ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

M.3340
(05/2009)

SERIES M: TELECOMMUNICATION MANAGEMENT,
INCLUDING TMN AND NETWORK MAINTENANCE

Telecommunications management network

Framework for NGN service fulfilment and assurance management across the business to business and customer to business interfaces

Recommendation ITU-T M.3340

ITU-T M-SERIES RECOMMENDATIONS

TELECOMMUNICATION MANAGEMENT, INCLUDING TMN AND NETWORK MAINTENANCE

Introduction and general principles of maintenance and maintenance organization	M.10–M.299
International transmission systems	M.300–M.559
International telephone circuits	M.560–M.759
Common channel signalling systems	M.760–M.799
International telegraph systems and phototelegraph transmission	M.800–M.899
International leased group and supergroup links	M.900–M.999
International leased circuits	M.1000–M.1099
Mobile telecommunication systems and services	M.1100–M.1199
International public telephone network	M.1200–M.1299
International data transmission systems	M.1300–M.1399
Designations and information exchange	M.1400–M.1999
International transport network	M.2000–M.2999
Telecommunications management network	**M.3000–M.3599**
Integrated services digital networks	M.3600–M.3999
Common channel signalling systems	M.4000–M.4999

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T M.3340

Framework for NGN service fulfilment and assurance management across the business to business and customer to business interfaces

Summary

Recommendation ITU-T M.3340 contains the business to business/customer to business (B2B/C2B) interface framework for NGN service fulfilment and assurance management in the NGN management view. The framework of the interface across several administrative domains in the NGN service supply chain is provided. The interface framework is provided using the telecommunications management network (TMN) interface specification methodology described in Recommendation ITU-T M.3020, the NGN management architecture described in Recommendation ITU-T M.3060/Y.2401, the public B2B business operations map described in Recommendation ITU-T M.3050 Supplement 2.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

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NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

CONTENTS

Page

Introduction

This Recommendation contains the B2B/C2B interface framework for NGN service fulfilment and assurance management. The framework of the interface across several administrative domains in the NGN service supply chain is provided.

In a NGN service supply chain, the service customer, the service provider, and the network operator interwork with each other for service provisioning, service assurance, and service billing. Service management information is exchanged across interfaces which may be client-to-service-provider or service-provider-to-service-provider interfaces and may represent inter-jurisdictional communications. The scope of this Recommendation provides an interface framework for NGN service fulfilment and assurance management across several administrative domains.

Recommendation ITU-T M.3340

Framework for NGN service fulfilment and assurance management across the business to business and customer to business interfaces

1   Scope

This Recommendation contains the B2B/C2B interface framework for NGN service fulfilment and assurance management. The framework of interface across several administrative domains in the service supply chain is provided. It assumes a multi-service provider environment and is aimed at service fulfilment and assurance management high-level functional framework across B2B/C2B interface.

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.3050.1]   Recommendation ITU-T M.3050.1 (2007), *Enhanced Telecom Operations Map (eTOM) – The business process framework*.

[ITU-T M.3060]   Recommendation ITU-T M.3060/Y.2401 (2006), *Principles for the Management of Next Generation Networks*.

3   Definitions

3.1   Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1   administrative domain [b-ITU-T G.805]: For the purposes of this Recommendation, an administrative domain represents the extent of resources which belong to a single player such as a network operator, a service provider or an end-user. Administrative domains of different players do not overlap amongst themselves.

3.1.2   B2B/C2B interface [ITU-T M.3060]: Synonymous to X interface.

3.1.3   end-user [ITU-T M.3050.1]: The end user is the actual user of the products or services offered by the enterprise. The end user consumes the product or service.

NOTE – The end-user may not be the entity that actually pays or has responsibility for payment of the bill.

3.1.4   function block [b-ITU-T M.3010]: The smallest (deployable) unit of TMN management functionality that is subject to standardization.

3.1.5   interface [b-ITU-T M.3010]: An architectural concept that provides interconnection between physical blocks at reference points.

3.1.6   management function [b-ITU-T M.3010]: The smallest part of a management service as perceived by the user of the service.

3.1.7   managed object referring to test [b-ITU-T X.745]: A managed object which is used to refer to the functionalities that are being tested.

3.1.8 **management service** [b-ITU-T M.3010]: A management service is an offering fulfilling specific telecommunications management needs.

3.1.9 **measurement point** [b-ITU-T M.3341]: The physical or logical point at which measurements can be made and to which the data obtained is related, e.g., a measurement point in a network or a step in the business process dependant upon the service life cycle.

3.1.10 **network operator** [b-ITU-T M.3343]: An organization that operates a NGN transport stratum. A network operator may offer both transport stratum and service stratum. A NGN network operator may or may not provide NGN service stratum services.

3.1.11 **next generation network (NGN)** [b-ITU-T Y.2001]: A packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

3.1.12 **observation** [b-ITU-T M.3341]: An observation is used by the service customer to monitor the QoS of the telecommunication service provided to the SC by the SP. An observation is associated with exactly two measurement points.

3.1.13 **operations system (OS)** [b-ITU-T M.3010]: A physical block which performs operations systems functions (OSFs).

3.1.14 **operations systems function (OSF)** [b-ITU-T M.3010]: A function block that processes information related to the telecommunications management for the purpose of monitoring/coordinating and/or controlling telecommunication functions including management functions (i.e., the TMN itself).

3.1.15 **partner** [ITU-T M.3050.1]: A partner has a stronger profit and risk-sharing component in their business agreement with the enterprise, than a supplier would have. A partner generally is more visible to the enterprise's customer than a supplier would be. A partner might be part of an alliance, a joint service offering, etc.

3.1.16 **product** [ITU-T M.3050.1]: Product is what an entity (supplier) offers or provides to another entity (customer). Product may include service, processed material, software or hardware, or any combination thereof. A product may be tangible (e.g., goods) or intangible (e.g., concepts) or a combination thereof. However, a product ALWAYS includes a service component.

3.1.17 **service customer** [ITU-T M.3050.1]: The entity which buys products and services from the Enterprise or receives free offers or services. A customer may be a person or a business. [ITU-T M.3050.1] defines this term simply as "customer".

3.1.18 **service** [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.

3.1.19 **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.

3.1.20 **test conductor** [b-ITU-T X.745]: A manager that issues test operations.

3.1.21 **test execution** [b-ITU-T X.745]: That phase of a test during which the test outcome is being determined.

3.1.22 **test invocation** [b-ITU-T X.745]: A specific instance of test, from the time of initiation to termination.

3.1.23   test object [b-ITU-T X.745]: A managed object that exists only for a controlled test invocation and which has attributes, operations and notifications that pertain to that instance of test.

3.1.24   test performer [b-ITU-T X.745]: An agent which receives test operations.

3.1.25   trouble administration [b-ITU-T M.3343]: Trouble administration consists of a set of functions that enable troubles to be reported, tracked, and maintained.

3.1.26   trouble resolution [b-ITU-T M.3343]: It is the process of diagnosis and repair action required to clear a trouble. It includes the process of assigning specific work items or overall responsibility for clearing and closing the trouble report.

3.1.27   X interface [b-ITU-T M.3010]: An interface applied at x reference points.

NOTE – SP and SC used in this Recommendation mean SP role and SC role.

3.2   Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1   appointment management: Appointment management consists of a set of functions that enable a mutual acceptable appointment time to be established between the SP and SC.

3.2.2   customer order: A customer order is an agreement used to procure products. A customer can request one or more products in one customer order. A customer order can be decomposed into one or more service orders.

3.2.3   service assurance: Service assurance in this Recommendation consists of all the activities that are needed to monitor and maintain service quality across B2B/C2B interface. It covers trouble administration, testing management, QoS/service level agreement management and appointment management.

3.2.4   service fulfilment: Service fulfilment in this Recommendation consists of all the activities that are needed to configure and activate service across B2B/C2B interface. It covers preorder management, order management, testing management, QoS/service level agreement management[1] and appointment management.

3.2.5   service order: A service order represents a customer order decomposed into the services through which the products are realized. Service orders are only viewable inside a SP domain and never across the B2B and C2B interface.

3.2.6   service user: The end user of the service. The service user may or may not have a contractual relationship with the service provider, but other entities, e.g., corporate telecommunications department, may actually maintain the contractual relationship with the SP.

4   Abbreviations

This Recommendation uses the following abbreviations and acronyms:

B2B   Business to Business

BOM   Business Operation Map

C2B   Customer to Business

CPE   Customer Premises Equipment

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[1] (Manage QoS/SLA Violation Process) ensures that the Customer is informed of any planned maintenance or other scheduled events likely to impact fulfilment of the customer's service order. QoS/SLA Management also refers to the SP performance against the Customer Requested Due Date or Standard Implementation Interval contained in the Contract.

EpMF	Enterprise Management Function
eTOM	enhanced Telecom Operations Map
KPI	Key Performance Indicator
MORT	Managed Object Referring to Test
MP	Measurement Point
MPCMF	Market, Product and Customer Management Function
NGN	Next Generation Network
NO	Network Operator
Ob	Observation
OSF	Operations Systems Function
PM	Performance Measurement
QoS	Quality of Service
SC	Service Customer
SEF	Service Element Function
SEMF	Service Element Management Function
SLA	Service Level Agreement
SM	Service Management
SMF	Service Management Function
SNMF	Service Network Management Function
SP	Service Provider
SPRMF	Supplier/Partner Relationship Management Function
SRMF	Service Resource Management Function
TEF	Transport Element Function
TEMF	Transport Element Management Function
TMN	Telecommunications Management Network
TNMF	Transport Network Management Function
TO	Test Object
TRMF	Transport Resource Management Function

5 Conventions

None.

6 Concepts and background

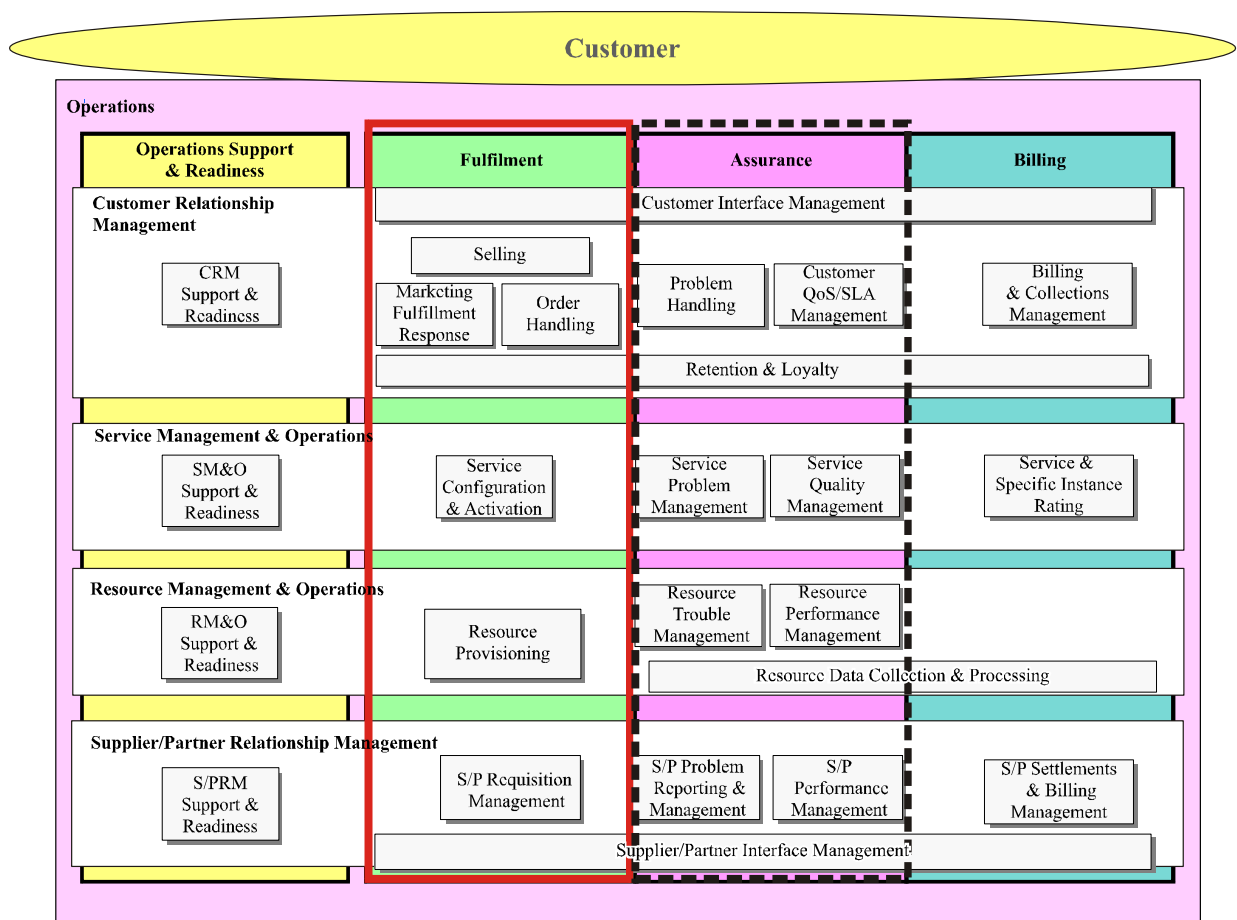### 6.1 NGN service fulfilment and assurance overview

From the business process point of view described in [b-ITU-T M.3050.x], service fulfilment is a vertical end-to-end process grouping which is responsible for providing customers with their requested products in a timely and correct manner. It translates the customer's business or personal need into a solution, which can be delivered using the specific products in the enterprise's portfolio.

This process informs the customers of the status of their purchase order, ensures completion on time, as well as ensuring a delighted customer.

Similarly, service assurance is a vertical end-to-end process grouping which is responsible for the execution of proactive and reactive maintenance activities to ensure that services provided to customers are continuously available and meet the requirements of SLA or QoS performance levels.

The service fulfilment and assurance end-to-end process grouping are supported by the horizontal functional process groupings.

Figure 1 shows the operations end-to-end process breakdown, where the red (solid-lined) rectangle illustrates the level 2 processes related to service fulfilment, and the dashed rectangle illustrates the level 2 processes related to service assurance.

M.3340(09)_F01

**Figure 1 – Processes related to service fulfilment and assurance
end-to-end process grouping**

From the NGN management functional view point (see [ITU-T M.3060]), the management functions contained in the several logical management layer functions, including MPCMF, OSF, SPRMF cooperate together to support the service fulfilment and assurance.

The information related to service fulfilment and assurance is exchanged between the different administrative domains across B2B/C2B interface. Each of the administrative domains is considered to be an individual telecommunications management network (TMN). Each domain maintains its own management functions related to service fulfilment or assurance and has different physical implementations. The exchange of service fulfilment and assurance information and the

interactions between these OSFs, MPCMFs or SPRMFs of the different administrative domains take place across the B2B/C2B interface.

6.2   Reference model in the NGN environment

Figure 2 illustrates the SP/SC/SU relationships in the NGN environment. The SP provides NGN services to support interactions between the SP and SC, and between the SP and SP/network operator. In the NGN supply chain, a SP can provide a telecommunication service to a customer by importing external transport resources from other entities acting as network operators or importing external service resources from other service providers. Self-service management is considered for further study and will not be considered in this version of the Recommendation.
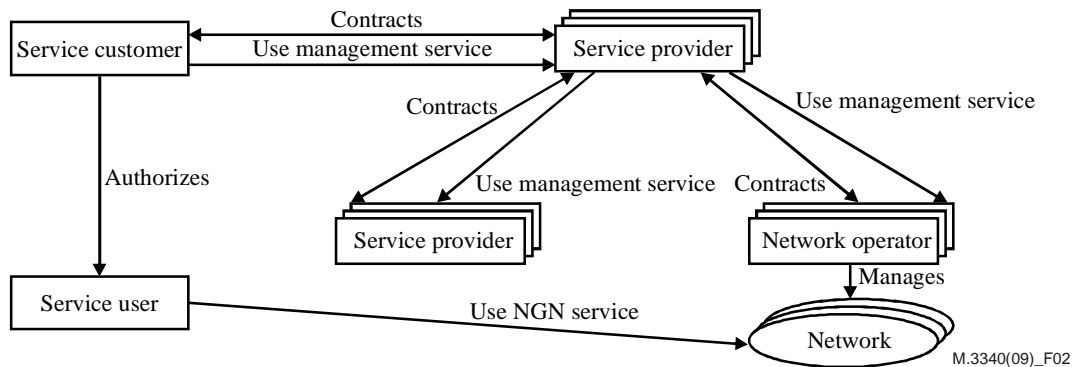

Figure 2 – SP/SC/SU roles in NGN management

6.3   Business context of B2B/C2B interface

There are two types of business context as to B2B/C2B interface. One is that the customer role is taken by an end-user entity. Another is that customer role is taken by another service provider organization in the overall supply chain.

In the first business context, for end-user organization, in order to communicate with the service provider across B2B/C2B interface, it must support the management functions related to service fulfilment and assurance in its own management domain.

In the second business context, it is possible that a service provider provides a NGN service to an end-user with the cooperation of other service providers or transport providers. In this case, the service fulfilment and assurance information need to be exchanged between the SP and other SPs or transport providers. The SP providing the telecommunication services to the end-user acts as a customer role, while the other SPs or transport providers act as provider role. The B2B/C2B interface in this Recommendation is used to convey the service fulfilment and assurance information between SPRMF of other SPs or transport providers (acting as provider role) and MPCMF of the SP (acting as customer role). In the NGN supply chain, the customer and service provider roles may change depending on the circumstances. However, in any particular situation, one entity will be the customer role, while the other will be the provider role.

Customers often require services composed of several different SPs' products combined to provide an end-to-end service. For example, a service typically involves both access and transport services to be combined from two or more service providers to connect locations. The SC may act as "service integrator" whereby the SC purchases services from two or more SPs and integrates the separate services into an end-to-end service offering. In this case, the SLAs are between the SC and each individual SP for their component of the service. No end-to-end SLA exists from a SP to the SC.

The SC may also request that one SP acts as the "service integrator" and acquires all the services from the SP's partners to provide the end-to-end service. In this case, the SP acting as the "service integrator" has the sole responsibility to the SC for QoS or SLA for the end-to-end service. The individual partners, supplying service components, have a responsibility to the "service integrator" SP, acting as a SC role, for their components. The "service integrator" need not actually provide network, transport or other components but rather integrate services obtained from its partners.

7 Function framework

Figure 3 illustrates the management functions needed to be implemented across B2B/C2B interface. These functions are organized into two major groups: service fulfilment and service assurance. Each function group has some function blocks. The service fulfilment function group has five blocks: pre-order management, order management, testing management, SLA/QoS management and appointment management. The service assurance function group has four blocks: trouble administration, testing management, SLA/QoS management and appointment management. Some functions are required both to support the NGN service fulfilment and assurance, such as testing management and appointment management.
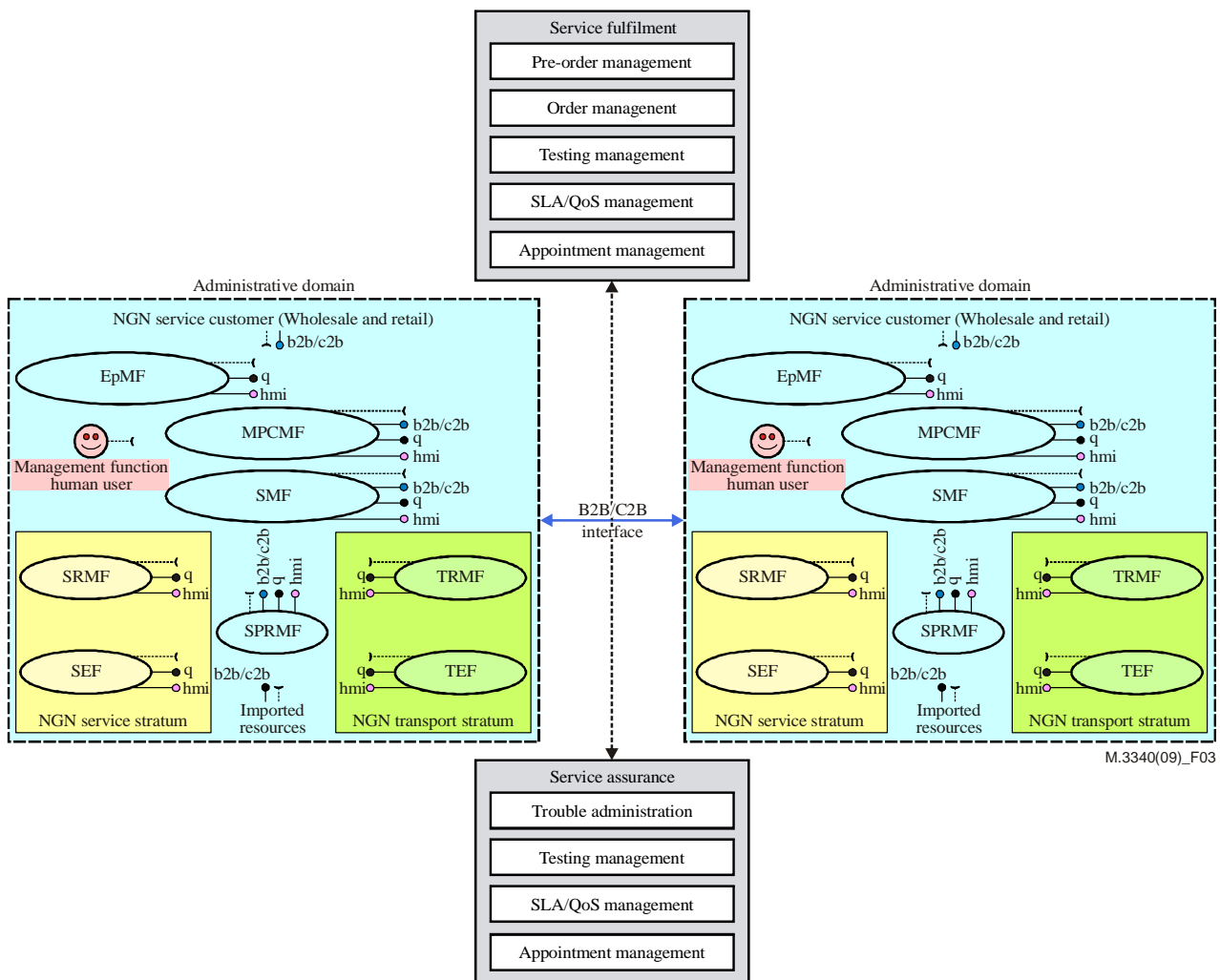

Figure 3 – High level of B2B/C2B interface function framework

7.1   Pre-order management

Process Name: Order Handling

Process identifier: 1.1.1.5.

Pre-order management consists of a set of functions across B2B/C2B interface that enable the interaction before the customer order be created. It comprises a number of transactions:

– *Provide service requirements*

The B2B/C2B interface should support interactions to provide service requirements from the SC to SP. When the SC needs to order services from the SP, the SC can send his requirements across the B2B/C2B interface.

– *Design solution*

The purpose of this function is to provide a solution which has the potential to comply with a particular customer requirement. B2B/C2B interface should support the request and response between the SP and SC for design and confirm the designed solution.

– *Validate customer satisfaction*

The purpose of this function is to predict the expected value to be delivered by the solution. It validates that the customer is capable of realizing maximum value from the operation or use of the solution. It ensures that the customer is satisfied that the solution that was actually delivered meets the original or updated expectations and agreements and that the solution is operable by the customer.

– *Determine pre-order feasibility*

Before the customer order is created, the SP needs to check the availability and/or the feasibility of providing non-standard product(s) and/or special solutions on standard product(s) to a customer. If the SP provides a telecommunication service to a customer by using external service resources from other SPs, he can send a request across B2B/C2B interface to determine the feasibility of using the SP's resource.

7.2   Order management

Process Name: Order Handling

Process identifier: 1.1.1.5.

Order management consists of a set of functions across B2B/C2B interface that enable a customer order to be created, reported, tracked, and maintained. It comprises a number of transactions:

– *Creation of customer order*

Before the customer order is created, the SP and SC need to negotiate with each other about the details of the order. This process should be closed with terms that are mutually agreeable to both the SP and SC. One specific solution is selected and its details are described in a sales proposal. The sale is concluded through negotiations of features, service levels, pricing and discounts, resulting in a sign-off formal agreement between the SC and SP. The formal agreement constitutes a customer order. The SP shall inform the SC about the creation of the customer order in the SP's order handling system.

– *Tracking of customer order*

The SC shall be able to track the order handling progress of a customer order by initiating a request to retrieve the customer order state/status at any time from the SP.

The state/status of the service fulfilment activity should be updated as SP's order handling process progresses, and the SC should be notified of all changes.

–   *Modify customer order*

When a customer order is in an open/active state[2], the SC should be able to update the customer order with new information (e.g., additional address change, contact change, etc.) across B2B/C2B interface.

When any attribute value is modified, the SP should inform the SC about the modification.

–   *Completion of customer order*

When the SP has deemed a customer order to be completed, the SP initiates a request for the SC to verify completion of the customer order.

The SC should be allowed to verify the customer order is completed prior to the closure of the customer order by the SP.

–   *Cancel customer order*

The SC should be able to request the cancellation of a customer order and indicate in the request to cancel the customer order the name of the person making the request.

–   *Retrieve customer order information*

The SC should be able to retrieve a complete description of a specific set of customer orders based on an ad hoc filter definition or a distinct customer order based on the customer order identifier.

–   *Retrieve customer order history*

It should be possible for the SC to retrieve customer order history across B2B/C2B interface.

7.3   Trouble administration

Trouble administration consists of a set of functions across the B2B/C2B interface that enables troubles to be reported, tracked, and maintained. This may be carried out after the SC has carried out an initial diagnosis using the testing management B2B/C2B interface. It comprises a number of transactions based on [b-ITU-T M.3343]:

–   *Creation of trouble report*

The B2B/C2B interface should support the request of the creation of trouble report from a SC. When the SC needs to initiate a request that a trouble report be created on the service provider side, the SC can send a request across the B2B/C2B interface.

After a trouble report is created, either initiated by the SC or by the SP, the SP should inform the SC of the creation.

–   *Tracking of trouble report*

The SC shall be able to track the progress of a trouble report until its resolution by requesting the trouble report state/status at any time from the SP.

The state/status of the trouble repair activity should be updated as the SP's trouble resolution progresses, and the SC should be notified of all changes.

–   *Modification of trouble report*

When a trouble report is in open and active state, the SC should be able to update the trouble report with new information (e.g., additional trouble-related information, contact change, etc.) across the B2B/C2B interface.

When any attribute value is modified, the SP should inform the SC about the modification.

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[2] See Figure 4 of [b-ITU-T M.3208.1] for a description of the request state model.

– *Grouping of trouble reports*

 Both the SC and SP should be able to group trouble reports together.

 The SC can group trouble reports together, e.g., to indicate a common problem.

 After some trouble reports are grouped together, the SP should inform the SC about the grouping of the trouble reports.

– *Clearance of trouble report*

 When the SP has deemed a trouble report to be cleared, it initiates a request for the verification of the clearance of trouble report to the SC.

 The SC should be allowed to verify if the trouble report is cleared prior to the closure of the trouble report by the SP.

– *Cancellation of trouble report*

 The SC should be able to request the cancellation of a trouble report and to indicate in the trouble report the person making the request.

– *Closure of trouble report*

 The SP should notify the SC about the closure of the trouble report. The outage duration should then be added to the trouble report at the time of closure.

– *Retrieval of trouble report information*

 The SC should be able to retrieve a complete description of a specific set of trouble reports based on an ad hoc filter definition or a distinct trouble report based on trouble report ID.

– *Retrieval of trouble report history*

 It should be possible for the SC to retrieve the trouble report history across the B2B/C2B interface.

– *Deletion of trouble report*

 The SC should be able to receive an indication when an instance of a trouble report is deleted locally by the service provider.

7.4 Testing management

Testing management is concerned with the B2B/C2B processes requesting diagnostic tests between the SC and SP. It comprises a number of transactions based on [b-ITU-T X.745]:

– *Test initiation*

 The test conductor (acted by the SP or SC) can initiate the test(s) to the test performer (acted by the SC or SP) and can specify the test input information, e.g., the identification of MORT(s), test category specific input information, a timeout period, the identity of one or more associated objects, a test session identifier, etc.

 A test can be uncontrolled or controlled. An uncontrolled test is one which is not subject to monitoring or control, and the test results are provided in one or more replies to the test request. A controlled test is one for which one or more test objects and results of the controlled test are made available as attribute values of the TO(s) and/or are returned via notifications issued by the TO(s).

– *Test scheduling*

 The test conductor may provide a time window in which it would like a TO to execute. If the test performer can schedule TO execution within this time window, it will return a successful confirmation and may provide an actual (or expected) start and stop time for the TO. The test performer may report any changes in the actual start and stop times. If the actual stop time becomes greater than the requested stop time or the actual start time is prior to the requested start time, the TO shall cease execution (if executing) and emit a

scheduling conflict notification.

– *Test suspension/resumption*

Only a controlled test may be suspended or resumed by a test suspend/resume request directed to the object which received the test request.

In the response to the suspend/resume request, the list of all test invocations that have been suspended/resumed as a result of this request shall be returned.

– *Test cancellation*

A controlled test may be terminated by a test terminate request. In the response to the termination request, the list of all test invocations that have been terminated as a result of this request shall be returned.

– *Test results reporting*

For uncontrolled tests, the results of the test are reported in one or more confirmations to the test request from the test performer. The final confirmation indicates that the test was completed and shall contain the test outcome parameter.

For controlled tests, the results may be requested of the TO by the test conductor, or the results may be emitted as notifications.

7.5 Appointment management

Appointment management covers appointment processes for managing the establishment of mutual acceptable appointment time slots between the SP and SC. Appointment is needed for handling visits to shared facilities or customer facilities to install or repair equipments, for example, to access customer premises, locked engineering or other facilities, or for joint testing between two enterprises. It includes:

– *Appointment scheduling*

The appointment scheduling is a process prior to the appointment confirmation process. The negotiation procedure in the scheduling process between the SP and SC is iterative.

The SC shall be able to schedule an appointment for the SP to gain access to the SC's premises, e.g., to install equipment, or where the results of service tests/diagnostics indicate that a site visit is required. The SP may be able to offer the SC the convenient time slots for carrying out activities at the SC's premises. The SC may be able to offer convenient time slots for the SP to visit the SC's premises.

The SC shall be able to accept or decline the time slots offered by the SP. The SP shall offer available time slot(s) within the SLA time-scale for the service. The SC should be able to offer the available access times from the SC's point of view for each specified location by request.

When the SC offers less time than is actually required for the SP to perform the activity, the SP must, in that case, be able to negotiate additional time slot(s) from the SC in order to perform the activity. In this situation, the SP may offer time slots which the SC may select or the SP may request additional time slots from the SC, which the SP will select, and the SC will confirm.

– *Appointment confirmation*

Confirmation of the appointment slot(s) agreement/reservation by the SC shall form a bilateral agreement.

If the appointments/access times offered by the SC do not enable the SP to fulfil its contractual obligations, the SP shall be able to reject the appointments. The reason for the rejection must be recorded as being caused by the SC.

If the appointment is denied by the SC, the SP shall be able to request another appointment time slot until the appointment is mutually accepted.

–   *Appointment change*

Prior to the appointment time, and subject to the terms specified in the contract, the SP or SC can modify the information related to the appointment, e.g., additional information, contact change, etc. This information may be attributes of the appointment derived from the order or trouble ticket which is made available to the SP field engineer.

Prior to an appointment time, and subject to the terms specified in the contract, the SP or SC may request to reschedule an agreed appointment (time, location). The reason why the SP or SC reschedules the appointment shall be given.

Either the SP or the SC shall be able to accept or decline the appointment change request. If the change request is denied, the SP or SC shall reschedule the appointment until the appointment is mutually agreed.

–   *Appointment cancellation*

Prior to the appointment time, and subject to the terms specified in the contract, the SP or the SC may request the cancellation of an agreed appointment. The reason why the SP or SC cancels the appointment shall be given.

On receipt of the appointment cancellation request, the receiving party shall acknowledge and accept or reject the request. The SP or the SC, accepting the cancellation, shall provide a tracking mechanism to assure against repudiation, and non-repudiation.

–   *Appointment report*

The SP or SC may be able to notify each other of the failures to keep an appointment.

The SP may, at its option, periodically provide an appointment report to the SC.

The SP shall provide, at the request of the SC, a report of the activities performed by the SP at the SC's location(s) as specified in the SLA.

–   *Appointment information retrieval*

The SC shall be able to query a complete description of a specific set of his current or historical appointments. The period of the retention of these records, by the SP, shall be subject to the SLA or a regulatory statute.

The filters to be applied to the information can be any relevant parameter exchanged as part of the interaction operations during scheduling an appointment, confirming an appointment, updating or modifying an appointment, and cancelling an appointment.

The SC shall be able to obtain detailed tracking information about the status transitions of an appointment (including timestamps).

7.6   SLA/QoS management

SLA/QoS management covers the SLAs that describe the product or service that is provided and their risks of non compliance in the processes providing or repairing an instance of service, which is sometimes referred to as key performance indicators (KPI). National regulators often require reports on KPIs. It comprises a number of transactions based on [b-ITU-T M.3341]:

–   *Request PM data (current or history)/Request SLA/KPI report*

The SC issues a spontaneous request to the SP for a current or historical PM data information on a given Ob or set of Obs, or a SLA/KPI report on a given service order.

–   *Retrieve MPs*

The SC queries the SP to find out what MPs are being provided corresponding to the telecommunication service that is being provided to the SC. The SC may also query the detailed attribute values associated with a specific MP.

–   *Retrieve Obs*

The SC queries the SP to find out what Obs currently exist corresponding to the telecommunication service that is being provided to the SC. The SC may also query the detailed attribute values associated with a specific Ob.

–   *Configure Ob*

The SC may create a new Ob or delete an existing Ob. In order to account for the case where the SC may want to cancel the creation of a new Ob, it is suggested that Obs be created in a "suspended" state, i.e., the Ob object gets created but does not perform any functionality until the SC performs the "resume PM data collection" function.

Therefore, if the SC decides that the Ob creation should have been cancelled, the SC may simply delete this Ob object while it is in the "suspended" state, which in effect "cancels" the original creation request.

–   *Assign PM data collection interval*

The SC instructs the SP about the duration of the PM data collection interval for a given Ob or set of Obs. This information (i.e., the duration of the PM data collection interval) may also be queried from the SP by the SC.

–   *Suspend/Resume PM data collection*

The SC instructs the SP to suspend/resume the performance monitoring data collection activity for a given Ob or set of Obs.

–   *Reset PM data*

The SC instructs the SP to reset the performance monitoring counters for a given Ob or set of Obs.

–   *Assign PM history duration*

The SC instructs the SP to establish the duration to maintain a specific record of PM historical data. This information (i.e., the duration to maintain a specific record of PM historical data) may also be queried from the SP by the SC.

–   *Assign PM threshold (including severity)/Set SLA threshold*

The SC instructs the SP to establish the threshold criteria for PM data of a given Ob or set of Obs. Each threshold setting consists of the attribute identifier of the PM parameter, the threshold value and (optionally) the severity of the threshold-exceeding event. This information (i.e., the threshold criteria for PM data) may also be queried from the SP by the SC.

–   *Report PM threshold violation/notify SLA violation*

The SP informs the SC of a PM parameter threshold violation having occurred in a specific Ob, or a SLA violation having occurred in a specific service.

–   *Report MP configuration changes*

If the SP makes a change to the MPs provided to the SC, then the SP would send a report to the SC to inform him of such a change. The reported change could be the addition of a new MP, the deletion of an existing MP, or a change in the PM parameters that can be monitored from the MP.

- *Report SP suspension of PM data collection*

  In unusual circumstances (e.g., SP PM data collection system failure), it may be necessary for the SP to suspend PM data collection corresponding to an Ob that the SC has established without obtaining permission from the SC to do so. If the SP suspends PM data collection, then the SP would send a report to the SC to inform him of this event.

- *Notify Jeopardy Status*

  The SP informs the SC Jeopardy Status of a SLA before the SLA violation occurs.

- *Notify Jeopardy Cleared*

  The SP informs the SC Jeopardy Cleared if QoS resumes normal level.

Appendix I

A scenario example

(This appendix does not form an integral part of this Recommendation)

I.1   Scenario description

This informative appendix gives a sample scenario to explain how to support the NGN service fulfilment and assurance management process across several administrative domains in the NGN value-chain.

This scenario describes an end-to-end NGN service fulfilment or trouble resolution process in a multi-service provider environment. It involves three actors: the customer, the SP and the NGN transport provider. The SP provides a NGN service to the customer with the cooperation of the NGN transport provider. The customer acts as SC role to the SP. The SP acts as SP role to the customer to which he supplies NGN services, and acts as SC role to the NGN transport provider from which he gets NGN transport stratum services. The NGN transport provider acts as SP role to the SP.

Figure I.1 illustrates the NGN management function blocks that can be contained in each administrative domain.
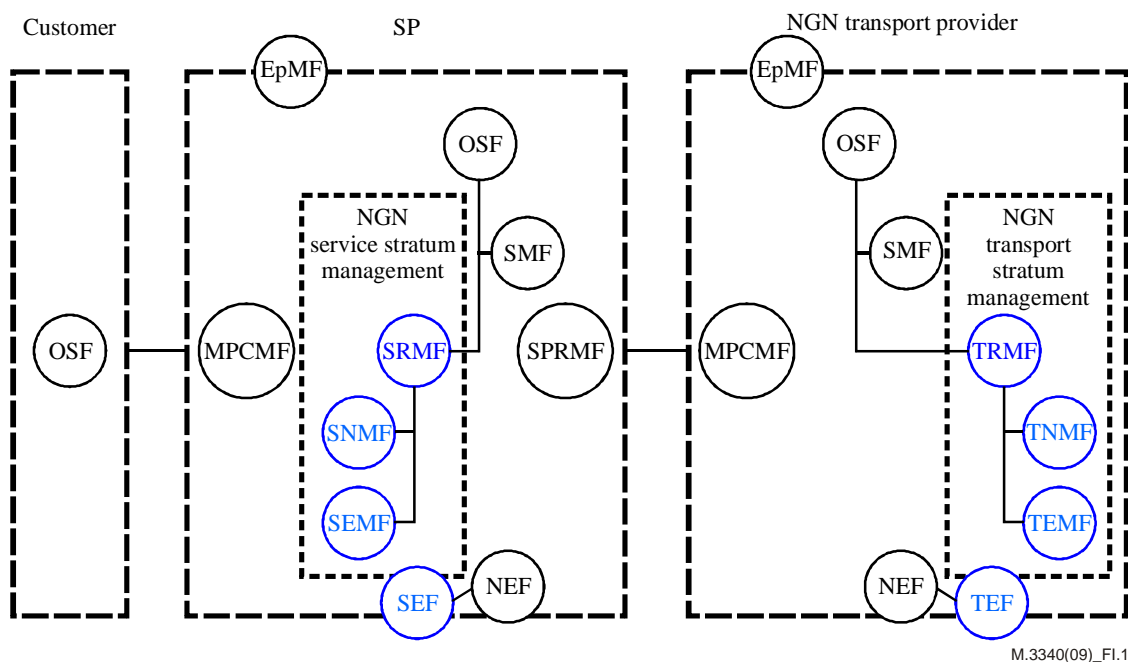

**Figure I.1 – Example NGN management function blocks
in each administrative domain**

The administrative domain of the customer may contain some management functions that can administer and monitor the customer's facilities and can interact with the SP across C2B interface. The administrative domain of the SP may contain EpMF, MPCMF, OSF which is decomposed to SMF and SRMF, NEF which is decomposed to SEF, SPRMF. The SP does not supply NGN transport stratum service. The administrative domain of the NGN transport provider may contain EpMF, MPCMF, OSF which is decomposed to SMF and TRMF, NEF which is decomposed to TEF.

The C2B interface in this Recommendation is used to convey service fulfilment and assurance information between the OSF in the customer administrative domain and MPCMF in the SP administrative domain. The B2B interface in this Recommendation is used to convey service fulfilment and assurance information between the SPRMF in the SP administrative domain and MPCMF in the transport provider administrative domain.

I.2 Example of trouble administration process flow

Figure I.2 shows a typical trouble administration process flow between the customer, the SP and the transport provider.
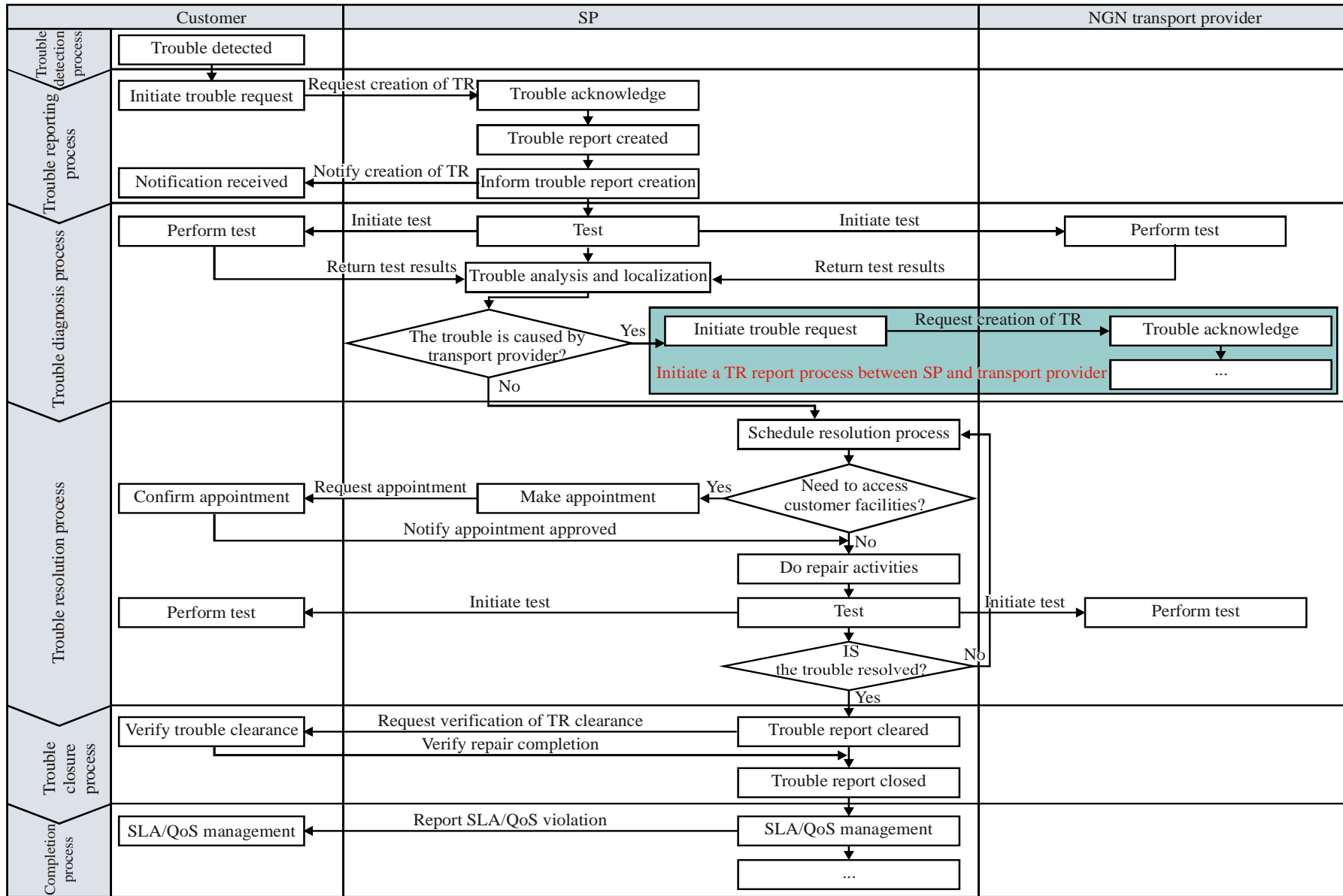
Figure I.2 – Trouble administration process flow example

NOTE – The process is not only part of an end-to-end service assurance process, but also operates at the end-to-end fulfilment process when trouble is detected during the new service provision process.

In general, a trouble administration process may include the following sequential processes:

1) *Trouble detection process*

   A trouble can be experienced by the customer or be detected by the management system located in the customer administrative domain.

   The customer trouble detection process is a local matter for the customer. If the trouble is detected by the customer, he can decide if the TR needs to be sent to the SP.

2) *Trouble reporting process*

   The customer can initiate, via a local process, a request that a trouble report on a resource or service be created by a service provider using the interoperable interface.

   The SP can acknowledge or reject the trouble report, if the SP acknowledges the trouble report, he should be able to notify the customer about the creation of a trouble report.

3) *Trouble diagnosis process*

   Trouble diagnosis process analyses and localizes the trouble, isolates the trouble to root cause, or refers the trouble.

   During the trouble diagnosis process, the SP may initiate a test to help localize the trouble.

   The trouble may be due to the transport stratum supplied by the transport provider. In this case, the SP can initiate a request of trouble report creation to the transport provider. This is a new trouble report process between the SP and the transport provider and the process is transparent to the customer. A new trouble report will be created during the trouble report process, which is different from the trouble report between the customer and the SP.

4) *Trouble resolution process*

   Trouble resolution process makes a schedule for trouble restoration, makes an appointment for restoration, does the restoration, and tests after the restoration. It may be iterative until it is confirmed that the trouble is cleared by the test.

5) *Trouble closure process*

   Trouble closure process can be initiated by the SP when the SP has deemed a trouble report to be cleared and initiates a request for the verification of the clearance of trouble report to the customer.

   When a customer gets the trouble cleared information, he can initiate an end-to-end testing process for confirmation.

   Trouble report is closed by the SP at the end.

   Trouble closure process ends the lifecycle of the trouble report.

6) *Completion process*

   The completion process notifies the relevant processes about the trouble report, including the SLA management, billing process, etc.

I.3   Example of service fulfilment process flow

Figure I.3 shows a typical service fulfilment process flow between the SC, the SP and the network operator.
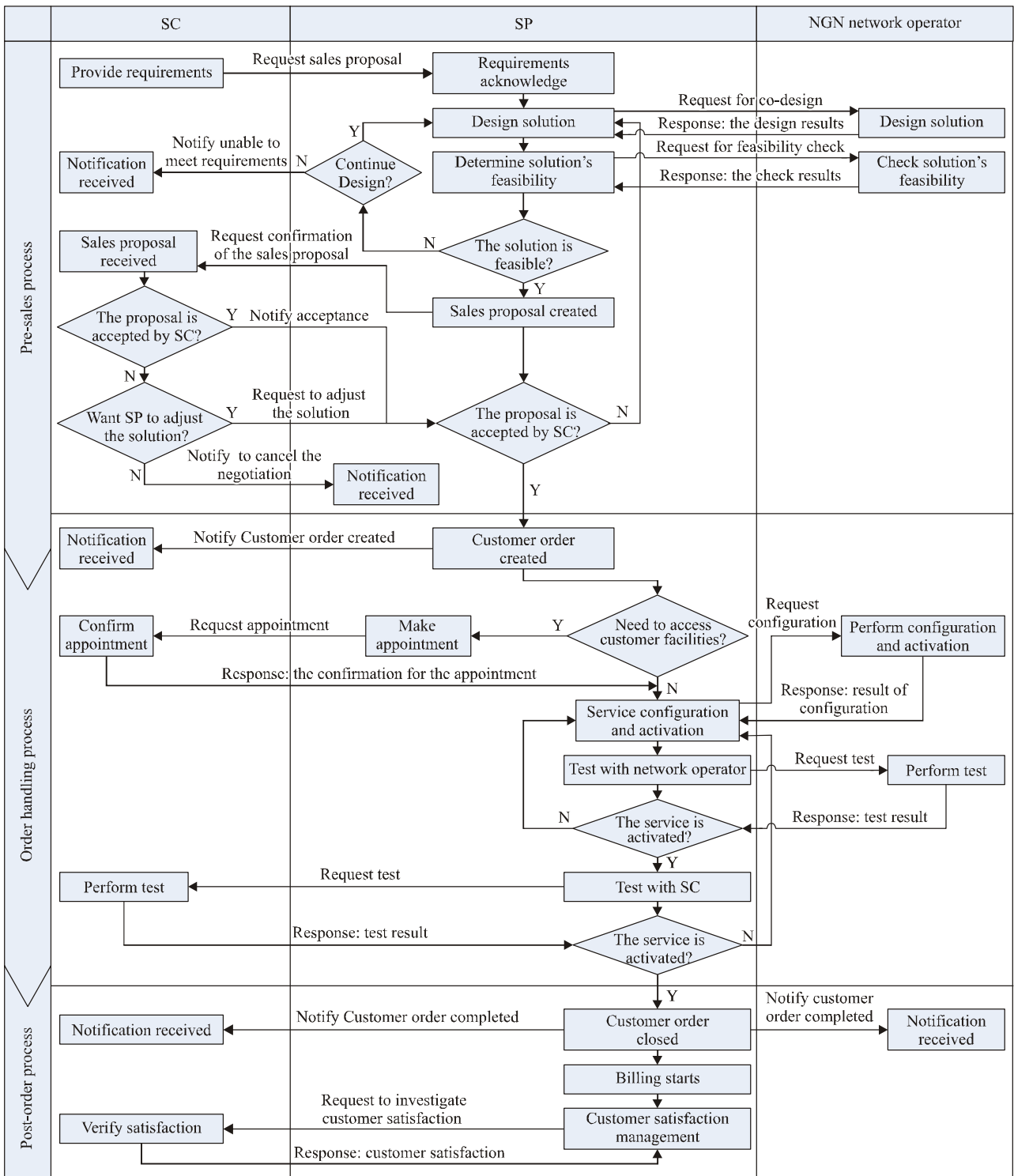
Figure I.3 – Service fulfilment process flow example

NOTE – In this process, the product provided to the SC is not a standard product, but a customized one. Therefore, one must first design a solution and determine the solution's feasibility.

In general, the service fulfilment process may include the following sequential processes:

1) *Pre-sales process*

   In the pre-sales process, the SP and SC negotiate with each other about the details of the order. This process should be finalized with terms that are mutually agreeable to both the service customer and the service provider. One specific solution is selected and its details are described in a sales proposal. The sale is concluded through negotiations of features, service levels, pricing and discounts, resulting in a formal sign-off of an agreement between the SC and SP. The formal agreement could include a customer order.

   If the solution relies on transport stratum supplied by the network operator, the SP needs to initiate requests of verification for the solution to the network operator.

2) *Order handling process*

   Order handling process is responsible for accepting and handling customer orders. It deals with customer order creation, order status and tracking, service configuration and activation, end-to-end service test, order modification and cancellation.

   If the service relies on transport stratum supplied by the network operator, the SP needs to initiate requests of service configuration and test to the network operator.

3) *Post-order process*

   Post-order process is responsible for customer notification on order completion, customer satisfaction investigation, and authority to begin billing.

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