International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Series E

Supplement 10

(01/2016)

SERIES E: OVERALL NETWORK OPERATION, TELEPHONE SERVICE, SERVICE OPERATION AND HUMAN FACTORS

ITU-T E.800 series – QoS/QoE framework for the transition from network oriented to service oriented operations

ITU-T E-series Recommendations – Supplement 10

International Telecommunication Union

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Supplement 10 to ITU-T E-series Recommendations

ITU-T E.800 series – QoS/QoE framework for the transition from network oriented to service oriented operations

Summary

Supplement 10 to ITU-T E-series Recommendations intends to provide the basis of the service quality management (SQM) and customer experience management (CEM) and key parameters related to SQM and CEM for supporting operations within the service operations centre (SOC). The introduction of the two paradigms, for instance SQM and CEM managed via the SOC is an essential component in order to:

– Monitor and maintain an acceptable level of quality for end-to-end services delivered to an individual or a group of customers.

– Measure not only quality of service (QoS) parameters but also the level of consumer satisfaction regarding services delivered by communication network/service provider).

This Supplement can be used by communication network/service providers in order to provide a better quality of experience (QoE) and quality of service (QoS) to their customers.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T E-800 series Suppl. 10	2016-01-21	12	11.1002/1000/12762

Keywords

Service quality management (SQM), customer experience management (CEM), service operations centre (SOC), communication service provider (CSP).

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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Introduction

As competitive pressures, customer expectations and the complexities of quality control for voice and data services rise and profit margins shrink, there is a need for communication network/service providers to transform their businesses from network-oriented to service-oriented businesses in order to embrace a broader concept of quality of service (QoS) as described in [ITU-T G.1000].

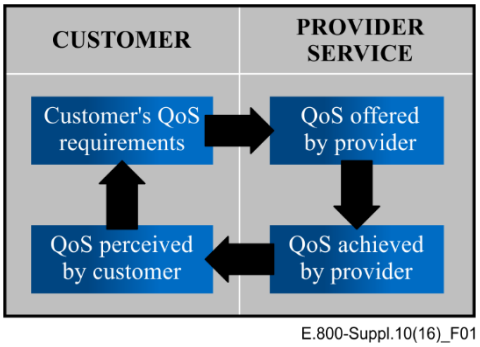

Figure 1 – Four viewpoints of QoS
(source: [ITU-T G.1000])

Figure 1 adapted from [ITU-T G.1000] shows four viewpoints of QoS, which are oriented to identify problems associated with quality of service from the perspective of customers and service providers:

- Customer's QoS requirements: Simple language declaration of the QoS level required by customers/users when utilizing services/applications.
- QoS offered/planned by the service provider: Declaration of QoS level expectations when providing services to customers.
- QoS achieved/delivered by the service provider: Declaration of the real achieved and delivered-to-customers QoS level.
- QoS perceived by the customer: Statement of the QoS level that the customer believes/thinks is the level of quality received or experienced.

The identification of how QoS behaves with regard to these viewpoints could be achieved more easily by means of automated processes that help construct and monitor key parameters providing information on this matter, from the consumer point of view.

Therefore, the introduction of the two paradigms, for instance service quality management (SQM) and customer experience management (CEM) managed via a service operation centre (SOC) is an essential component in order to:

- Monitor and maintain an acceptable level of quality for end-to-end services delivered to an individual or a group of customers.
- Measure not only QoS parameters but also the level of consumer satisfaction regarding services delivered by the communication network/service provider.

This Supplement can be used by communication network/service providers in order to provide a better QoE and QoS to their customers/end users.

Thus, this Supplement focuses on providing the basis of the SQM and CEM functions and key parameters related to SQM and CEM for supporting operations within a SOC environment.

Supplement 10 to ITU-T E-series Recommendations

ITU-T E.800 series – QoS/QoE framework for the transition from network oriented to service oriented operations

1 Scope

This Supplement:

- Provides the framework for a service operations centre (SOC) developed with service quality management functions and solutions and an evolving customer experience with a view to operations for converged networks and services.
- Identifies key parameters relating to service quality management (SQM), quality of experience (QoE) and performance for supporting operations within a service operations centre (SOC) environment.

2 References

[ITU-T E.800] Recommendation ITU-T E.800 (2008), *Definitions of terms related to quality of service*.

[ITU-T E.802] Recommendation ITU-T E.802 (2007), *Framework and methodologies for the determination and application of QoS parameters*.

[ITU-T E.804] Recommendation ITU-T E.804 (2014), *Quality of service aspects for popular services in mobile networks.*

[ITU-T G.1000] Recommendation ITU-T G.1000 (2001), *Communications Quality of Service: A framework and definitions*.

[TR 148 v0.9] TeleManagement Forum Technical Report, TR 148 v0.9 (2009), *Managing the Quality of Customer Experience.*

[TR 149 v0.9] TeleManagement Forum Technical Report Part 1, TR 149 v0.9 (2009): *Holistic e2e Customer Experience Framework.*

[Chappell] Chappell, Heavy Reading (2014), *Managing Customer Experience of the network: Strategies for Success*.

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses the following terms defined elsewhere:

3.1.1 quality of experience (QoE) [ITU-T E.804]: The inclusion of the user to the overall quality in telecommunications extends the rather objective QoS to the highly subjective quality of experience (QoE). The QoE differs from user to user since it is influenced by personal experiences and expectations of the individual user.

3.1.2 quality of service (QoS) [ITU-T E.800]: Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service.

3.2 Terms defined in this Supplement

This Supplement defines the following terms:

3.2.1 customer experience: The accumulation of all experiences a customer has with a service provider during his/her relationship with that provider which results from the direct interaction with the offered services.

3.2.2 communication network provider (CNP): An organization that offers a communication network to the communication service providers.

3.2.3 communication service provider (CSP): An organization that offers communication services to the customer and/or users.

3.2.4 customer experience management (CEM): An approach designed to focus on procedures and a methodology to satisfy the service quality needs of each end-user.

3.2.5 service quality management (SQM): The process of monitoring and maintaining an acceptable level of quality for end-to-end services delivered to an individual or a group of customers.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

CEM	Customer Experience Management
CNP	Communication Network Provider
CSP	Communication Service Provider
KPI	Key Performance Indicator
KQI	Key Quality Indicator
NOC	Network Operation Centre
QoE	Quality of Experience
QoS	Quality of Service
SLA	Service Level Agreement
SMS	Short Message Service
SOC	Service Operation Centre
SQM	Service Quality Management
WAP	Wireless Application Protocol

5 Conventions

None.

6 Basis of CEM and SQM

This clause introduces the two concepts adopted in service operations centre (SOC) environments, specifically customer experience management (CEM) and service quality management (SQM). The SOC concept is the key for service and user centric operation transformation. A SOC enables better service quality experience and operational effectiveness, together with revenue and margin enhancement.

Previously an understanding of consumer behaviour was not very important to communication network providers (CNPs) and communication service providers (CSPs). CSPs and CNPs tended to focus more on measuring the parameters of the network part, for example network bandwidth and channel capacity. Nowadays however the service quality experienced by customers may include other quality parameters, such as for instance the time it takes for the user to receive a billing request response from a CSP.

6.1 Customer experience management

- According to [TR 148 v0.9], customer experience is defined as "*the result of the sum of observations, perceptions, thoughts and feelings arising from interactions and relationships (direct and indirect) over an interval of time between a customer and their provider(s) when using a service*".
- Customer experience management (CEM) is a management discipline that uses the most relevant insights about the customer to drive the right actions across appropriate domains of the business and measures the outcomes of those actions to refine both insights and actions in the future.
- The CEM approach is designed with procedures and methodology to satisfy the service quality needed by each and every customer. It provides a fully integrated framework that measures the final consumers' satisfaction regarding the services delivered by service providers.
- Customer perception of the telecom operator depends on frequent, long-lived interactions with the operator's network through a series of services and devices.
- CEM depends on understanding multiple aspects of a customer's experience. Obviously the network is the customer's prime touch-point with an operator and the fundamental source of experience of telecom services. However, there are other organizational touch-points that affect the experience of customers such as for instance a network's billing, fault resolution processes and device management activities [Chappell].
- CEM uses, as main inputs, the objective key performance indicator (KPI) parameters and key quality indicator KQI parameters that contribute to QoE. Nonetheless QoE is a subjective measure and therefore subjective evaluation should be the only reliable method. This means that CEM should be built on customers' feedback. However, as subjective measurement is expensive and may be time consuming, the reference content is sometimes missing. Accordingly, CEM is based on building models for real-time estimation and utilizes KPIs and KQIs as the main inputs towards developing the QoE.

6.2 Service quality management (SQM)

- According to Tele-management Forum Technical Report TR 148 and TR 149, service quality management is defined as the set of features displayed by an operation support system (OSS) that allow for the quality management of the different products and services offered by an enterprise/company.
- SQM is the process of monitoring and maintaining an acceptable level of quality for end-to-end services delivered to an individual or a group of consumers. SQM refers to the level of satisfaction a customer perceives when using a given service.
- However, to proactively manage this, the end-to-end components that make up the service must be monitored and maintained. Typically, end-to-end SQM requires a powerful data aggregation engine and a tool for end-to-end mapping of services.
- SQM systems make use of collected information (regarding user perceived QoS and the performance of the provision chain) in order to enhance the guarantee in the quality of the offered services. Customer data is collected from the network in order to formulate the characterization of services usage.

These activities provide the necessary data for the generation of key performance and quality indicators (KPI/KQI), which allow for threshold management, service level agreements (SLAs) surveillance and real-time monitoring, and are the best approach to customer experience management.

Figure 2 illustrates the evolution of quality from resource level (Network) to user level (Customer).

6.3 CEM and SQM together

- In an operators' network, SQM data is naturally collocated with the network operations centre (NOC) data. In this situation, SQM focuses on the proactive monitoring and management of services that run across networks, including traditional and next-generation voice and messaging services, over-the-top applications and mobile broadband services such as long term evolution (LTE) and third generation (3G) services.
- As network events flow through their service models, SQM systems can detect degradations in service quality and drill down into the underlying network component (s) causing performance issues.
- Therefore, integration of SQM and CEM systems adds the customer dimension to the service assurance process. In this way, operators are able to detect the customers affected by service quality issues in order to resolve the detected problem. Accordingly, SQM can send alerts to network management systems to fix service performance issues based on customer value, SLAs, location or any other customer insights or metrics.

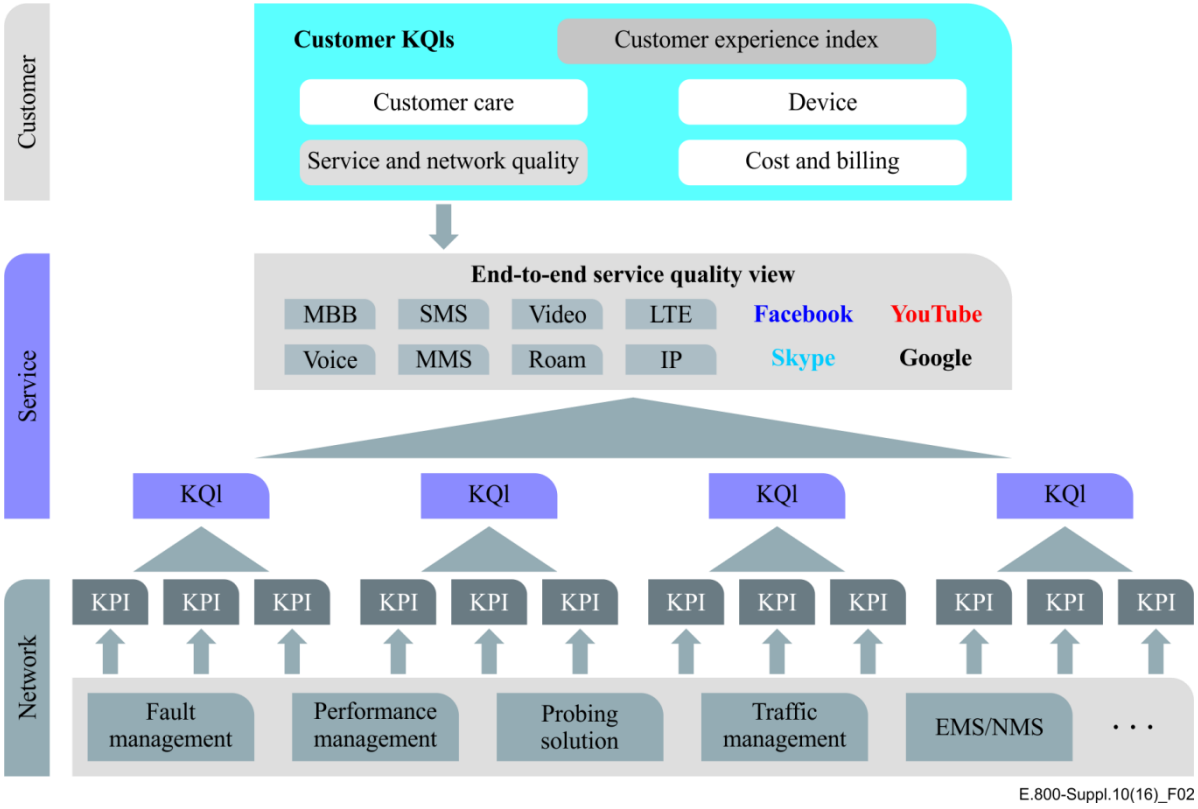

Figure 2 – Relationship between customer, service and network metrics

7 Key parameters related to SQM and CEM

This clause describes the key parameters related to SQM and CEM for supporting operations within the SOC environment. The identified key parameters include technical and non-technical parameters.

7.1 Technical parameters

1) Voice Service:
   - Perceived call success rate
   - Perceived call drop rate
   - Good voice quality rate
2) Web browsing service:
   - Page response success rate
   - Page response delay
   - Page browsing success rate
   - Page browsing delay
   - Page download throughput
3) Wireless application protocol (WAP):
   - Page response success rate
   - Page response delay
   - Page browsing success rate
   - Page browsing delay
   - Page download throughput
4) Short message service (SMS):
   - SMS origination success rate
   - SMS origination delay
   - SMS termination success rate
   - SMS termination delay

7.2 Non-technical parameters

1) Service provisioning/activation time
2) Service availability/uptime (for all users)
3) Fault repair/restoration time
4) Customer complaint resolution
5) Bill payment:
   - Service reliability
   - Service accuracy
   - Operation efficiency of customer billing
6) View bill:
   - Service accuracy
   - Keep customer informed
   - Operational efficiency for bill view
7) Advice of charge:
   - Service accuracy
   - Keep customer informed
   - Channel operational efficiency for advice of charge

8) Customer perception of services:

a) % of users satisfied with the provision of service

b) % of users satisfied with the billing performance

c) % of users satisfied with help-desk services

d) % of users satisfied with network, reliability and availability

e) % of users satisfied with maintainability

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Printed in Switzerland
Geneva, 2016