very important quality attribute that means a network can offer service in accordance with the service quality to which users have subscribed.

The problem that BOSS faces is how to manage a variety of services and their QoS, and enable users to find their favorite features quickly.

### 1.3 Multi-cooperation for Win-win Future

It is a long-term and huge task to develop and maintain all kinds of 3G data services. Operators can hardly fulfill the task by themselves unless they cooperate with certain Customer Services Providers (CSP). In alliance with CSPs, operators may appropriately roll out more and more quality multimedia services, rapidly tap the market, and actively foster their markets.

Additionally, the 3G value chain is extended by a large number of entities. As an all-win operation model is adopted for the value chain, only when each entity on the chain gets what it deserves can successful services be guaranteed. The previous model adopted by operators is basically to

build a network and directly sell all the services generated by the network to its users. In fact, it is the direct distribution. However, the new value chain system can be thought of as a supermarket model<sup>[9]</sup>, and the mobile wireless system becomes a supermarket that can offer information service 24 hours a day, 7 days a week. It integrates all kinds of information, and contains a variety of value-added services in addition to voice information. All these services are put in the supermarket for users to choose and purchase. In an information supermarket, people can choose various data information, amusement channels and game channels as they choose CocaCola, PepsiCola, Qingdao Beer and Budweiser Beer in any real supermarkets. Like traditional supermarkets, the information supermarket also includes all kinds of brands to be managed. But the difference is that the information supermarket requires the operator to deliver a combination of personalized services and personalized product packages.

### 1.4 Intelligent Billing

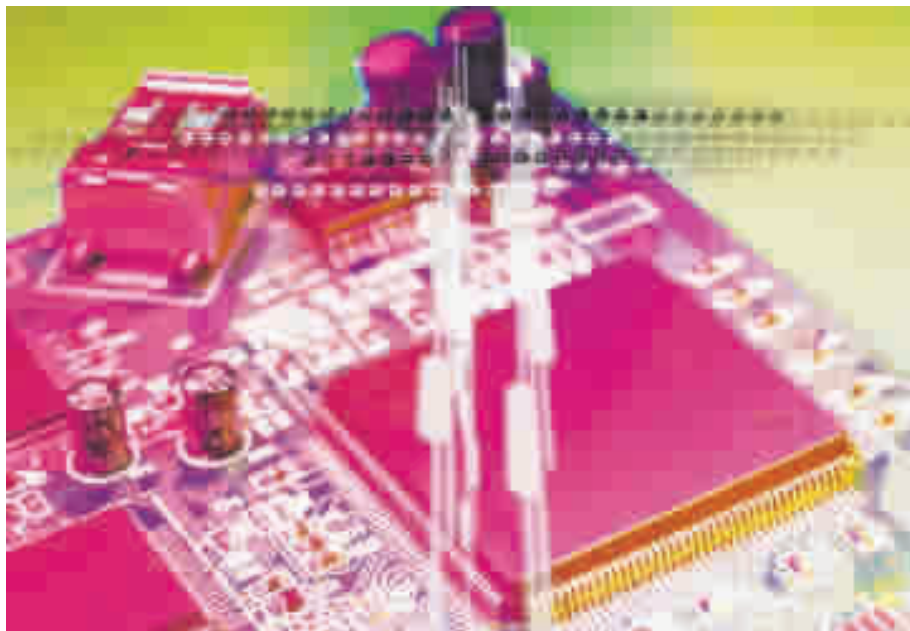
3G network operation can adopt the following modes:

- Cooperation with the third-party SCP;
- Cooperation with other operators, using complementary advantages to roll out a full range of telecom services to end users when necessary, to improve competitiveness;
- Customer segmentation, delivering personalized services as well as desirable service packages to different customer groups.

Accordingly, the intelligent billing system has to address the following issues:

- Inter-network settlement with cooperative partners should be fulfilled.
- The system may break the boundaries of various service media to support various bill data formats and provide unified and real-time billing capabilities. A user can be charged for using voice and data services over the same account. In general, the traditional voice service network is operated separately from a new data service network for a comparatively long period,





so the intelligent billing system has to solve the problem of user data and billing in a unified manner.

- It should be applicable to various new billing modes. In the 3G era, collection objects for billing are numerous, and requirements for billing are quite complicated. For example, charging can be based on duration, flow, content, click count and combination of them. In addition, as numerous 3G services are rolled out, it is difficult to foretell what kind of services will be introduced in the future. Hence the intelligent billing system shall support configurable service rules.

Inter-network settlement needs to manage a complex cooperative partner relationship and support revenue sharing, assistance, wholesale and other new concepts. The cooperative partner can be an SCP or an operator. For example, pack and bind up another operator's services for sale, or allow users to have equal access to multiple operators' services. Inter-network settlement with the cooperative partners shall be dealt with fairness, following the principle of equivalent trade to achieve equality of profit distribution. Therefore it shall support flexible policies and regulations created by the supervision departments concerned.

In delivering personalized services, it is necessary to provide flexible billing models. For example, the account

balance in the current stage can be transferred to the next stage to be charged or presented freely; the system provides a binding service for group users (such as a family), which means several user numbers can be charged over a common account; the system makes a real-time estimate of a user's charge and adjusts the most preferential price package for the user, for instance, a 50-yuan package service enjoys 100-minute free resources, and a 60-yuan package service enjoys 150-minute free resources. When a user's free resources exceed 100 minutes, the 60-yuan package service will be a best choice for him, and the system can automatically change his package service. Moreover, the system shall provide security monitoring functionality. When a user selects various "supermarket" services, the system provides real-time user data, conducts real-time control over the user's credit and traces the bank interface in a real-time manner, making an analysis of the user's actions based on the measured data and providing the user with necessary information to meet the requirements for personalized services<sup>[9]</sup>.

### 1.5 Tailor-made Products

To survive fierce market competition, operators must keep the needs of both ordinary customers and cooperative partners in mind, serve them

wholeheartedly, and provide them with tailor-made products. The demands of ordinary customers and cooperative partners would be changeful and the sorts of services be in numerous varieties, and the BOSS should accordingly be able to develop and deploy service products quickly and provide easy operation interfaces. For instance, before using services, customers can know which products are suitable for them only by inputting customer-related information into the system; with the work flow engine, customers are encouraged to log on to the network by themselves and freely tailor their own services.

### 1.6 Other Possible Problems

#### (1) Multi-standard Systems Environment

An operator in China may adopt more than one wireless system standards in its network, such as TD-SCDMA and WCDMA, or TD-SCDMA and CDMA2000. These systems can be different in terms of terminal parameters, service performance and even the service types they provide.

#### (2) Variable Services

According to statistics, the speed of service variation is 7 times as fast as that of an IT system update. In order to keep pace with service developments, the BOSS shall attach great importance to standard, modular and integrated system design.

#### (3) System Security

In the 3G era, telecom networks are not as closed as before. The open and integrated networks need to address security issues including system and customer service security.

## 2 Suggestions for BOSS Construction

### 2.1 Developing Step by Step

BOSS is a huge and complicated system other than a simple combination of several sets of equipment and software. It needs an auxiliary administration system, professional technical personnel and marketing personnel, and relies on mature telecom network technologies to evolve together with the market. It is unfeasible to build a perfect BOSS in one



step with too much investment in the early construction phase, because future demands are uncertain and BOSS construction needs huge capital investment. Therefore it is advisable to adopt a market-oriented strategy, i.e., to start with the research, give priority to the fundamental construction including network interconnection, database and personnel training, and make sure telecom networks are running reliably before finally deploying the BOSS upper-layer applications<sup>[10]</sup>.

Furthermore, the operation of existing services and deployment of new services must be guaranteed when building a new BOSS. To make full use of the BOSS, the construction solution and procedure shall be specially designed to adapt to the service development.

## 2.2 Adapting to Life Cycle of Data and Various Objects

The available contents for operators that are processed from original data are called information. In the cycle process of business operations, a large amount of various data would be generated. Generally, the operations data in telecom must be properly kept and cannot be treated as junk data at any time<sup>[11]</sup>. Therefore, storing those data would become a big challenge. The growth of storage technology would not keep up with storage requirements forever, so an appropriate policy shall be made to store and manage those data.

Data, information, services and even partner relationship with the third party all have their life cycles. For example, content data generally undergo different periods such as generating, frequently-using, backup and resuming, hardly-using and archiving. In each above period, an appropriate storage device should be used respectively to ensure the equipment response speed and optimize the investment usage. For instance, you may handle all the emails you have just received this week, but seldom read the last month ones, and would have no idea where the emails you received last year have gone. If data of all periods are put on the same storage device, the response speed for data access will obviously slow down, and routine maintenance difficulty as well as expenditure will greatly increase.

According to the analysis done by University of California, Berkeley, 93% data in a single world is digital and 75% is fixed content that remain unchanged once stored. This analysis can be considered when selecting a suitable storage and management solution. The solution of a storage system would determine whether BOSS can run smoothly during all phases of the data information cycle.

The types of services and business processes also have rapid update cycles, so it is necessary for BOSS to provide related update functions. Those outdated services should be put away and not appear on the BOSS or the website of the operator. When dealing with the partner relationship with the third party, the life cycle should also be taken into account.

## 2.3 Integrating Existing OSS and BSS

Part of 3G services would continue or improve the traditional ones. As operators' existing systems have accumulated years of experience in network coverage and stability, and lots of investments have been poured into these systems, the first requirement for operators to develop their 3G systems is to ensure stable running of their existing systems.

In existing traditional networks, the software system of BOSS is relatively complicated and has no unified standards. OSS of equipment is generally supplied by the equipment vendors, and the switching and transmission facilities are offered by multiple vendors through bidding. This makes the network management system, billing system, accounting system and customer service system to be independent of one another, and it is difficult to provide a favorable combination of the disorderly system structure. On the other hand, it is



unfeasible to build a complete and compatible system to take the place of all existing systems, for operators can hardly afford numerous manpower, money and time. Hence integrating existing systems is an inevitable choice of operators.

## 2.4 Perfecting CRM

What is Customer Relationship Management (CRM)? For instance<sup>[12]</sup>, a man gets off work and is on his way home. He goes to a grocery store near his house, takes up a bottle of soy sauce, and then puts it back after having a look at its usage and price. 3 minutes later, he goes back to that grocery store. Again he picks up and looks at that bottle of soy sauce. If you were the storekeeper at that moment, what would you do? The storekeeper comes over and says to the man, "Mr. Zhang, it is the very soy sauce your wife usually buys. It contains plenty of soy beans and tastes better. Besides, your wife is an old customer of ours who enjoys a monthly payment and 5% discount. It has been almost a month since your wife bought soy sauce, so I suppose you might have used up that

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bottle of soy sauce. Nevertheless, you can take away this bottle of soy sauce as long as you sign your name here, and I am sure your wife would be delighted.” From this case, you can learn the application of CRM.

To deliver personalized services in the 3G era, it is necessary to build a perfect CRM. CRM is beneficial for improving customer satisfaction and loyalty, lowering the customer loss rate, and prolonging customer relationships. With powerful CRM, a large-scale telecom company can also memorize detailed information about every customer and adopt relevant service policy as the storekeeper does.

CRM construction aims at decreasing frequent data inputs, increasing customer quantity, reducing information islands, improving productivity and lowering operation cost. CRM helps operators achieve initiative-selling, cross-selling, target-selling and personalized selling to generate more revenues.

### 2.5 Giving Attention to Standardization and Preparing for Network Interconnection and Interworking

Many of equipment vendors support the standardization of software and interfaces, because it makes possible interoperability between different equipment and public upper management software, and facilitates future equipment maintenance and development.

Currently there are few mature international standards available for 3G-oriented BOSS. Out of all active research organizations and forums, TeleManagement Forum (TMF) issued the Next Generation Operations System and Software (NGOSS), which gets support from both operators and equipment vendors. This solution is module-based, object-oriented and distributed. NGOSS is a future-oriented operation support system. At present, TMF is mainly engaged in end-to-end NGOSS for the enhanced Telecom Operation Map (eTOM).

### 2.6 Enhancing Assistance and Management Ability

With growing demands for telecom services and increasingly complex IT

systems, it is very difficult for people to deal with more and more business work. To avoid such an embarrassment of insufficient human resources and growing service demands, it is necessary to rely on the automation of BOSS. Moreover, BOSS must provide decision support functionality, i.e., extracting intelligence and knowledge necessary for operators from original data, to provide reference for the decision-making of the high management levels.

### 2.7 Others

#### (1) Cooperation with Strong System Integrators

BOSS is a complex system that not only involves operators' internal and external business operations, but also has many complicated technologies and secondary development for application systems. Operators hardly purchase such a complex system from a vendor directly. As the construction and operation for the new-generation BOSS may last for a relatively long period, it is difficult for operators to ensure stable and continuous development of BOSS during the construction if having no powerful system integrators as their cooperative partners. Moreover, if the work of the system integrator fails to keep pace with the service development of the operator, the new-generation BOSS will be severely affected and consequently future service deployment of the operator will be severely hampered. But the close cooperation with the integrator is a solution to service development, system reconstruction and secondary development for the operator.

#### (2) Disaster-tolerance System

Information data are the life of an operations system. Loss of all data would bankrupt an operations company. When conditions permit, an off-site disaster-tolerant backup of the core system shall be provided. Besides, reliability tests and even disaster-tolerance rehearsals shall be done regularly for the backup system.

## 3 Conclusions

Due to the limits of space, this article merely addresses several factors to be concerned for BOSS construction, and

they are far from instructive to construction practice. Integrators and operators should jointly study all kinds of specific requirements. As the saying goes “an army marches on its stomach”, it is necessary to build BOSS before 3G services are rolled out. Otherwise, even if 3G licenses are granted, operators can only deploy traditional services. The BOSS built shall deal with or adapt to all kinds of predictable issues.

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