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SERIES M: TELECOMMUNICATION MANAGEMENT, INCLUDING TELECOMMUNICATION NETWORK MANAGEMENT AND NETWORK MAINTENANCE

Telecommunications management network

Requirements for service management in cloud-aware telecommunication management system

Recommendation ITU-T M.3371

International Telecommunication Union

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Recommendation ITU-T M.3371

Requirements for service management in cloud-aware telecommunication management system

Summary

Recommendation ITU-T M.3371 defines the general and functional management requirements that support service management in a cloud-aware telecommunication management system (see Recommendation ITU-T M.3070) and provides a functional framework for service management in a cloud-aware telecommunication management system.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T M.3371	2016-10-29	2	11.1002/1000/13064

Keywords

Cloud-aware telecommunication management system, cloud computing, functional framework, functional requirement, service management.

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* 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.

FOREWORD

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Requirements for service management in cloud-aware telecommunication management system

1 Scope

This Recommendation defines the general and functional management requirements that support the service management in a cloud-aware telecommunication management system (see [ITU-T M.3070]), and it also provides a functional framework for service management in a cloud-aware telecommunication management system.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T M.3070] Recommendation ITU-T M.3070/Y.3521 (2016), *Overview of end-to-end cloud computing management*.

[ITU-T X.1601] Recommendation ITU-T X.1601 (2015), *Security framework for cloud computing*.

[ITU-T Y.3522] Recommendation ITU-T Y.3522 (2016), *End-to-end cloud service lifecycle management requirements*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 cloud computing [b-ITU-T Y.3500]: Paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand.

NOTE – Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

3.1.2 cloud service [b-ITU-T Y.3500]: One or more capabilities offered via cloud computing invoked using a defined interface.

3.1.3 cloud service provider [b-ITU-T Y.3500]: Party which makes cloud services available.

3.1.4 customer [b-ITU-T M.60]: An entity which receives services offered by a service provider based on a contractual relationship. It may include the role of a network user.

3.1.5 inter-cloud computing [b-ITU-T Y.3511]: The paradigm for enabling the interworking between two or more cloud service providers.

NOTE – Inter-cloud computing is also referred as inter-cloud.

3.1.6 service [b-ITU-T M.3050.1]: Services are developed by a Service Provider for sale within Products. The same service may be included in multiple products, packaged differently, with different pricing, etc.

3.1.7 service management interface [ITU-T M.3070]: Interface that provides a set of management capabilities exposed by a cloud service through which the cloud service can be managed.

3.1.8 service provider [b-ITU-T M.3320]: A general reference to an entity who provides telecommunication services to Customers and other users either on a tariff or contract basis. A Service Provider may or may not operate a network. A Service Provider may or may not be a Customer of another Service Provider.

3.1.9 telecommunication service [b-ITU-T M.60]: That which is offered by an Administration to its customers in order to satisfy a specific telecommunication requirement.

NOTE – Bearer service and teleservice are types of telecommunication service. Other types of telecommunication service may be identified in the future.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 TC-hybrid service: The service which consists of both telecommunication and cloud service components.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CSP Cloud Service Provider

CT Communications Technology

E2E End-to-End

IT Information Technology

KPI Key Performance Indicator

KQI Key Quality Indicator

SMI Service Management Interface

5 Conventions

The keywords "**is required to**" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "**is recommended**" indicate a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance.

In the body of this Recommendation and its annexes, the words shall, shall not, should, and may sometimes appear, in which case they are to be interpreted, respectively, as is required to, is prohibited from, is recommended, and can optionally. The appearance of such phrases or keywords in an appendix or in material explicitly marked as informative is to be interpreted as having no normative intent.

6 Overview

As an important part of telecommunication management, service management implements all of the functionalities necessary for the management and operations of communications and information services required by or proposed to customers.

It includes service fulfilment, service assurance and service billing through the lifecycle of the service:

– service fulfilment: To fulfil the resource capacity and service quality requirements of customers, maintain the readiness of the resource and service capacity, provide function and interface to customers for the access and consumption of service;

– service assurance: To support the function and process of service assurance, includes service level management, service incident and problem management, service monitoring and reporting management;

– service billing: To support the function and process of service billing.

With the convergence of information technology (IT) and communications technology (CT) industries, cloud computing is being adopted in telecommunication infrastructures. Telecommunication operators deliver cloud services, and also apply cloud computing technologies for the optimization of their telecommunication service platforms and telecommunication support systems.

[ITU-T M.3070] has defined a service management interface (SMI)-based common model for end-to-end (E2E) cloud computing management, which is described in Figure 6-1. In this model, a cloud-aware telecommunication management system can manage cloud-based facilities through the management interface "I1" which can correspond to a set of SMIs.

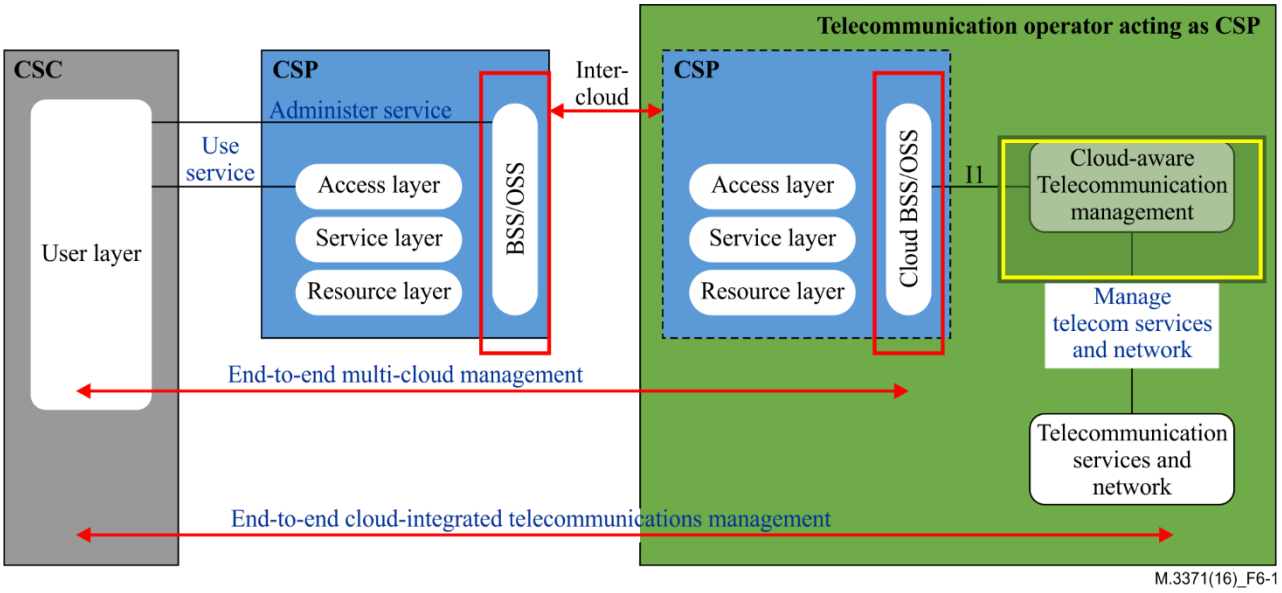

Figure 6-1 – Common model for E2E cloud computing management, with telecommunication operator acting as a CSP (after [ITU-T M.3070])

A cloud-aware telecommunication management system can manage both telecommunication services and cloud services in a consistent manner. Although the management layering could be the same as the traditional telecommunication management layering, with the introduction of cloud computing, there are still new requirements for cloud-aware telecommunication management. This Recommendation addresses the requirements of comprehensive service management in a cloud-aware telecommunication management system.

The relationship between cloud service management and service management in a cloud-aware telecommunication management system is also illustrated in Figure 6-1. The cloud service management is located in business support system(BSS)/operations support system (OSS) (marked by the red rectangle in Figure 6-1) which belongs to the cloud service provider (CSP), and the service management in the cloud-aware telecommunication management system (marked by the yellow

rectangle in Figure 6-1) which belongs to telecommunication operator. As an important aspect of cloud service management, cloud service lifecycle management (see [ITU-T Y.3522]) is also located in BSS/OSS which belongs to CSP.

7 General requirements for service management in cloud-aware telecommunication management system

As a cloud-aware telecommunication management system, the difference with a traditional telecommunication management system is it could support comprehensive management for telecommunication services, cloud services and TC-hybrid services which consist of both telecommunication and cloud service components.

In a cloud-aware telecommunication management system, the general requirements include:

– it is required that service management provides service catalogue and service inventory management functionality for telecommunication service, cloud service and TC-hybrid service;

– it is required that service management supports the on-demand and automated service provisioning modification and termination for telecommunication service, cloud service and TC-hybrid service;

– it is recommended that service management supports the E2E quality assurance of telecommunication service, cloud service and TC-hybrid service, and provide high levels of reliability and availability according to the service level agreement (SLA);

– it is recommended that service management supports charging for telecommunication service, cloud service and TC-hybrid service, according to use time, bandwidth, resource usage and any combination of these;

– it is recommended that service management supports monitoring, auditing and reporting for telecommunication service, cloud service and TC-hybrid service, for the purpose of service quality evaluation and assurance.

All of the requirements listed above are suitable for services provided by single CSP as well as inter-cloud service provider.

8 Functional framework for service management in cloud-aware telecommunication management system

The high-level organization of service management functionalities in a cloud-aware telecommunication management system is composed of service catalogue management, service inventory management, service test management, service order management, service problem management, service quality management, service performance management and service rating/discounting management.

Figure 8-1 depicts the functional framework for service management in a cloud-aware telecommunication management system:

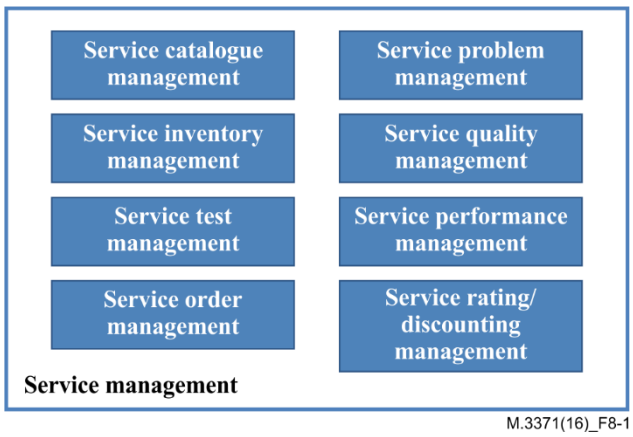

Figure 8-1 – Functional framework for service management in cloud-aware telecommunication management system

The functions are as follows:

– service catalogue management: Provides capabilities for creating and designing new services, mapping service definitions, managing complex rules, supporting componentization of services and managing their relationships and dependencies;

– service inventory management: Provides capabilities for storing and managing service instances and their attributes. It also stores and manages service relationships, which is the mapping of services to other services and/or service components;

– service test management: Provides the capabilities for ensuring that the various services are working properly. In the fulfilment process, the service test is responsible for ensuring that the assigned service works as designed. In the assurance process, the service test is responsible for service trouble/problem distinguishing;

– service order management: Provides the capabilities for managing the E2E lifecycle of a service request. This includes validating service availability as well as the service order request. It also includes service order issuance, service and/or product order decomposition, and service order tracking along with orchestrating the activation and the test processes;

– service problem management: Provides the capabilities for receiving service affecting customer problems as well as network troubles/faults, relating the various problems, and resolving them in an efficient manner;

– service quality management: Provides the capabilities for monitoring and managing the levels of service. Service quality measurements are collected and compared against established quality indicators, and the conclusions made available to interested parties;

– service performance management: Provides the capabilities for monitoring, analysing and reporting on the E2E service performance. This should include a real-time E2E view to ensure that each service is functioning correctly as well as a historical view;

– service rating/discounting management: Provides the capabilities for ensuring that the customer receives an invoice that is reflective of all the billable events delivered by the service provider dictated by their business relationship.

9 Functional requirements for service management in cloud-aware telecommunication management system

This clause provides functional requirements for service management in a cloud-aware telecommunication management system.

9.1 Service catalogue management

In a cloud-aware telecommunication management system, the service catalogue management requirements include:

– it is required that service catalogue management provides functions to manage cloud service information. It is required that service catalogue management provides functions to manage information of TC-hybrid services.

9.2 Service inventory management

In a cloud-aware telecommunication management system, the service inventory management requirements include:

– it is required that service inventory management provides functions to manage the attributes of cloud service;

– it is required that service inventory management provides functions to trace the relationship between the cloud service or TC-hybrid service and resource.

9.3 Service order management

In a cloud-aware telecommunication management system, the service order management requirements include:

– it is required that the service order management provides functions to validate cloud service availability as well as the cloud service order request;

– it is required that the service order management provides functions to manage service and or product order decomposition which contain cloud service;

– it is required that the service order management provides functions to track the provisioning process of service order which contain cloud service.

9.4 Service problem management

In a cloud-aware telecommunication management system, the service problem management requirements include:

– it is required that the service problem management provides functions to manage complaint tickets from the customer side as well as trouble tickets from network surveillance;

– it is required that the service problem management provides functions to separate a fault between the cloud and the telecommunication network;

– it is recommended that the service problem management has holistic view of configuration/relationship of different network layers to support root cause analysis.

9.5 Service performance management

In a cloud-aware telecommunication management system, the service performance management requirements include:

– it is required that the service performance management provides functions to monitor, analyse and report the key performance indicator (KPI) of cloud service.

9.6 Service test management

In a cloud-aware telecommunication management system, the service test management requirements include:

– it is required that the service test management provides functions to test the cloud service, both in the fulfilment and assurance process.

9.7 Service quality management

In a cloud-aware telecommunication management system, the service quality management requirements include:

– it is required that the service quality management provides functions to monitor, analyse and report the key quality indicator (KQI) of cloud service.

9.8 Service rating/discounting management

In a cloud-aware telecommunication management system, the service rating/discounting management requirements include:

– it is required that the service rating/discounting management provides functions to support service rating/discounting in the context of service bundling and composition which contains cloud service.

10 Security considerations

Security aspects for consideration within the cloud computing environment, including service management in a cloud-aware telecommunication management system, are addressed by security challenges for the CSPs as described in [ITU-T X.1601]. In particular, [ITU-T X.1601] analyses security threats and challenges, and describes security capabilities that could mitigate these threats and meet the security challenges.

Bibliography

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[b-ITU-T Y.3511] Recommendation ITU-T Y.3511 (2014), *Framework of inter-cloud computing*.

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