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SERIES M: TELECOMMUNICATION MANAGEMENT,
INCLUDING TMN AND NETWORK MAINTENANCE

Telecommunications management network

Requirements and analysis for NGN trouble administration across B2B and C2B interfaces

ITU-T Recommendation M.3343



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ITU-T Recommendation M.3343

Requirements and analysis for NGN trouble administration across B2B and C2B interfaces

Summary

ITU-T Recommendation M.3343 contains the requirements and analysis for trouble administration functions for the business-to-business and customer-to-business interfaces in support of NGN. The requirements and analysis are provided using the TMN interface specification methodology described in ITU-T Recommendation M.3020. This Recommendation differs from existing approved Recommendations on trouble management in that NGN requires product and service flexibility and extensions introduced by new technology for NGN. Trouble type is also configurable and extensible by either the service provider or service customer to support new products and services. These extensions are introduced to support peer-wise, local, national and regional requirements introduced and described in ITU-T Recommendation M.3050.2 for supplier/partner relationship management introduced by the NGN value-chain. This is needed to support regulatory and international trade needs.

Source

ITU-T Recommendation M.3343 was approved on 13 January 2007 by ITU-T Study Group 4 (2005-2008) under the ITU-T Recommendation A.8 procedure.

Keywords

Analysis, B2B/C2B interface, NGN, requirements, service customer, service provider, trouble report.

FOREWORD

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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.

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Introduction

This Recommendation contains the requirements and analysis for the trouble administration function for the business-to-business (B2B) and customer-to-business (C2B) interfaces.

From time to time all systems, including communications networks, develop problems or malfunctions, referred to in this Recommendation as "troubles". A "trouble" in a communications network is a problem that has an adverse effect on the quality of service perceived by network users. When a trouble is detected, possibly as a result of an alarm report, a trouble report may be entered by a user or the system may raise a report automatically. Management of that trouble report is necessary to ensure that it receives attention and that the trouble is cleared to restore the service to its previous level of capability.

At the time of a trouble, a network may have been interworking with another network to provide a service and the problem or malfunction may be due to the other network. Therefore, it may be necessary to exchange trouble management information between management systems across interfaces which may be client-to-service provider or service provider-to-service provider interfaces and may represent inter-jurisdictional, as well as intra-jurisdictional, boundaries. In addition to exchanging information on trouble that has already been detected, advance information on service inaccessibility may also need to be exchanged. Thus, a service provider may need to inform a customer of future service inaccessibility (because of planned maintenance, for example). The scope of this Recommendation includes all of the above processes for exchange of management information for NGN to support the B2B and C2B interfaces.

The NGN introduces the requirements for the extensibility and configurability of the trouble types to address new and evolving IMS services, the definition of these extensions is for further study.

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ITU-T Recommendation M.3343

Requirements and analysis for NGN trouble administration across B2B and C2B interfaces

1 Scope

This Recommendation contains the requirements and analysis for the business-to-business (B2B) and customer-to-business (C2B) interfaces of trouble administration for NGN. It assumes a multi-service provider environment and is aimed at trouble administration functions to support the deployment of NGN and includes both the B2B and C2B interfaces. B2B/C2B interface is a synonymous term to X Interface.

Figure 1-1 shows the relationship of this Recommendation to existing and as yet undefined documents for service assurance management. It shows the architecture for NGN service assurance management.

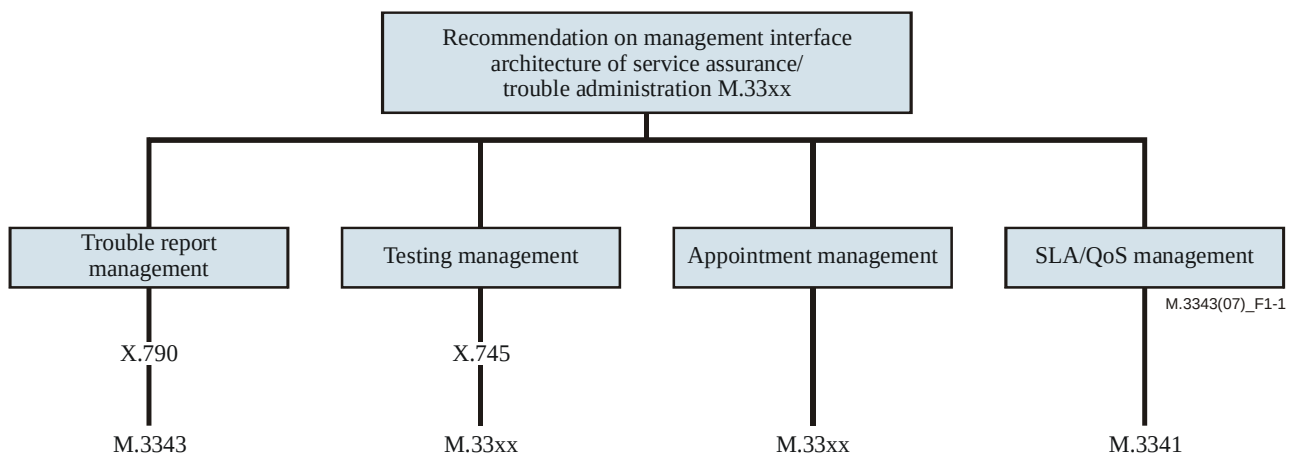


Figure 1-1 – Illustration of document architecture for NGN service assurance/trouble management

Trouble administration consists of processes utilizing trouble report management, testing management, appointment management and SLA management. This Recommendation and the current [ITU-T X.790] are specific to trouble report. Functions for testing of the service or transport stratum, appointment management and SLA management are outside the scope of this Recommendation. Trouble administration will require all the functions defined in this Recommendation and the other three Recommendations to provide a complete set of functions.

Third-party request/response operations are dependent upon the privacy business rules defined in the SC/SP's contract and consequently are considered out of scope for this Recommendation.

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 G.805] ITU-T Recommendation G.805 (2000), *Generic functional architecture of transport networks*.
- [ITU-T M.3010] ITU-T Recommendation M.3010 (2000), *Principles for a telecommunications management network*.
- [ITU-T M.3016.x] ITU-T Recommendation M.3016.x (2005), *Security for the management plane*.
- [ITU-T M.3020] ITU-T Recommendation M.3020 (2007), *Management interface specification methodology*.
- [ITU-T M.3050.x] ITU-T Recommendation M.3050.x (2004), *Enhanced telecommunications operations map (eTOM)*.
- [ITU-T M.3060] ITU-T Recommendation M.3060/Y.2401 (2006), *Principles for the management of next generation networks*.
- [ITU-T M.3200] ITU-T Recommendation M.3200 (1997), *TMN management services and telecommunications managed areas: Overview*.
- [ITU-T M.3208.1] ITU-T Recommendation M.3208.1 (1997), *TMN management services for dedicated and reconfigurable circuits network: Leased circuit services*.
- [ITU-T M.3400] ITU-T Recommendation M.3400 (2000), *TMN management functions*.
- [ITU-T Q.1290] ITU-T Recommendation Q.1290 (1998), *Glossary of terms used in the definition of intelligent networks*.
- [ITU-T X.720] ITU-T Recommendation X.720 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Management information model*.
- [ITU-T X.721] ITU-T Recommendation X.721 (1992), *Information technology – Open Systems Interconnection – Structure of management Information: Definition of management information*.
- [ITU-T X.790] ITU-T Recommendation X.790 (1995), *Trouble management function for ITU-T applications*.
- [ITU-T Y.2001] ITU-T Recommendation Y.2001 (2004), *General overview of NGN*.
- [ETSI TS 122 228] ETSI TS 122 228 (2006), *UMTS: Service requirements for the IP multimedia core network subsystem (IMS); Stage 1*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 administrative domain: [ITU-T G.805].

3.1.2 b2b/c2b reference point: [ITU-T M.3060].

3.1.3 interface: [ITU-T M.3010].

3.1.4 IP multimedia application [ETSI TS 122 228]: An application that handles one or more media simultaneously, such as speech, audio, video and data (e.g., chat text, shared whiteboard) in a synchronized way from the user's point of view. A multimedia application may involve multiple parties, multiple connections and the addition or deletion of resources within a single IP multimedia session. A user may invoke concurrent IP multimedia applications in an IP multimedia session.

- 3.1.5 IP multimedia subsystem (IMS)** [ETSI TS 122 228]: An IP multimedia service is the user experience provided by one or more IP multimedia applications.
- 3.1.6 managed resource:** [ITU-T M.3010].
- 3.1.7 management domain:** [ITU-T M.3010].
- 3.1.8 management function:** [ITU-T M.3010].
- 3.1.9 market, product and customer management function (MPCMF):** [ITU-T M.3060].
- 3.1.10 next generation network (NGN):** [ITU-T Y.2001].
- 3.1.11 operations system (OS):** [ITU-T M.3010].
- 3.1.12 operations systems function (OSF):** [ITU-T M.3010].
- 3.1.13 Q interface:** [ITU-T M.3010].
- 3.1.14 service customer:** [ITU-T M.3208.1].
- 3.1.15 service provider:** [ITU-T M.3208.1].
- 3.1.16 service resource management function (SRMF):** [ITU-T M.3060].
- 3.1.17 service user:** [ITU-T Q.1290].
- 3.1.18 supplier/partner relationship management function (SPRMF):** [ITU-T M.3060].
- 3.1.19 X interface:** [ITU-T M.3010].
- 3.1.20 x reference point:** [ITU-T M.3010].

NOTE 1 – The definitions of SPRMF, MPCMF and SRMF are for further study.

NOTE 2 – SP and SC used in this Recommendation means SP role and SC role.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

- 3.2.1 B2B/C2B interface:** The B2B/C2B interface in this Recommendation is used to interconnect two administrative domains or to interconnect a compliant environment with other networks or systems which accommodate a compliant interface, across which trouble administration information can be exchanged.
- 3.2.2 clearing trouble report:** An assertion by an agent that actions which are identified in the trouble report or the repair activity object instances have been satisfactorily performed to resolve the trouble, or that such actions are no longer necessary, such that in either case the trouble report is a candidate for closure.
- 3.2.3 closing trouble report:** An assertion by an agent that the trouble is resolved such that the cleared trouble report may only be processed further to generate a trouble history record and/or be deleted.
- 3.2.4 network operator:** 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.
- 3.2.5 open trouble report:** An assertion by the manager that a trouble exists in the quality of service of one or more network services including one or more network resources being managed, and resulting in the creation of a trouble report in the service provider's TA OSF agent.
- 3.2.6 status of a trouble report:** The stage that has been reached by a trouble report since its instantiation/creation while the trouble is being resolved.

3.2.7 trouble: Any cause that may lead to, or contribute to, a manager perceiving degradation in the quality of service of one or more network services including one or more network resources being managed.

3.2.8 trouble administration: Trouble administration consists of a set of functions that enable troubles to be reported, tracked and maintained.

3.2.9 trouble report: The formal report of trouble exchanged over the B2B or C2B interface.

3.2.10 trouble resolution: Trouble resolution 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.

3.2.11 trouble type: The description or category of the trouble that was detected.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

B2B/b2b	Business-to-Business
C2B/c2b	customer-to-Business
HMI	Human-Machine Interface
IMS	IP Multimedia Subsystem
MPCMF	Market, product and customer management function
NGN	Next Generation Network
OS	Operations System
OSF	Operations System Function
SC	Service customer
SEF	Service Element Function
SMF	Service Management Function
SP	service provider
SPRMF	Supplier/Partner Relationship Management Function
SRMF	Service Resource Management Function
SU	Service User
TA	trouble administration
TEF	Transport Element Function
TMN	Telecommunications Management Network
TR	Trouble Report
UML	Unified Modelling Language

5 Conventions

In this Recommendation, mandatory requirements are indicated by the use of the word "shall". Desirable requirements are indicated by the use of the word "should". Optional requirements are indicated by the use of the word "may" or "can".

In this Recommendation, when specifying managed entities and their management operations, the following abbreviations are applied to indicate the support qualifier of attributes, notifications or operation parameters:

- M: Mandatory;
- O: Optional;
- C: Conditional;
- Not supported.

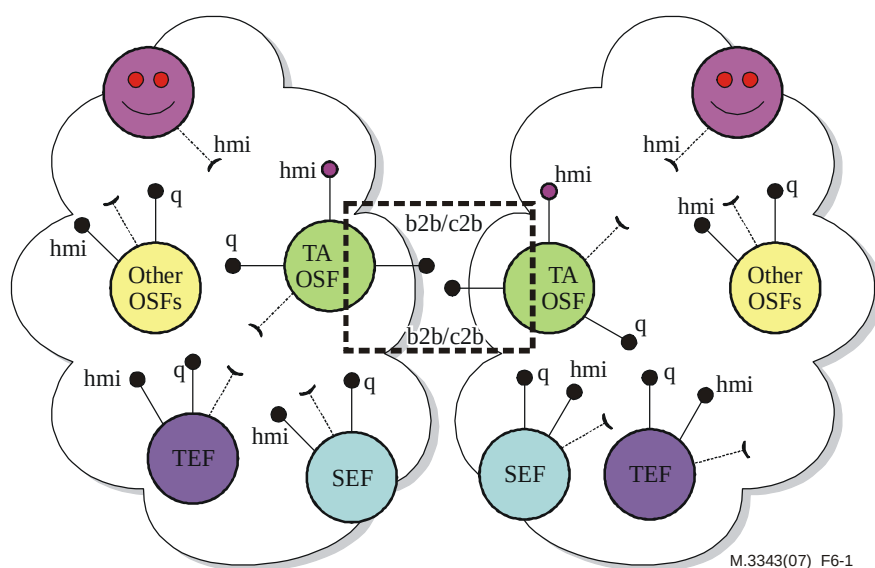
The following abbreviations are applied to indicate the read qualifier and write qualifier of the attributes.

- R+: must be readable;
- R: optional readable;
- R-: non-readable;
- W+: must be writeable;
- W: optional writeable;
- W-: non-writeable;
- C+: must be write-on-createable;
- C: optional write-on-createable;
- C-: non-write-on-createable.

6 Functional requirements

6.1 Requirements framework

Figure 6-1 shows the b2b/c2b reference points being addressed by this Recommendation. It is adapted from the illustration of reference points described in [ITU-T M.3060]. The b2b/c2b reference points for trouble administration are located between the OSFs in different administrative domains where trouble administration function is contained. The dashed rectangle shows the location of b2b/c2b reference points.



M.3343(07)_F6-1

Figure 6-1 – Illustration of b2b/c2b reference points for trouble administration

Figure 6-2 illustrates the SP/SC/SU relationships for the trouble administration. The SP provides trouble administration services to support interactions between SP and SC, and between SP and SP/Network Operator. In 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.

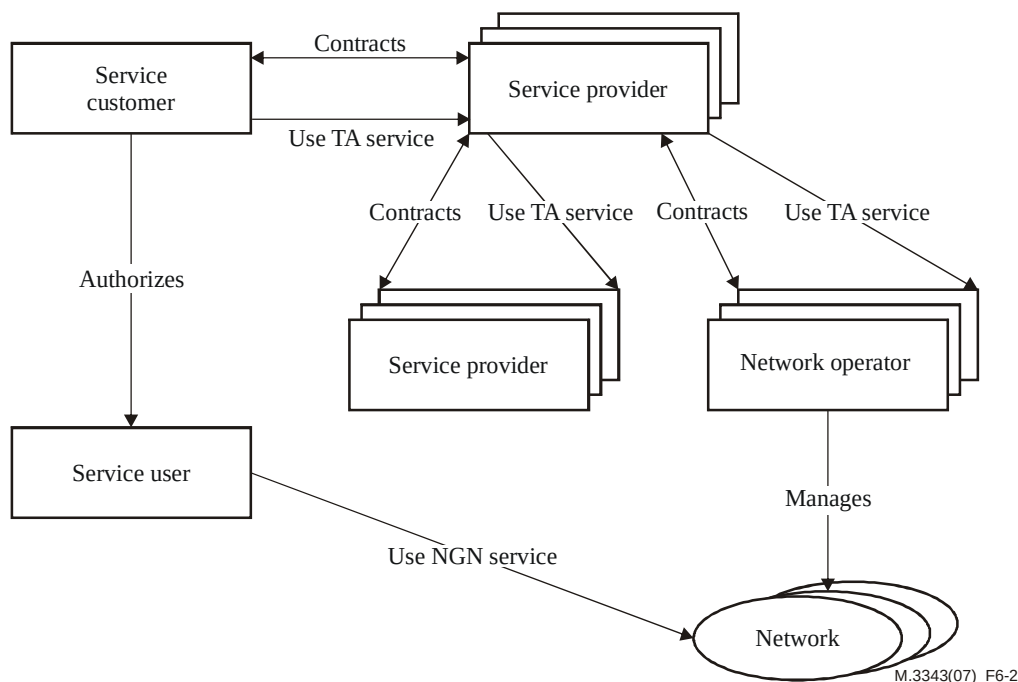


Figure 6-2 – SP/SC/SU roles in trouble administration

The scope of trouble administration function in NGN management is shown in Figure 6-3. Trouble administration OSF may be contained in several logical management layer functions including MPCMF, SMF, SRMF and SPRMF.

The security requirements for the B2B and C2B interface of NGN TA can be found in [ITU-T M.3016.x]. These requirements apply not only to the interfaces between SC and SP, but also between SC-SU and SP-SP.

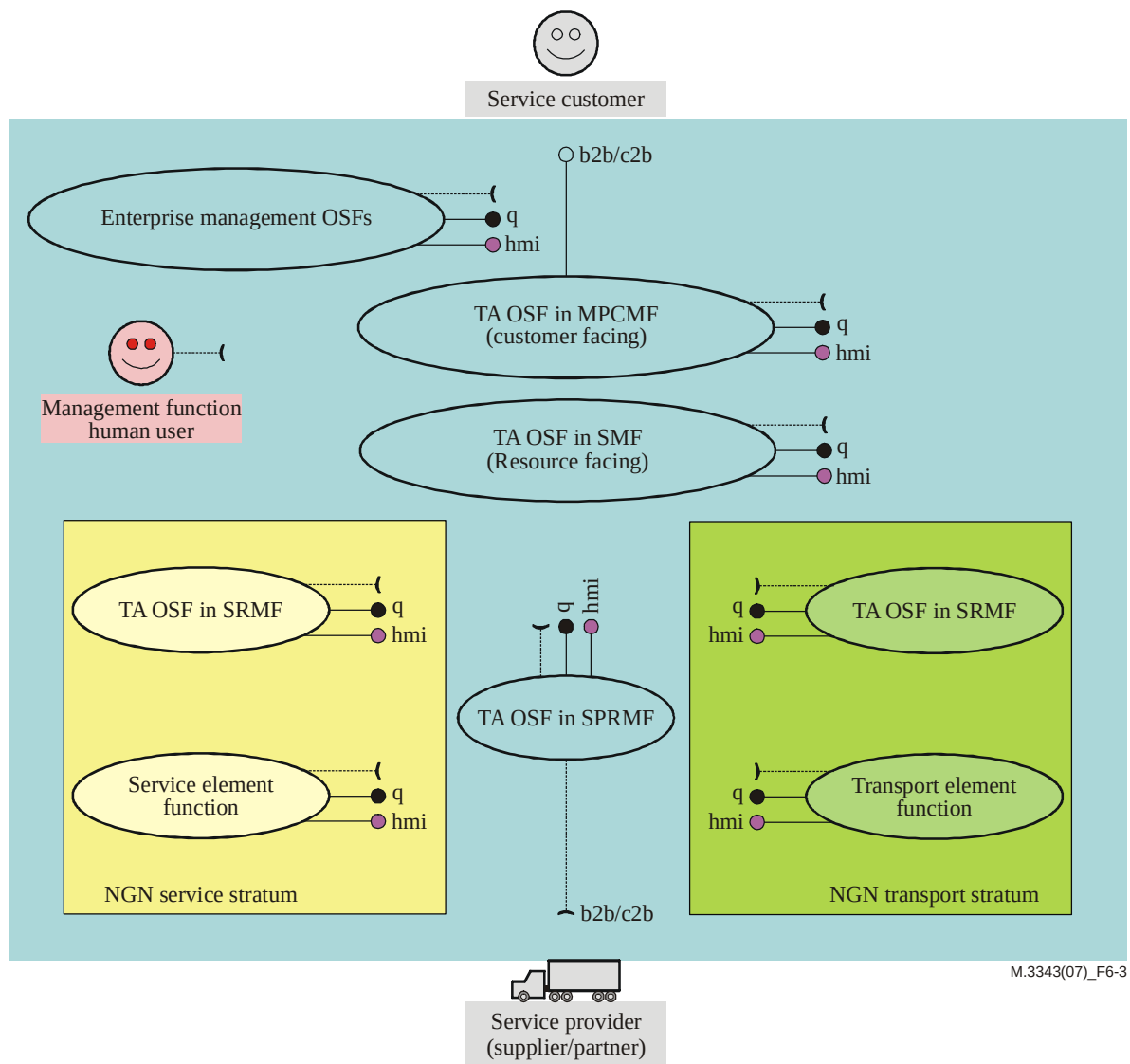
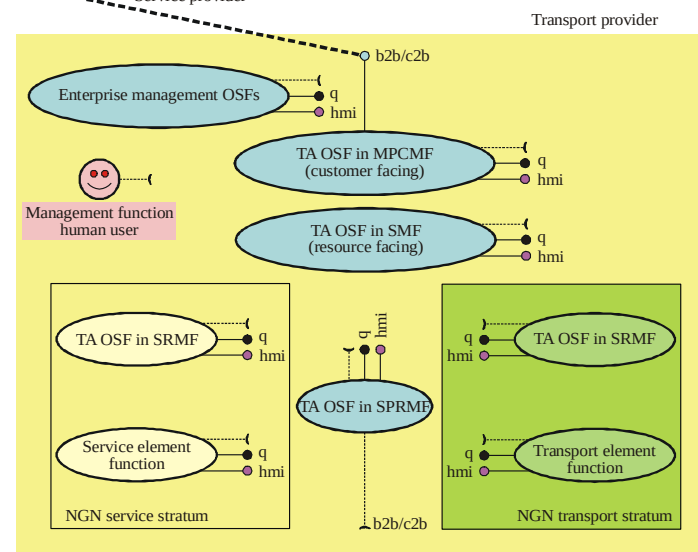
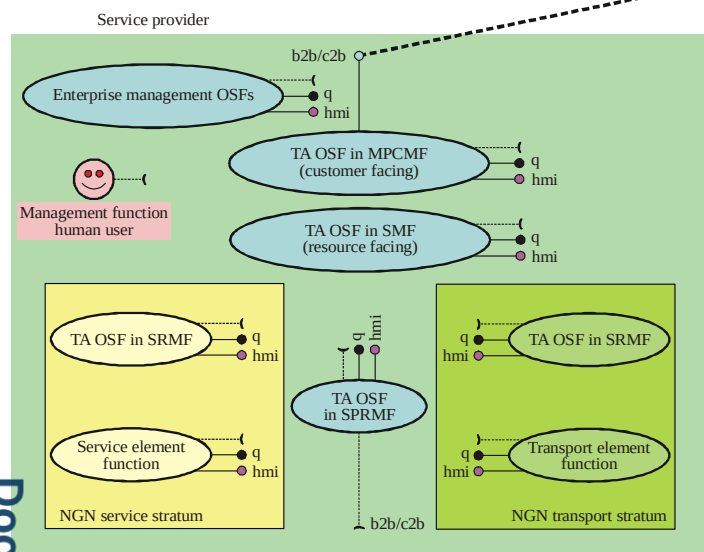
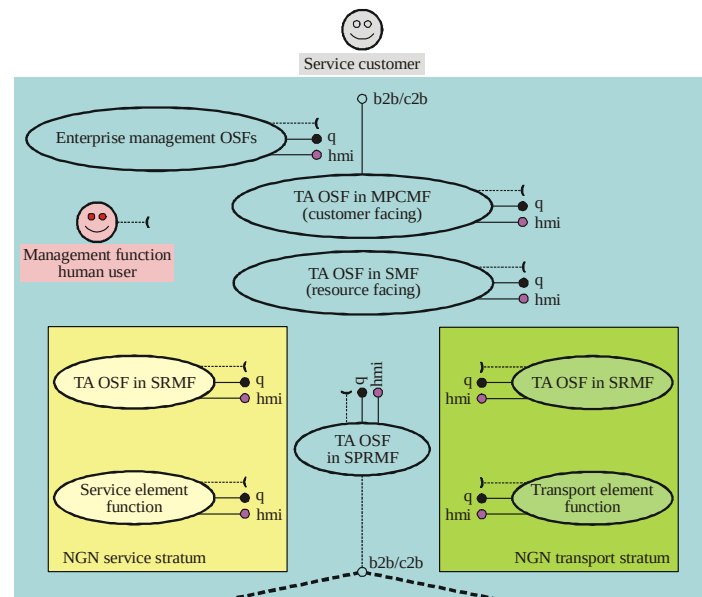


Figure 6-3 – The scope of trouble administration function in NGN management

Figure 6-4 illustrates an example of interconnection of NGN TA management logical architecture. It is consistent with the NGN management logical architecture described in [ITU-T M.3060]. Each of the administration domains shown is considered to be an individual telecommunication management network (TMN). Each domain maintains its own trouble administration management function. The interchange of trouble administration information and interactions between these TA OSFs of different administration domains takes place across the B2B/C2B interface.



M.3343(07)_F6-4

Figure 6-4 – Example of interconnection of NGN TA management logical architecture

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 the customer role is taken by another service provider organization in the overall supply chain.

In the first business context, the service provider detects end-user trouble through a variety of means; either through internal fault-detection procedures or via customer contact. The trouble administration interface is used to allow the customer to report troubles, to enable the service provider to keep the customer informed of trouble resolution and to facilitate the cooperation of service providers. For an end-user organization, in order to communicate with a service provider across a B2B/C2B interface, it must support the trouble administration function in its own management domain. The trouble administration solution may communicate with other equipment's OS within the customer network but the internal interface is out the scope of this Recommendation.

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

6.2 Business level requirements

6.2.1 Business level requirements

The trouble administration processes between customers and service providers is part of a business relationship between their organizations in which the service provider has contracted to provide a set of services to a defined level of quality as defined in a customer's contract – service level agreement. The trouble administration processes are concerned with the identification and resolution of total or partial failures of the individual services offered under the customer's contract.

The basic requirements includes:

- trouble report creation (see clause 6.2.1.2);
- trouble report tracking (see clause 6.2.1.3);
- trouble report management (see clause 6.2.1.4);
- trouble report clearing and closure (see clause 6.2.1.5);
- other requirements (see clause 6.2.1.6).

6.2.1.1 Trouble report subject

REQ-TA-CON-101 Each trouble report shall have a single identified subject, which is the resource or service in trouble. Any single resource or service could be the subject of a trouble report. The resource or service which is the subject of a trouble report must be known to the service provider. If the customer uses the interoperable interface to create a trouble report, then the inventory of resources and services which can be the subject of a trouble report must be made known to the customer in advance by the service provider.

6.2.1.2 Trouble report creation

- REQ-TA-FUN-201 A customer should be able to 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 process by which the customer initiates the request is a local matter outside the scope of this Recommendation. This is a choice by the customer. Not every customer trouble report needs to be sent to a service provider. The choice is a local customer policy.]*
- REQ-TA-FUN-202 A service provider should be able to notify a customer about the creation of a trouble report on a resource or service based on one of the following scenarios.
- REQ-TA-FUN-202.a A service provider management system detects a trouble and automatically generates a trouble report, for instance due to threshold limits being exceeded or alarm notifications.
- REQ-TA-FUN-202.b A person in the customer's organization reports a trouble to the service provider by a procedure other than using the interoperable interface (e.g., a telephone call) and, as a result, the service provider creates a trouble report.
- REQ-TA-FUN-203 A service provider should be able to create a trouble report to specifically notify the customer that planned maintenance will be carried out at a given time and that all, or parts of, the service(s), resource(s), network or system will be inaccessible during that time. In this case, the trouble management function is used to notify the customer that planned maintenance action is scheduled.
- [This type of trouble report is intended solely to allow the customer to track planned outages, not to support customer approval or suppression of planned outages.]*
- REQ-TA-FUN-204 The creation time should be recorded in a trouble report by the service provider.
- [Creation time is the time that the trouble report is accepted as valid by a service provider. If the service provider implements a 'queued' state, there may be an interval between trouble report creation time and opening time, otherwise they are equivalent.]*
- REQ-TA-FUN-205 If the service provider rejects the trouble report (i.e., does not create it), the customer should be informed. The reason why the service provider rejects the trouble report should be specified.
- REQ-TA-FUN-206 The trouble report originator, either service provider or customer, should be able to specify the time at which the trouble was detected, as it is likely to be different from the time at which the trouble report was created.
- REQ-TA-FUN-207 It should be possible to have alias(es) for the trouble report. For example, there may be distinct trouble report IDs on the service provider side and the customer side. This allows for compatibility with existing trouble handling systems, e.g., the trouble report identity derived using existing internal trouble management practices may be used. Each trouble report should be able to support a customer trouble report ID in addition to the service provider trouble report ID.

- REQ-TA-FUN-208 Both customer and service provider should be able to group trouble reports together, e.g., to indicate a common problem.
[The criteria for grouping or regrouping trouble reports is outside the scope of this Recommendation. This is a local matter.]
- REQ-TA-FUN-209 A trouble report used during the trouble resolution procedures may have associated with it one or more alarms triggered by a single common problem.
[Association with alarms is a local matter. This implies the presence of a separate fault management system that allows for the sharing of alarm information.]
- REQ-TA-FUN-210 Multiple distinct trouble reports can be created against the same subject only if the service provider and customer support it, although this does not necessarily imply trouble report correlation.
- REQ-TA-FUN-211 It should be possible for either the service provider or customer to include comments in free format text in the trouble report. Comments, once included, cannot be modified or removed. The size of text should be agreed between the service provider and the customer.
- REQ-TA-FUN-212 It shall be possible for the trouble report originator, either service provider or customer, to include in the trouble report the trouble type and additional information about the trouble. This represents the customer's viewpoint, not the service provider's viewpoint.

NOTE – As part of the contract, specified by the supplier/partner relationship management process, the SP may require, i.e., make it mandatory that, the SC submit, in additional data, evidence of pre-trouble ticket process execution and pass evidence of prior processes and test diagnosis results.
- REQ-TA-FUN-212.a The trouble type shall be configurable and extensible, by either the service provider or the service customer, and also support trouble type definitions agreed and documented at national, regional and international levels to support NGN services.
- REQ-TA-FUN-213 The trouble report originator, either service provider or customer, should be able to supply the identity of the person or system who originated the trouble report.
- REQ-TA-FUN-214 The trouble report originator, either service provider or customer, should be able to supply the perceived trouble severity in terms of the effect on the trouble report subject.

[This severity is from the customer's viewpoint. Severity is not to be confused with priority or escalation level.]
- REQ-TA-FUN-215 In addition to the identity of the service or network resource against which the trouble is being reported, the trouble report should be able to contain additional suspect objects and the location of the trouble. This additional information is not necessarily present in the create request, but should be able to be added by trouble report updates.
- REQ-TA-FUN-216 The customer should be able to supply a priority to indicate the urgency for resolution of the trouble relative to his own other outstanding trouble reports.

[Exchange of this information does not guarantee any change in the processing of trouble reports. That is beyond the scope of the interface.]

- REQ-TA-FUN-217 Both the service provider and customer should each be able to identify a contact person and alternative contact person(s) from their respective organizations who can provide additional information about the trouble.
- REQ-TA-FUN-218 The customer or service provider should be able to indicate that the subject of the trouble report was recently created or that another trouble was reported on this subject in the recent past.
- [This might be used to identify chronic problems and newly – deployed equipment. The mechanism used for determining this is outside the scope of this Recommendation.]*
- REQ-TA-FUN-219 The customer should be able to request a commitment time (e.g., the time at which the service provider either arrives on site or clears the trouble). The service provider should be able to supply a commitment time, not necessarily the same time as requested by the customer.
- REQ-TA-FUN-220 The customer should be able to specify when the site is accessible to the service provider.
- REQ-TA-FUN-221 The customer should be able to specify when the subject of the trouble report is accessible (i.e., when disruptive repair activity may be carried out).

6.2.1.3 Trouble report tracking

This clause is concerned with the tracking of the problem resolution process by the customer.

- REQ-TA-FUN-301 A customer shall be able to track the progress of a trouble report to resolution. The customer should be able to request the trouble report state and/or status from the service provider. The service provider should be able to notify the customer of changes to the trouble report.
- [This tracking capability should not have to be explicitly requested by customers. The issue of whether the customer trouble report system polls for status versus having the service provider trouble report system automatically update status will be explicitly determined by what transport protocol is implemented.]*
- Some implementations may provide a periodic refresh by the service provider to the customer, irrespective of whether any changes have taken place, but this mechanism is not itself a functional requirement.]*
- REQ-TA-FUN-302 The state of the trouble report should be updated as the global condition of the trouble report changes (i.e., whether or not the trouble report may be changed, closed or otherwise moved through the state transition model).
- REQ-TA-FUN-303 The status of the trouble repair activity should be updated as the service provider's trouble resolution progresses and the customer should be notified of all changes. The service provider should maintain the time of the last change in the trouble report status.
- REQ-TA-FUN-304 The time at which the trouble report was last updated should be recorded.

- REQ-TA-FUN-305 The trouble report should maintain a running account of information on the activities taken to diagnose, test and repair the trouble, the repair type, the length of time spent on each activity, whether or not the activity is billable and the equipment involved in each activity. This information is provided by the service provider. In addition to the running account, it should be possible to summarize key information, such as how long was spent on an activity, whether or not the work is billable, etc.
- [Any processing that is carried out on this information is a local matter.]*
- REQ-TA-FUN-306 The service provider should allow the customer to retrieve a complete description of a specific trouble report based on the specification of the unique service provider trouble report ID.
- [This would be for the re-synchronization of "views" of trouble reports if there is a suspicion that they are not equivalent, or the creation of a new customer trouble report instance if a trouble report has been missed.]*
- REQ-TA-FUN-307 The service provider should allow the customer to retrieve complete descriptions of a specific set of trouble reports based on an ad hoc filter definition (e.g., active (not closed) trouble reports, updated trouble reports, etc.).
- REQ-TA-FUN-308 It is possible that the service provider system may not be able to update the trouble report information. In this case, the customer should be informed that the trouble report is disabled and its information cannot be updated.

6.2.1.4 Trouble report management

- REQ-TA-FUN-401 It should be possible for a customer to escalate a trouble report if this is supported by the service provider, or for a trouble report to be escalated by the service provider. The customer should be informed of all changes to the escalation level. Escalation levels can only increase, not decrease.
- [Some service providers may not wish to allow customers to escalate trouble reports, as it could cause confusion, but prefer to carry out escalation according to prior arrangement in a business level agreement. In any case, the conditions under which a trouble report is escalated (for example, if the trouble has not been resolved in a given period of time) should be contained in a business level agreement.]*
- REQ-TA-FUN-402 It should be possible for the service provider to defer work on a trouble report. For example, it may be necessary to suspend repair work because access to the faulty resource has been prevented by the customer. Deferral of a trouble report suspends the 'outage duration timer'. The service provider should notify the customer when a trouble report has been deferred and when the deferral is released.
- REQ-TA-FUN-403 The customer should be able to provide the required repair completion time (which may be derived from an SLA, for example) and obtain from the service provider the expected repair time and, subsequently, the actual repair time.
- REQ-TA-FUN-404 The customer should be able to update an open and active trouble report with new information, e.g., additional trouble-related information, contact change, etc.

- REQ-TA-FUN-405 The customer should be able to authorize repairs to be made at the customer's location outside of normal business hours and also be able to identify the permitted access times for a given single location. This is out of scope for this Recommendation.
- REQ-TA-FUN-406 Upon receiving a request for authorization related to specific repair activities from the service provider, a customer should be able to provide authorization over the interoperable interface. This is out of scope for this Recommendation.
- REQ-TA-FUN-407 The service provider should be able to indicate to the customer whether the repair activity covered by the present trouble report is billable. This is out of scope for this Recommendation.

[It is not intended that the trouble report be used for invoicing.]

6.2.1.5 Trouble report clearing and closure

- REQ-TA-FUN-501 A customer should be able to request the cancellation of a trouble report and indicate in the trouble report the person making the request.
- REQ-TA-FUN-502 When the service provider requests clearance verification for the trouble report, the activity timer should be suspended. It should be restarted if the customer denies clearance.
- REQ-TA-FUN-503 The customer should be allowed to verify that the trouble is cleared prior to closure of the trouble report by the service provider. When the clearing of the problem related to the trouble report is verified by the customer, the identity of the trouble clearance person doing the verification should be captured in the trouble report. In the event that the customer denies or delays closure verification, then the service provider should have the option of closing the trouble report.
- REQ-TA-FUN-504 Once a service provider has deemed a trouble report to be cleared and has notified the customer, regardless of whether the customer denies clearance or fails to respond, the service provider should be able to deny the customer the ability to modify some of the information in the trouble report.

[This is intended to prevent redefinition of the original problem. The details of how the service provider ensures that the appropriate notification has been received by the customer and the time period within which he has to respond to the request are beyond the scope of this Recommendation.]

- REQ-TA-FUN-505 The actual cause of the trouble found, together with the solution provided and other relevant factors should be recorded in the trouble report.
- REQ-TA-FUN-506 It should be possible to compute/determine the outage duration of the equipment/service from the repair activity information held in the trouble report or the repair activity object instance, if present. This outage duration should then be added to the trouble report at the time of closure.

[The algorithm for computing/determining the outage duration is outside the scope of this Recommendation.]

- REQ-TA-FUN-507 The customer should be able to receive an indication when an instance of a trouble report is deleted locally by the service provider.

[The customer may not require these notifications, which are of limited use.]

6.2.1.6 Other requirements

REQ-TA-FUN-601 It should be possible for either the service provider or the customer to maintain trouble report history.

6.2.2 Actor roles

The capabilities described in this Recommendation are available to relevant service providers and service customers.

6.2.3 Telecommunications resources

The object management functionality is applicable to all types of telecommunications resources.

6.2.4 High-level use case diagrams

This clause contains high-level use case diagrams that summarize the functionality and interfaces of the trouble administration as shown on Figures 6-5 and 6-6. The use case diagrams are organized along the lines shown in Table 6-1, i.e., use cases initiated by the SC are depicted first, followed by use cases initiated by the SP. Use case descriptions are provided in clause 6.3 for every use case pictured in these high level diagrams.

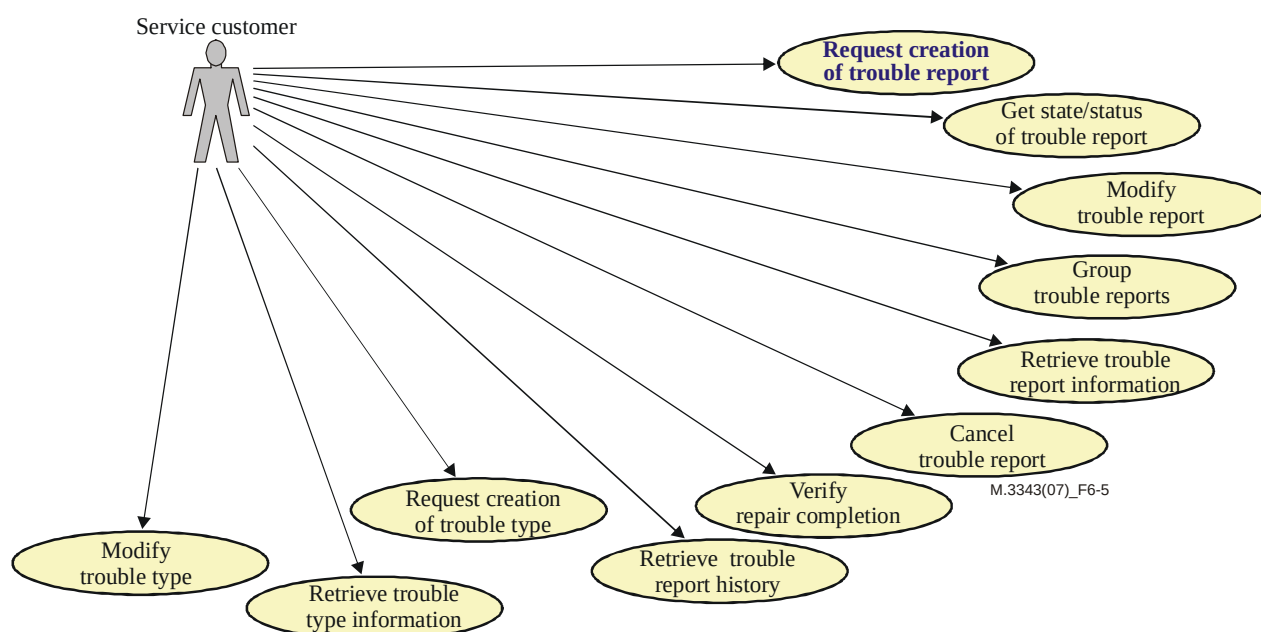


Figure 6-5 – SC-Initiated use cases

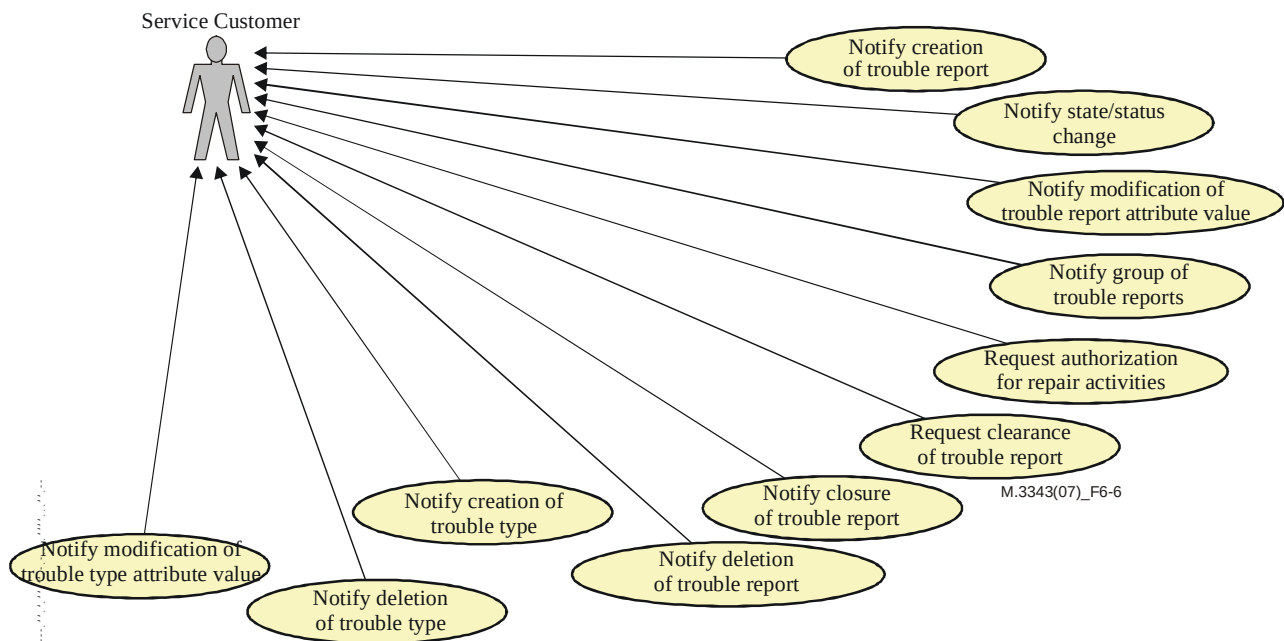


Figure 6-6 – SP-Initiated use cases

NOTE – All third-party use cases will be considered out of scope for this Recommendation.

6.2.5 Interaction

Table 6-1 – Trouble administration interactions across B2B/C2B interface

Originator	Receiver	Interaction
Service customer	Service provider	Request creation of trouble report; Get state/status of trouble report; Modify trouble report; Group trouble reports; Retrieve trouble report information; Cancel trouble report; Verify repair completion; Retrieve trouble report history; Request creation of trouble type; Retrieve trouble type information; Modify trouble type.
Service provider	Service customer	Notify creation of trouble report; Notify state/status change; Notify modification of trouble report attribute value; Notify group of trouble reports; Request authorization for repair activities; Request clearance of trouble report; Notify closure of trouble report; Notify deletion of trouble reports; Notify creation of trouble type; Notify deletion of trouble type; Notify modification of trouble type attribute value.

i) Tracing of requirements

Requirement No.	M/O	Brief description of requirement	Interaction
REQ-TA-CON-001	M	Each trouble report shall have a single identified subject, which is the resource or service in trouble.	All.
REQ-TA-FUN-201	M	A customer should be able to initiate a request for creation of a trouble report.	Request creation of trouble report.
REQ-TA-FUN-202	M	A service provider should be able to notify a customer about the creation of a trouble report.	Notify creation of trouble report.
REQ-TA-FUN-203	M	A service provider should be able to create a trouble report to specifically notify the customer that planned maintenance will be carried out.	Notify creation of trouble report.
REQ-TA-FUN-204	M	The creation time should be recorded in a trouble report by the service provider.	Notify creation of trouble report.

Requirement No.	M/O	Brief description of requirement	Interaction
REQ-TA-FUN-205	M	If the service provider rejects the trouble report (i.e., does not create it), the customer should be informed.	Notify creation of trouble report.
REQ-TA-FUN-206	M	The trouble report originator should be able to specify the time at which the trouble was detected.	Request creation of trouble report; Notify creation of trouble report.
REQ-TA-FUN-207	M	It should be possible to have alias(es) for the trouble report.	Request creation of trouble report; Notify creation of trouble report.
REQ-TA-FUN-208	M	Both customer and service provider should be able to group trouble reports together.	Group trouble reports; Notify group of trouble reports.
REQ-TA-FUN-209	O	A trouble report may have associated with it one or more alarms triggered by a single common problem.	Request creation of trouble report; Notify creation of trouble report.
REQ-TA-FUN-210	O	Multiple distinct trouble reports can be created against the same subject.	Request creation of trouble report; Notify creation of trouble report.
REQ-TA-FUN-211	M	It should be possible for either the service provider or the customer to include comments in free format text in the trouble report.	Request creation of trouble report; Notify creation of trouble report; Modify trouble report; Notify modification of trouble report attribute value.
REQ-TA-FUN-212	M	It shall be possible for the trouble report originator to include in the trouble report the trouble type and additional information about the trouble.	Request creation of trouble report; Notify creation of trouble report; Modify trouble report; Notify modification of trouble report attribute value.

Requirement No.	M/O	Brief description of requirement	Interaction
REQ-TA-FUN-212.a	M	It shall be configurable and extensible, by either the service provider or the service customer, and also support trouble type definitions agreed and documented at national, regional and international levels to support NGN services.	Request creation of trouble type; Retrieve trouble type information; Modify trouble type; Notify creation of trouble type; Notify deletion of trouble type; Notify modification of trouble type attribute value.
REQ-TA-FUN-213	M	The trouble report originator should be able to supply the identity of the person or system who originated the trouble report.	Request creation of trouble report; Notify creation of trouble report
REQ-TA-FUN-214	M	The trouble report originator should be able to supply the perceived trouble severity.	Request creation of trouble report; Notify creation of trouble report.
REQ-TA-FUN-215	M	In addition to the identity of the service or network resource against which the trouble is being reported, the trouble report should be able to contain additional suspect objects and the location of the trouble.	
REQ-TA-FUN-216	M	The customer should be able to supply a priority.	Request creation of trouble report; Notify creation of trouble report.
REQ-TA-FUN-217	M	Both the service provider and customer should each be able to identify a contact person and alternative contact person(s).	Request creation of trouble report; Notify creation of trouble report; Modify trouble report.
REQ-TA-FUN-218	M	The customer or service provider should be able to indicate that the subject of the trouble report was recently created or that another trouble was reported on this subject in the recent past.	Request creation of trouble report; Notify creation of trouble report.
REQ-TA-FUN-219	M	The customer should be able to request a commitment time.	Request creation of trouble report; Notify creation of trouble report; Modify trouble report.

Requirement No.	M/O	Brief description of requirement	Interaction
REQ-TA-FUN-220	M	The customer should be able to specify when the site is accessible to the service provider.	Request creation of trouble report; Notify creation of trouble report; Modify trouble report.
REQ-TA-FUN-221	M	The customer should be able to specify when the subject of the trouble report is accessible.	Request creation of trouble report; Notify creation of trouble report; Modify trouble report.
REQ-TA-FUN-301	M	A customer shall be able to track the progress of a trouble report to resolution.	Get state/status of trouble report; Notify state/status change.
REQ-TA-FUN-302	M	The state of the trouble report should be updated as the global condition of the trouble report changes.	
REQ-TA-FUN-303	M	The status of the trouble repair activity should be updated as the service provider's trouble resolution progresses and the customer should be notified of all changes.	Notify state/status change.
REQ-TA-FUN-304	M	The time at which the trouble report was last updated should be recorded.	
REQ-TA-FUN-305	M	The trouble report should maintain a running account of information on the activities taken to diagnose, test and repair the trouble, the repair type, the length of time spent on each activity, whether or not the activity is billable and the equipment involved in each activity.	
REQ-TA-FUN-306	M	The service provider should allow the customer to retrieve a complete description of a specific trouble report based on the trouble report ID.	Retrieve trouble report information.
REQ-TA-FUN-307	M	The service provider should allow the customer to retrieve complete descriptions of a specific set of trouble reports based on ad hoc filter definitions.	Retrieve trouble report information.
REQ-TA-FUN-308	O	It is possible that the service provider system may not be able to update the trouble report information. In this case the customer should be informed that the trouble report is disabled and that its information cannot be updated.	Notify state/status change.
REQ-TA-FUN-401	M	It should be possible for a customer to escalate a trouble report.	Modify trouble report; Notify state/status change.
REQ-TA-FUN-402	M	It should be possible for the service provider to defer work on a trouble report.	Notify state/status change.

Requirement No.	M/O	Brief description of requirement	Interaction
REQ-TA-FUN-403	M	The customer should be able to provide the required repair completion time (which may be derived from an SLA, for example) and obtain from the service provider the expected repair time and, subsequently, the actual repair time.	Request creation of trouble report; Notify creation of trouble report; Modify trouble report; Retrieve trouble report information.
REQ-TA-FUN-404	M	The customer should be able to update an open and active trouble report with new information	Modify trouble report.
REQ-TA-FUN-405	M	The customer should be able to authorize repairs to be made at the customer's location outside of normal business hours, and also be able to identify the permitted access times for a given single location.	Request authorization for repair activities.
REQ-TA-FUN-406	M	Upon receiving a request for authorization related to specific repair activities from the service provider, a customer should be able to provide authorization over the interoperable interface.	Request authorization for repair activities.
REQ-TA-FUN-407	M	The service provider should be able to indicate to the customer whether the repair activity covered by the present trouble report is billable.	Notify state/status change.
REQ-TA-FUN-501	M	A customer should be able to request the cancellation of a trouble report and indicate in the trouble report the person making the request.	Cancel trouble report.
REQ-TA-FUN-502	M	When the service provider requests clearance verification for the trouble report, the activity timer should be suspended. It should be restarted if the customer denies clearance.	Request clearance of trouble report.
REQ-TA-FUN-503	M	The customer should be allowed to verify the trouble is cleared prior to the closure of the trouble report by the service provider.	Verify repair completion.
REQ-TA-FUN-504	M	Once a service provider has deemed a trouble report to be cleared and has notified the customer, the service provider should be able to deny the customer the ability to modify some of the information in the trouble report.	Notify closure of trouble report.
REQ-TA-FUN-505	M	The actual cause of the trouble found, together with the solution provided and other relevant factors should be recorded in the trouble report.	Notify closure of trouble report.

Requirement No.	M/O	Brief description of requirement	Interaction
REQ-TA-FUN-506	M	It should be possible to compute/determine the outage duration of the equipment/service from the repair activity information held in the trouble report or the repair activity object instance, if present. This outage duration should then be added to the trouble report at the time of closure.	Notify closure of trouble report.
REQ-TA-FUN-507	M	The customer should be able to receive an indication when an instance of a trouble report is deleted locally by the service provider.	Notify deletion of trouble report.
REQ-TA-FUN-601	M	It should be possible for either the service provider or customer to maintain trouble report history.	Retrieve trouble report history.

ii) Interactions initiated by service customer

The following provides a narrative description of requests initiated by the SC and sent across the B2B/C2B interface to the SP for action:

- 1) Request creation of trouble report – B2B/C2B interface should support the request of creation of a trouble report from a customer. When a customer needs to initiate a request that a trouble report be created on the service provider side, the customer can send a request across the B2B/C2B interface.
- 2) Get state/status of trouble report – A customer shall be able to track the progress of a trouble report to resolution by initiating a request for the trouble report state and/or status at any time from the SP.
- 3) Modify trouble report – When a trouble report is in open and active state, the customer 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.
- 4) Group trouble reports – A customer can group trouble reports together, e.g., to indicate a common problem.
- 5) Retrieve trouble report information – A customer should be able to retrieve complete descriptions of a specific set of trouble reports based on an ad hoc filter definition or a distinct trouble report based on a trouble report ID.
- 6) Cancel trouble report – A customer should be able to request the cancellation of a trouble report and indicate in the trouble report the person making the request.
- 7) Verify repair completion – The customer should be allowed to verify the trouble is cleared prior to closure of the trouble report by the SP.
- 8) Retrieve trouble report history – It should be possible for a customer to retrieve trouble report history across a B2B/C2B interface.
- 9) Request creation of trouble type – A B2B/C2B interface should support the request for creation of a trouble type from a customer. When a customer needs to initiate a request that a trouble type be created on the service provider side, the customer can send a request across the B2B/C2B interface.
- 10) Retrieve trouble type information – A customer should be able to retrieve complete descriptions of a specific set of trouble types based on an ad hoc filter definition or a distinct trouble type based on a trouble type ID.

- 11) Modify trouble type – When a trouble type-related trouble report is "closed", a customer should be able to update the trouble type with new information (e.g., additional trouble type-related information, etc.) across the B2B/C2B interface.

iii) Interactions initiated by service provider

The following provides a narrative description of requests initiated by the SP and sent across the B2B/C2B interface to the SC for action:

- 1) Notify creation of trouble report – After a trouble report is created, either initiated by the customer or by the SP, the service provider should inform the customer about the creation.
- 2) Notify state/status change – The state/status of the trouble repair activity should be updated as the service provider's trouble resolution progresses and the customer should be notified of all changes.
- 3) Notify modification of trouble report attribute value – When any attribute value is modified, the SP should inform the customer about the modification.
- 4) Request clearance of trouble report – When a service provider has deemed a trouble report to be cleared, the service provider initiates a request for the verification of the clearance of the trouble report to the customer.
- 5) Notify closure of trouble report – The service provider should notify the customer about the closure of the trouble report.
- 6) Notify deletion of trouble report – The service provider should notify the customer about the deletion of some trouble reports.
- 7) Request authorization for repair activities – When the service provider needs access to the site or equipment owned by the customer, the SP should send a request to the customer across the B2B/C2B interface.
- 8) Notify group of trouble reports – After some trouble reports are grouped together, the SP should inform the customer about the group.
- 9) Notify creation of trouble type – After a trouble type is created, either initiated by the SC or by the SP, the service provider should inform the customer about the creation.
- 10) Notify deletion of trouble type – The service provider should notify the customer about the deletion of some trouble types.
- 11) Notify modification of trouble type attribute value – When any attribute value is modified, the SP should inform the customer about the modification.

6.3 Specification level requirements

This clause contains textual details for each of the use cases shown in the high-level use case diagrams of clause 6.2. The details are provided to clarify the roles of external actors and telecommunications resources and to refine the previous high level use case diagrams to a specification level. Use case details include the following components: