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Research on the Key Concepts and Problems of Service Quality

Wei Chen [1, a], Qingkai Zhao [2, b] and Hanshuo Duan [2, c]

[1]Global Energy Interconnection Research Institute, Nanjing 210003, China

[2]State Grid JiBei Information & Telecommunication Company, Beijing 100053, China.

[a]chenwei@geiri.sgcc.com.cn, [b]80425934@qq.com, [c]duanhanshuo@126.com

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Abstract. As increasing of the network users and network service provided, the network management has changed from the traditional network quality management to the service quality management. For the of the service control and indicator system, the network operation has been unable to meet the needs of network service operation and maintenance. The network operation and maintenance managers become interested in service quality management based on user-perceived. In this paper, we discuss on 'business and service', ' difference between QOE, KQI, KPI', 'KQI generation process' to provide the basis for the study of the service quality.

1. Introduction

TMF proposed KQI in GB293 and its main goal is to put forward a widely used key business quality parameters for different business based the user perceived [1]. Its starting - point is the change from the traditional network-based quality parameters KPI to the user-perceived quality parameters KQI. The goal is to provide a better way for network operation and maintenance evaluation, and a good method for Prompting network quality. But, over a period of time after the presentation of the methods, the methods have not been widely promoted and applied.

On the one hand, the theory still remains in the theoretical model level, can't adapt with different types of networks services fast. On the other hand, there is no need for "customer-perceived" quality of service monitoring and evaluation at that time. With the increase of new services, the network management operation and maintenance capabilities need to meet the needs of multi-service management operations. As a result, KQI-based service quality management is increasingly favored by operators.

2. The challenge of service operation and maintenance

As the development and innovation of service, the end-to-end service quality management becomes complex and difficult to assess and have to face the following challenges:

(1)Growing service chain

Each service involves the terminal, the core network (SGSN/GGSN), bearer network (data network, etc.), business network, application platform and other parts. The service chain covers all aspects of the network and involves a large number of network elements. Different network element is provided by different equipment manufacturers, and different systems are belonged to different developers.

(2)Increasing services

For the carrier technology, the services are divided into Voice service, SMS category, data service, streaming media service For the service type， the services are divided into browsing type, download type, access type and so on. Different types of services have different models, different key points of business quality based user-perceived and different requirements for QoS.

(3) Pattern diversification

At present, many services are operated by third party companies. This quality of service is not only related to the network, but also with the third party's network, equipment, software, etc. And the user is

generally unable to distinguish what is caused by the operator, which is caused by the third party companies.

In summary, as a direct provider of services to the customer's operator, the operators undoubtedly bear the quality of service monitoring, maintenance, promotion of the task. The current operators are good at the network-based KPI assessment, but can't directly and intuitively provide customer perceived, in line with customer experience quality indicators, so the urgent need to make up and fill this short board.

3. Objectives of service quality management

Through the relevant means of support, the operators can achieve business quality management functions and establish a sound business quality assessment system, a complete assessment of customer perception and network business quality.

Through the establishment of customer-oriented, business-oriented quality control system, the operators can achieve active protection and differentiated services Ability to enhance business support and end customer satisfaction, and achieve fine management. Service quality management can enhance the management of the network and the customer's service ability from three levels [2].

Table 1. Hierarchical objectives of service quality management

User Layer	User Care: Differentiated Services
Service layer	Service quality management: master user perception, advance prevention, improve network quality. Grasp the business development trend, ahead of planning
Operation layer	Daily operation and management: quickly find the network stealth failure. Improve the ability to detect fault processing, service security capabilities

4. QoE, KQI, KPI understanding

QoE, KQI, KPI and other terms are often used in the evaluation of service quality. How to define and obtain these parameters or indicators will directly affect the implementation of service quality assessment. The understanding of these terms is shown in table 2.

Table 2. Conceptual understanding

Terms	Understanding
QoE(Quality of Experience)	Defined in ITU-T P10 / G100. QoE emphasis on "customer subjective feelings", and provide service subjective perception evaluation from the user's point of view. Customer experience is the end user's subjective feelings on the provided service performance,is the sum of the subjective feelings of the quality, content and service of the service used, and is reflecting the gap between the quality of services for user expectated and the quality of networks . Generally user experience is getted through statistical information, research, interviews and other methods which are more subjective and quantitative weak.
KQI(Key Quality Indicator)	Defined in TMF GB923. From the user's point of view, in the service level it reflects the user experience indicators. KQI can be obtained through direct testing and statistical analysis of the network. Such as sending success rate, success rate, delay indicators. Generally it is calculated and summed by the KPIs
KPI(Key PerformanceIndicator)	Defined in TMF GB923. It is the network layer performance description on the network element layer.KPI includes a group of measurable parameters and is the most important method to operate and evaluate the network management currently.Such as call drop rate, PDP activation success rate and so on. KPI can be directly extracted from the network element using the network management system.

5. KQI generation process analysis

In Fig.1, In GB923 Wireless Service Management Handbook (Wireless Communication Service Management Manual), TMF puts forward a set of KPI / KQI design ideas and architecture, and provides a bottom-up evaluation method from KPI to KQI and a corresponding quality of service management model [3].

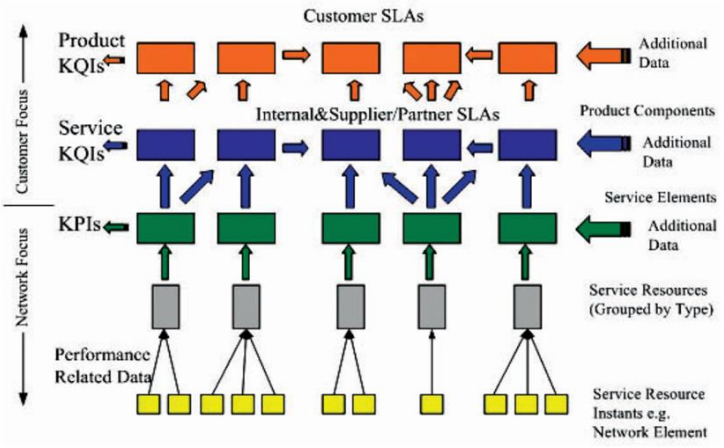

Fig. 1 GB923 key indicators hierarchical graph [1]

KPIs are the most familiar, most common, and most frequently used indicators. The data which is presented based on the network management system is also mostly belonged to the scope of KPI. We generally pay more attention to how the KQI by the aggregate of the bottom, weighted and other methods, and less concerned about the bottom KPI network elements such as performance parameters. Generally, we are more concerned about how KQI come from the bottom, and less concerned about the value of the performance indicator of KPI in the network element.

(1)KPI up to KQI

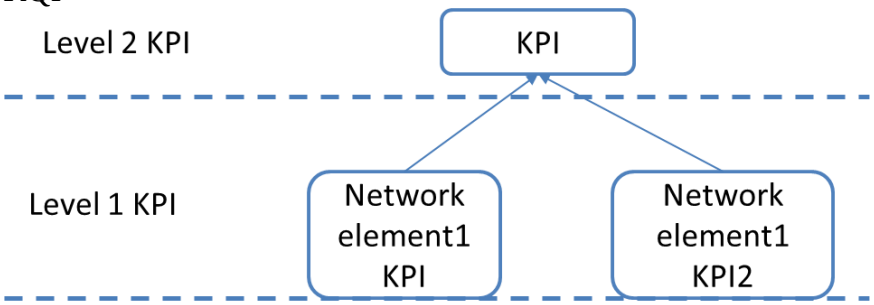

Fig. 2 KPIs Up to KQI

As shown in Figure 2, because of the large number of network KPIs and the different impacts from KPIs to KQI, the overlap or subordinate relationship between the different KPIs, the summary process for KQI needs to selective service parameters KPI with greater influence for the foundation of KQI. Common key indicators include PDP activation success rate, dropped call rate and so on. By reducing the range of KPI selection, we can greatly reduce the complexity of the algorithm to KQI KPI's, and improve the intelligibility of the KPI approach KQI model.

(2) KPI to the network element parameters.

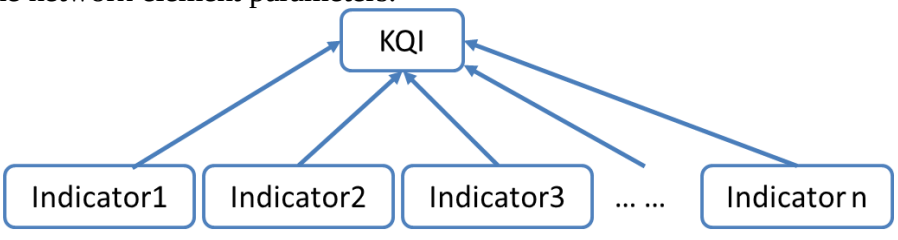

Fig.3 KQI down to KPIs

As shown in Figure 3, the establishment of service KQI by the network KPI has become a consensus. But in most systems for KQI indicators generation, only the method for KPI to KQI is

proposed, which means that decomposition from KQI stops at the KPI level while ignoring the relationship and influence between KPIs to the underlying network element parameters.

In the hierarchical model proposed by TMF, it is pointed out that KQI from the KPI and KPI from the bottom parameters of the network element [4]. For example, there are two network element mutual backup, one of the network elements fails, and another network element undertakes service. At this time, KQI / KPI data is still showing a relatively good state / performance. But at this time, we do not characterize the network in a good running state. Therefore, when we are monitoring the service layer KQI, we not only need to see the state of KQI, but also need to explore network topology, network architecture and backup methods of the bottom network which can help to tap the network quality problems that are hidden under the appearance.

6. Concluding remarks

This paper focuses on the key concepts and issues of Quality of Service, and studies the key quality indicators (KQI) recommended by TMF. Service quality management is particularly important in the context of the current network management. Service quality management is both a common system and a method, and a unique strategy and measure. How to improve the quality of user experience is based on the characteristics of the network resources, service type and organizational structure and is also the focus of future research. This work has been funded by the state grid project: Research and Application of Service Quality Intelligent Probe and Holographic Estimation Orienting to Electric Power Data Network (2016-2017).

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