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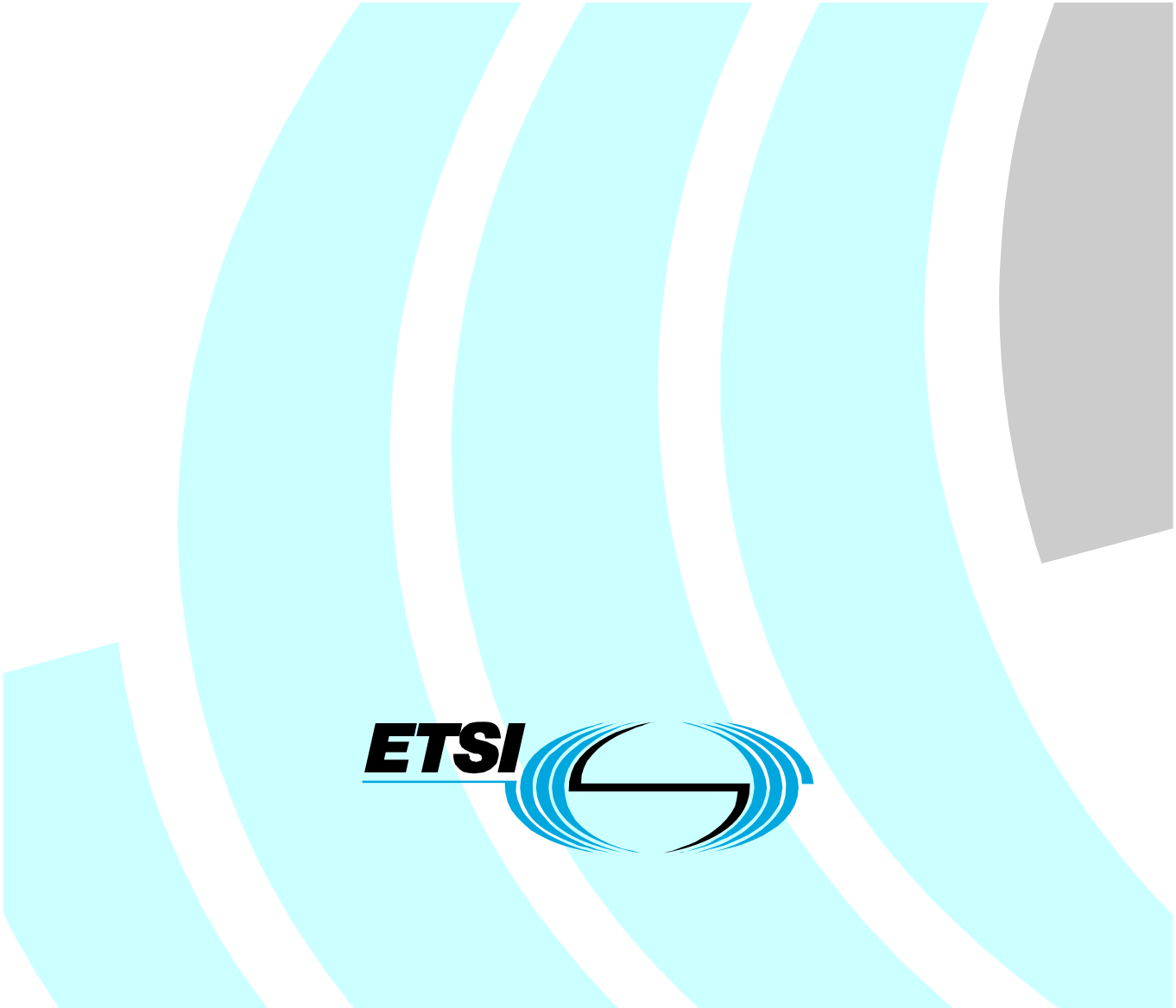
Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Subscription Management; Part 1: Requirements



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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

Introduction

The focus of the present document is on Subscription Management (SuM) which is necessary to allow Service Providers and Operators to provision, control, monitor and bill the configuration of NGN services that they offer to their subscribers.

Subscription Management (SuM) is a key feature that allows service providers and operators to provision their TISPAN NGN network entities with the data necessary for delivering services for a specific subscriber. Moreover, it also allows subscribers to configure their services when they have these capabilities.

Subscription Management (SuM) aligns with a subset of the eTOM fulfilment process. SuM is concerned with the definition of all the mechanisms and information needed to efficiently and flexibly configure the TISPAN NGN network with the appropriate data needed for a specific subscriber.

SuM is a telecommunications management framework that allows the service providers to leverage their network resources to:

- Validate (register, authenticate, and authorize) a request for service from a user.
- Collect, store, update, and distribute the Service Profile information for the user.
- Select the trusted network resources to manage access, distribution, and control of the profile data information for the user.
- Direct the network resources to promptly deliver the service requested to the user according to said profile information.

Subscription Management (SuM) fulfils the following essential TISPAN NGN requirements:

- The **"User equipment Diversity"** allows the users to access their TISPAN NGN services by a variety of UEs.
- The **"Service Diversity"** allows the users to access TISPAN NGN services provided by service providers or third party application server providers.
- The "**Access Diversity**" allows the users to access their TISPAN NGN services over a wide variety of network access such as xDSL, WLAN, GPRS, etc.
- **Nomadism:** allows the users to access their TISPAN NGN services in multiple nomadism scenarios.

1 Scope

The purpose of the present document is the definition of the necessary requirements for the Subscription Management (SuM) which is paramount for the NGN service delivery within TISPAN NGN.

The present document contains the specification of the requirements for the following:

- An end-to-end information model to cover all the mandatory/optional information related to Subscription Management (SuM) that shall be provisioned on the NGN Network.
- A Subscription Management (SuM) functional architecture which hides the complexity of the different functional entities to be configured including the CPE and the AS.

The present document is the first release of the TISPAN Subscription Management (SuM) requirements. Only Service Configuration and Activation aspects are addressed within this first release.

For the current release, configuration and customization of services by users and user's rights management, roles management are out of scope.

The requirements described in the present document including the defined information model are done according to the specifications of TISPAN R1. The present document will evolve according to new specifications in TISPAN R2.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

[1] Void.

[2] ETSI TS 123 008: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Organization of subscriber data (3GPP TS 23.008 version 7.6.0 Release 7)".

[3] Void.

[4] ETSI TS 132 140: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Subscription Management (SuM) requirements (3GPP TS 32.140 version 7.0.0 Release 7)".

[5] GB921: Enhanced Telecom Operations Map (eTOM), The Business Process Framework, Release 5.0.

[6] GB921D: Enhanced Telecom Operations Map (eTOM), The Business Process Framework, Addendum D: Process Decompositions and Descriptions. Release 5.0.

[7] ETSI TS 188 001: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN management; OSS Architecture Release 1".

[8] Void.

[9] Void.

[10] ETSI TS 188 006-2: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Management Information Model (MIM); Part 2: Information service".

[11] ETSI TS 129 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents (3GPP TS 29.228 version 7.6.0 Release 7)".

[12] ETSI TS 132 172: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Telecommunication management; Subscription Management (SuM) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS) (3GPP TS 32.172 version 7.0.0 Release 7)".

3 Definitions, and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

offered service: service offered by the Service Provider to the market

service profile: collection of service and user related data as defined in TS 129 228 [11]

service provider: entity that offers services to subscribers

NOTE: The exact terms, their definition and use within the present document may be modified as a result of the development of the SuM information model and SuM functional architecture.

static data: data that is not modifiable during a NGN session

subscribed service: service subscribed by the subscriber

subscriber: entity (associated with one or more users) that is engaged in a subscription with a service provider

NOTE: The subscriber is allowed to subscribe and unsubscribe services, to register a user or a list of users authorized to use these services, and also to set the limits relative to the use that associated users make of these services.

subscription: describes the commercial relationship between the subscriber and the service provider

user: entity that consumes the services subscribed by the subscriber

user "activated and customized" service: service activated and customized by the user

user assigned service: service configured by the subscriber and assigned to the user

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AS	Application Server
CLF	Connectivity session Location and repository Function
CPE	Customer Premises equipment
CRBT	Color Ring Back Tone.
DSL	Digital Subscriber Line
eTOM	enhanced Telecom Operation Map
GPRS	General Packet Radio Service
IMS	IP Multimedia Subsystem
MIM	Management Information Model

NACF	Network Access Configuration Function
NASS	Network Attachment Subsystem
NGN	Next Generation Network
NOSI	NGN OSS Service Interface
NRM	Network Resource Model
OSS	Operation and Suport System
P-CSCF	Proxy Call Session Control Function
PDBF	Profile Data Base Function
PSTN	Public Switched Telephony Network
RM&O	Resource Management and Operations
S/P	Supplier/Partner
S-CSCF	Serving Call Session Control Function
SID	Shared Information/Data model
SIP	Session Initiation Protocol
SM&O	Service Management and Operations
SuM	Subscription Management
UAAF	User Access Authorization Function
UE	User Equipment
UML	Unified Modelling Language
UPSF	User Profile Server Function
VOD	Video On Demand
WLAN	Wireless Local Area Networks
xDSL	all the Digital Subscribers Loof technologies

4 Subscription Management (SuM) description

4.1 SuM overview

Allowing service providers to deliver, control, monitor and bill services to their subscribers in a timely and correct manner, require the translation of each specific subscription into necessary/optional network data and their provisioning on the appropriate network functionalities such as UPSF, AS, CPE, etc. Subscription Management (SuM) is the feature that realizes the above translation and provisioning artefacts. Moreover, Subscription Management (SuM) must provide means that allow subscribers to configure their services when they have configuration access rights.

Subscription Management (SuM) can be summarized as the framework that offer service providers means for efficient management of all the data related to a specific subscription. This framework is part of the service delivery "processes" used by the service provider to deliver services for subscribers.

The SuM framework is responsible of handling only the data related to the service delivery of a specific subscription. Moreover, as depicted in figure 1, data provisioned thanks to the Subscription Management (SuM) framework can also be used in other processes such as monitoring, billing, etc.

Subscription Management (SuM) framework, as shown in figure, involves the following entities:

- Service provider: offers a set of services.
- Subscriber: may subscribe to one ore more services. The service provide will have then to manage the corresponding subscription by provisioning the necessary data and giving the following rights to the subscriber:
  - To become a user by using the services.
  - Give rights to its users, who will be then linked (or associated) to this subscription.
- User: use the authorized services.
- Services

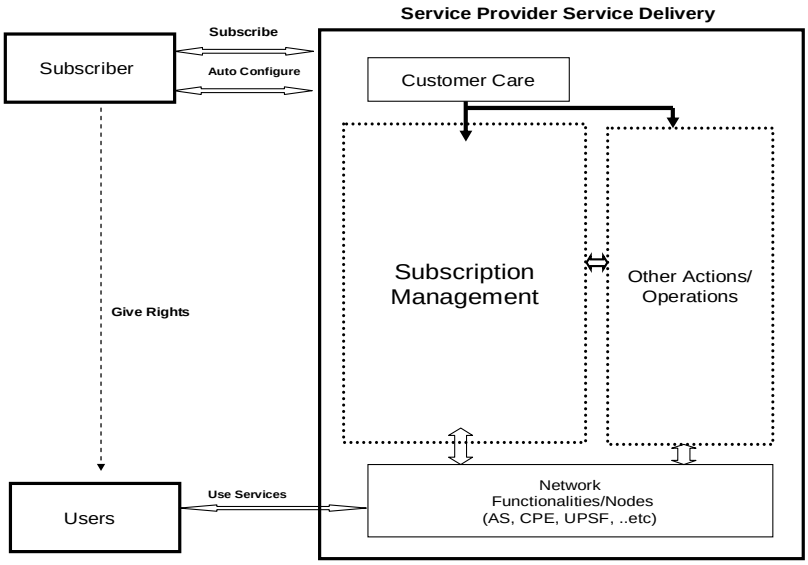

Figure 1: Subscription Management Overview

Subscription Management (SuM) aligns with subset of the eTOM fulfilment process, in particular the customer relationship management process, the service management and operations process, and the resource management and operation process.

4.2 SuM and eTOM fulfilment process

Subscription Management (SuM) can be viewed as part of the eTOM fulfilment process, in particular the customer relationship management process, the service management and operations process and the resource management and operation processes. However, the first release of the present document focuses only on the service and resource management parts.

The eTOM fulfilment process is defined as a vertical end-end process grouping 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.

As shown in figure 2, eTOM fulfilment process is composed of the following process:

- **Selling, marketing fulfilment response and order handling:** These processes are located within the customer relationship management process grouping which is responsible of functionalities necessary for the acquisition, enhancement and retention of a relationship with a customer. The order handling process is responsible for accepting and issuing orders.

- **Service configuration and activation:** This process is part of the service management and operations processes grouping which provide all the functionalities necessary for the management and operations of communications and information services required by or proposed to customer. The focus of the service management and operations is on service delivery and management as opposed to the management of the underlying network information technology. The service configuration and activation process encompasses the installation and configuration of the service for customers, and support the reconfiguration of the service (either due to customer demand or problem resolution).

- **resource provisioning:** This process is part of the resource management and operations process grouping which is responsible of managing all the resources (networks, IT systems, servers, routers, etc.) and delivering services required by or proposed to customers. The focus of the resource management and operations is to ensure that the network and information technologies infrastructure supports the end to end delivery of the required services. The resource provisioning process encompasses allocation and configuration of resources to individual customer service instances in order to meet the service requirements.

- **S/P requisition management:** This process is part of the Supplier/Partner (S/P) relationship management process grouping which enable the direct interface with the appropriate lifecycle, end-to-end customer operations or functional processes with supplier and/or partners. The S/P requisition management process manage requisitions with partners/suppliers to ensure on-time and correct delivery of the S/P product or service requested by the enterprise.

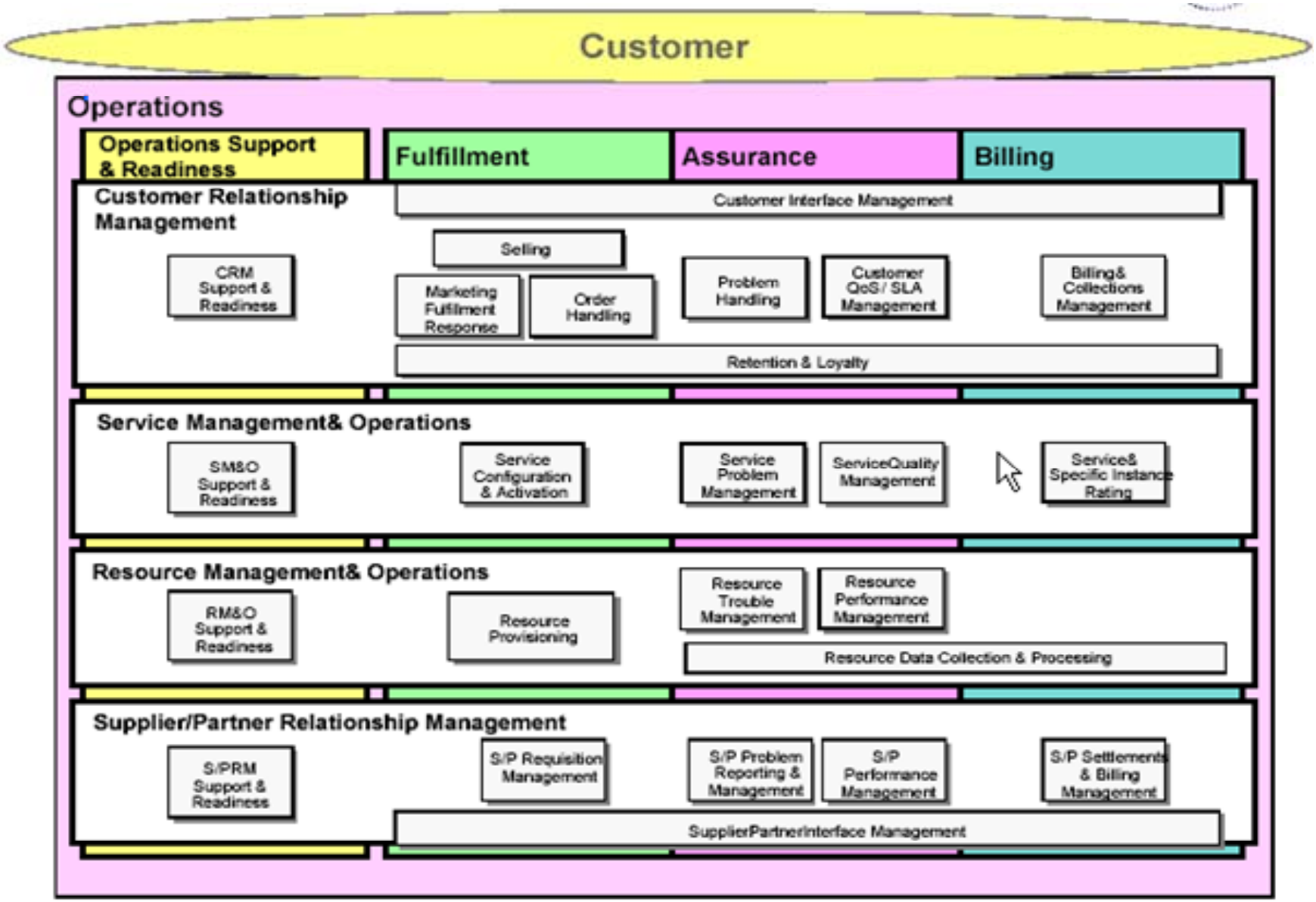

Figure 2: eTOM Operations Processes

SuM feature is the part of the fulfilment process which is responsible of handling and installing the data related to specific subscription.

According to the eTOM fulfilment process, SuM belongs to the following eTOM processes:

- Order handling.
- Service configuration and activation.
- Resource provisioning.

The order handling part of SuM is responsible of issuing the order of installing new subscriber to the service configuration and activation.

The service configuration and activation part of SuM ensures the translation of the subscription into network information that are independent from the underlying network technology.

The resource provisioning part of SuM ensures the configuration of the network information received from the service configuration and activation. This configuration is done by mapping the network information into the appropriate network data according to the deployed network technology.

The following table shows the relationship between ETOM fulfilment process and Subscription Management (SuM).

Table 1: Subscription management in ETOM fulfilment processes

eTOM Fulfilment Processes	Process level 2	Applicable to SuM	Refer to the Enhanced Telecom Operations Map (eTOM) GB921
CRM Fulfilment	Order Handling	**Yes**	
	Marketing Fulfilment Response	**No**	
	Selling	**No**	
SM&O	Service Configuration and Activation	**Yes**	
RM&O	Resource Provisioning	**Yes**	
S/P Relationship Management	S/P Requisition Management	**No**	

As a result of the previous table, the eTOM fulfilment processes involved in Subscription Management (SuM) can be shown as follows:

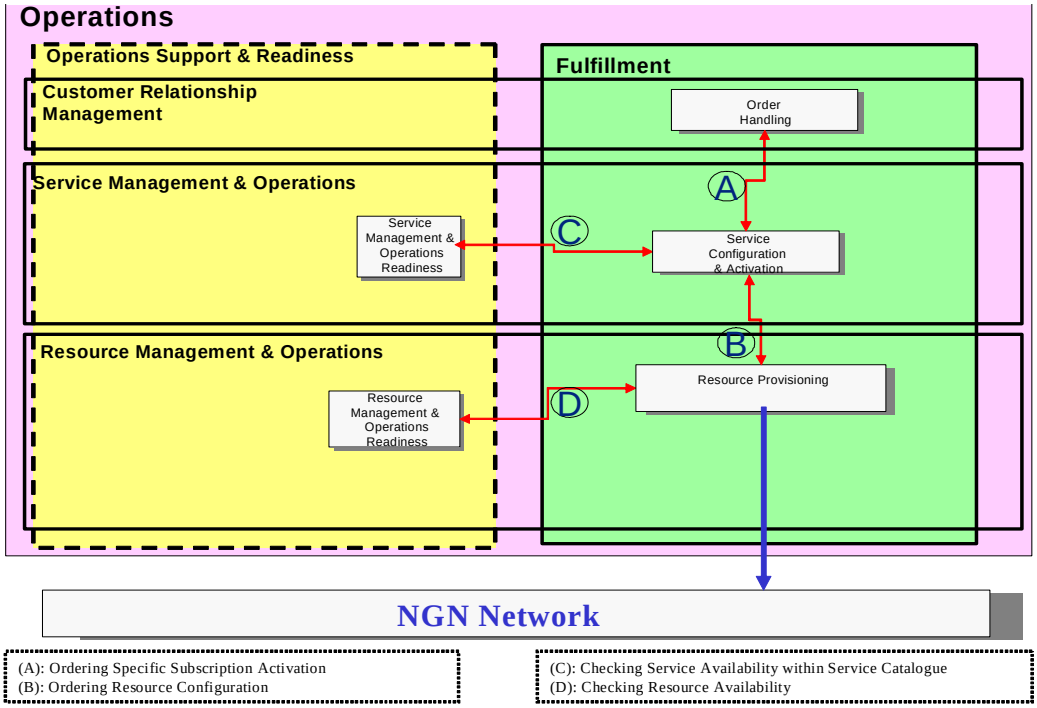

Figure 3: eTOM Processes involved in SuM

5 SuM value chain model

5.1 Introduction

The Subscription Management (SuM) value chain model concerns the definition of high level use-case in the context of Subscription Management (SuM), which allows the development of a broad overview. The high level use-case is depicted in figure 4.

It is required to have a description for each use case within the present document. Such descriptions will utilize the "use case" templates from 3GPP (see bibliography 3GPP TR 32.803).

Additionally, some example scenarios of TISPAN Subscription Management (SuM) are given in annex A.

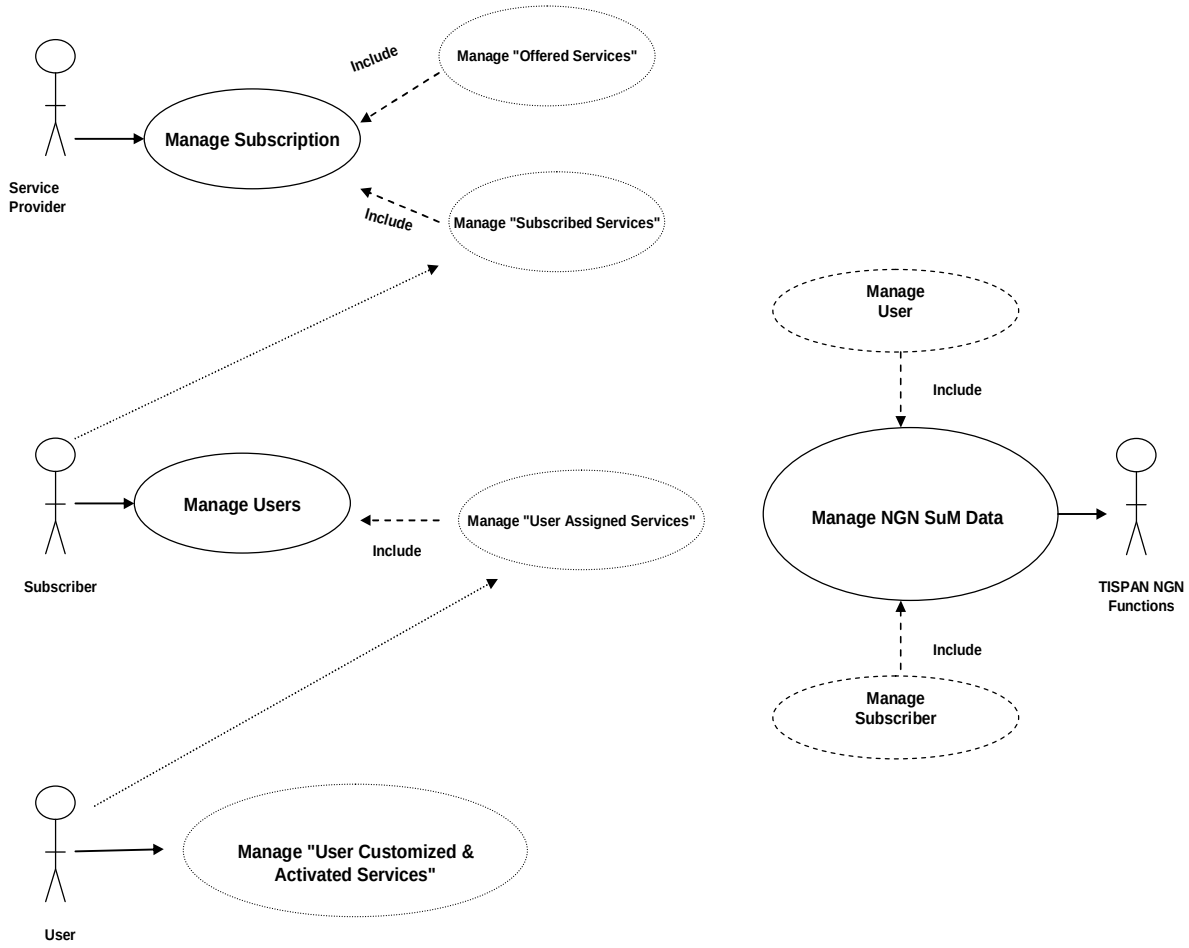

Figure 4: High level use-case diagram

The high level use-case diagram comprises the following use-cases:

- **Manage subscription:** This use-case is related to the management of a subscription of a specific subscriber. This use case includes the management of the "offered services" and of the "subscribed services" use-cases. This two uses cases can be defined as follows:
  - **Manage offered services:** Refers to the management of the services offered by the service provider to the market, and is part of the manage subscription use-case. The management of the offered services by the service provider is out of the scope of the current release of Subscription Management (SuM).
  - **Manage subscribed services:** Refers to the management of the services subscribed by a subscriber within a subscription, and is part of the manage subscription use-case.
- **Manage user:** Concerns the management of the users associated to a subscriber. This use-case includes the use-cases related to the management of the services assigned by the subscriber to its users.
  - **Manage user assigned services:** Refers to the management of the services that are assigned by a subscriber to a given user, and is part of the manage users use-case. This consists in the assignment, and the association of specific rights (e.g. activation/deactivation, customization, etc.) of some or all of the subscribed services to the user.
- **Manage user customized and activated services:** Referes to the management of the services that are assigned to the user by activating them or not, and customizing them or not according to the rights given by the subscriber. This use-case is part of the "manage its assigned services " use-case.

- **Manage NGN SuM data:** This use case refers to the management of the subscribers and their users' data within the NGN functional entities.

Within the high level use-case diagram, four kinds of services are highlighted. The transition from one service to another is depicted in figure 5.

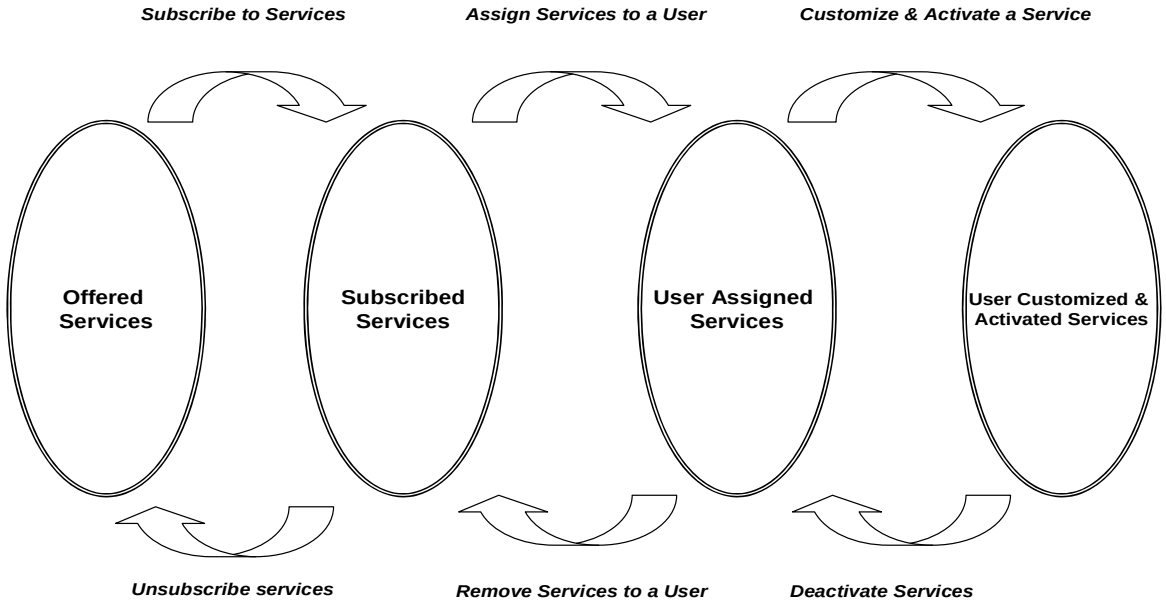

Figure 5: Services State Transition

5.2 Manage subscription use-cases

The manage subscription use-case is an abstract use-case. It includes all more concrete use-cases listed below:

- **Create subscription:** This use-case allows the service provider to create a new subscription.
- **Delete subscription:** This use-case allows the service provider to delete an existing subscription.
- **Update subscription:** This use-case allows the service provider or the subscriber to modify subscription (e.g. add new services). Some of the information can be updated only by the service provider.
- **Read subscription:** This use-case allows the service provider or subscriber to get all information related to a/his specific subscription.

In addition to the precedent use-cases, the "manage subscription" includes also abstract "manage subscribed services" which contain the following concrete use-cases:

- **Add service:** This use-case allows the service provider to add a new service to a specific subscription. Once this service is added, it is part of the Subscribed Services.
- **Subscribe to service:** This use-case allows a subscriber to subscribe to a new service offered by the service provider.
- **Unsubscribe a service:** This use-case allows a subscriber to unsubscribe a subscribed service.
- **Configure subscribed service:** This use-case allows the service provider or a subscriber to configure or reconfigure a subscribed service. Part of the information is only modifiable by the service provider only.

- **Remove subscribed service:** This use-case allows the service provider to remove a subscribed service from a subscription.
- **Read subscribed service:** This use-case allows the service provider or the subscriber to get all information related to a/his subscribed service.

5.3 Manage users use-cases

The manage users use-case is an abstract use-case. It includes the following concrete use-cases:

- **Create user:** Allows the subscriber to add a new user to his subscription.
- **Delete user:** Allows the subscriber to delete a user from his subscription.
- **Update user:** Allows the subscriber to (re)configure a user. It may also allows the user to (re)configure itself. Part of the configuration information is only modifiable by the subscriber.
- **Read user:** This use case allows the subscriber or user to get all information related to a/his user.

In addition to the precedent use-cases, the "manage users" use-case includes also abstract "manage user assigned services" which contain the following concrete use-cases:

- **Assign service:** Allows the subscriber to assign a service to a user and to specify the associated rights (e.g.: customization, activation/deactivation, etc.)
- **Update service:** This use case allows the subscriber to (re)configure an assigned service.
- **Delete assigned service:** Allows the subscriber to delete an assigned service from a user.
- **Read service:** Allows the subscriber or user to get information on a specific service (e.g. active or no).

5.4 Manage "user customized and activated services" use-cases

The "manage user customized and activated services" is an abstract use-case which includes the following concrete use-case:

- **Activate service:** Allows the user to activate a specific service.
- **Update service:** Allows the user to (re)configure an activated service (e.g. set the phone number for the call forwarding service).
- **Deactivate a service:** Allows the user to deactivate a service.

5.5 "Manage NGN SuM data" use-cases

The "manage NGN SuM data" is an abstract use-case which includes the following concrete use-case:

- **Install subscriber:** Allows the installation of a new subscriber.
- **Update subscriber:** Allows the (re)configuration of a subscriber.
- **Delete subscriber:** Delete a subscriber.
- **Read subscriber:** Get the information related to a subscriber.
- **Install user:** Allows the installation of a user with its associated services.
- **Update user:** Allows the (re)configuration of a user.
- **Delete user:** Allows deleting a user.

- **Read user:** Get the information related to a service of a user.

6 SuM high level requirements

6.1 Introduction

As described before, Subscription Management (SuM) is related to all the artefacts needed by service providers to provision their network with the data related to a specific subscription. Furthermore, these artefacts must allow subscribers to configure their services if they have configuration access rights.

Subscription Management (SuM) must define the following:

- An end-to-end information model to cover all the mandatory/optional information related to Subscription Management (SuM) that must be provisioned in the NGN Network.
- A Subscription Management (SuM) functional architecture which hides the complexity of the different functional entities to be configured including the CPE and the AS.

For the end-to-end information model, the objectives are to describe the concepts (data, attributes and relations) necessary for the provisioning of services for a specific subscriber. The provisioned data can be either static or dynamic, but only static data are covered within the present document. Static data are permanent or semi-permanent data. Typically static data are provisioned during the process of service and network resources configuration and are non modifiable during a NGN session. Dynamic data are characterized by frequent changes. For example, the IP address allocated to an equipment in the access network is a dynamic data because it is allocated for a given lifetime.

Regarding the Subscription Management (SuM) functional architecture, the focus will be on designing a functional architecture that offers service providers and operators means for a simple, flexible and efficient subscription data repartition in the TISPAN NGN network entities.

6.2 Requirements on information model

The purposes of specifying a SuM information model is to capture all the information needed for the management of a specific subscription. This information concerns network access identification and credential, user /subscriber identification, service identifications and credentials.

Within this first release of the document, SuM shall handle the following information parts:

- Information that need to be provisioned by resource provisioning process on the NGN functional entities;
- Information exchanged between service configuration and activation and resource provisioning process.

Other information is out of the scope of this first release.

R1) The SuM information model shall be flexible in way that adding new information can be achieved easily and without modifications to the existing information and relationships.

R2) The SuM information model terminology shall be in line with all the IMS information model terminology, and SuM model relationships must be in line with IMS model relationships defined by 3GPP (TS 123 008 [2].

R3) The SuM Information Model shall be connected to an existing "model infrastructure".

NOTE 1: Examples of "model infrastructure" are, but not limited to, the TMF Shared Information/Data model (SID), the TISPAN Management Information Model (MIM), UML etc.

NOTE 2: A most promising candidate to connect the SuM Information model to is TISPAN WG8's Management Information Model (MIM) (refer to DTS/TISPAN-08016-2-NGN-R2 [10]).

R4) The SuM information model shall model the ability to grant different configuration rights for service usage to different users.

R5) All key concepts and entities must be referred by a use case.

R6) The 3GPP SuM NRM model in TS 132 172 [12] should be re-used as much as possible.

R7) The SuM information model shall represent/model all the management entities justified either by the existence of a use case or a specific technical analysis.

R8) For each management entity of the Subscription Management (SuM) information model, a clear definition must exist.

R9) Relationships and cardinality between the SuM information model management entities must be well justified based on the TISPAN specifications (stage 1, stage 2, and stage 3 standards).

R10) The provider of the NGN Services (e.g. 3rd party service provider) can be different from the provider of the NGN service resources and NGN transport resources.

R11) The provider of the NGN service resources can be different from the provider of the NGN transport resources.

6.3 Requirements on functional architecture

The purpose of the SuM functional architecture is the design of the NOSIs needed for management of a specific subscriber, user, service profile and user services.

The SuM functional architecture shall deliver the necessary NOSIs for the resource provisioning and service activation processes.

R1) The SuM functional architecture shall hide the complexity of the different functional entities to be configured including the CPE and the AS.

R2) The SuM functional architecture shall allow management of necessary/optional data, operations and notifications related to Subscription Management (SuM).

R3) The SuM functional architecture shall be easily extensible for the support of new operations, data, and notifications.

R4) The SuM functional architecture shall define the NGN OSS service interfaces for the realization of the following processes:

- SM&O service configuration and activation process.
- RM&O Resource Provisioning process.

R5) The NOSIs related to service configuration and activation shall be network technology agnostic without any knowledge of the NGN functional entities that are involved.

R6) The NOSIs related to resource provisioning are responsible of NGN functional entities (including CPE and AS) management and shall hide the complexity of the different NGN functional entities to the NOSIs related to service configuration and activation.

R7) The NOSIs related to service configuration and activation shall manage the configuration of new subscription, and support of the reconfiguration of installed subscription (either due to customer demand or problem resolution).

R8) The SuM functional architecture shall comply with the eTOM operation regarding fulfilment as described in clause 4.2 with the following processes:

- Order handling.
- Service configuration and activation.
- Resource provisioning.

R9) The SuM functional architecture should consider reuse as much as possible of 3GPP existing standards.

6.4 Requirements on TISPAN NGN functional entities

The master NGN functional entities where subscription data are stored are the following:

- UPSF: holds service-level user related information.
- AS: contains SuM relevant data for value-added services.
- CLF: contain user accesses network information.
- NACF.
- PDBF: contains user authentication data (user identity, list of supported authentication methods, key materials, etc.) and information related to the required network access configuration: these data are called "user network profile".
- CPE.

The SuM framework shall allow the creation, read, update, and deletion of subscription data within the above entities.

Within the SuM functional architecture, specific management entities may be defined for the purpose of efficient management of the TISPAN NGN.

NOTE: Other NGN functional entities may, for performance or other issues, receive/retrieve some data related to user subscriptions from the above mentioned "master" functional entities and cache them locally.

6.5 Security requirements

R1) The SuM solution shall comply with specific local, national, and regional security regulations.

R2) Subscription data shall be safeguarded against unapproved disclosure or usage.

R3) Access to SuM data shall only be permitted in an authorized and secure manner.

R4) Secure mechanisms shall be available for the transfer of SuM data to, from or between authorized entities. The secure mechanisms to be applied shall be appropriate to the level of confidentiality of the data, the endpoints of the transfer and the routes that are available for the transfer of the data.

R5) Audit records should be maintained for all SuM transactions to facilitate resolution of security violations.

Annex A (informative): Example scenarios of TISPAN SuM

This informative text contains example scenarios of TISPAN Subscription Management (SuM).

A.1 Example 1

The following figure gives a view of the relationship between the service provider, subscriber, and users, according to the definitions in clause 3.1.

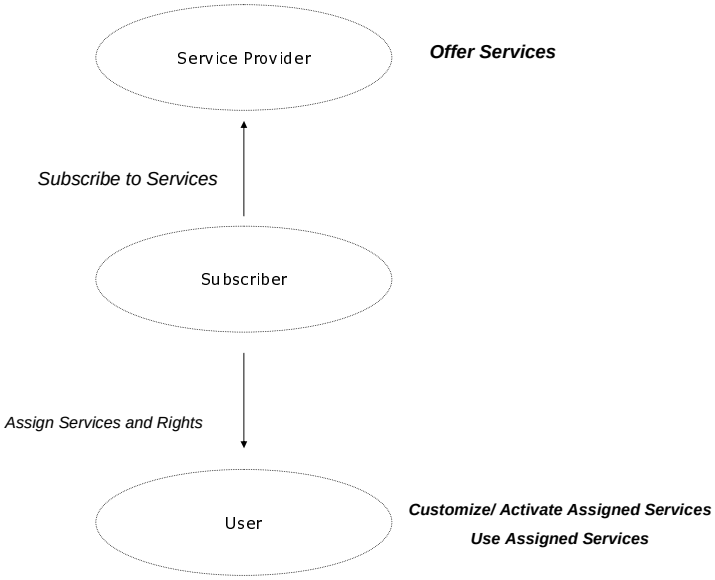

Figure A.1: Relation between services and subscriber/user/service provider

The following example gives a concrete scenario depicting the relationship between a service provider, subscriber and users.

A Service Provider (SP) offers the following network accesses:

- xDSL.
- GPRS.
- WLAN.

SP offers the following services which can be used over the above network accesses:

- Voice.
- TV.
- Internet access.
- Video On Demand.

In addition to these services, service provider "A" provides the following supplementary services for the voice service:

- Call forwardin.
- CRBT (Color Ring Back Tone).

The Subscriber David, subscribe to the following:

- XDSL and GPRS network accesses.
- Voice with call forwarding and CRBT supplementary services.

David creates the following 3 users with their assigned services and associated right:

- David: Voice with CRBT and call forwarding.
  - This service can be used in the subscribed network accesses.
- David Wife: Voice with CRBT and call forwarding
  - Call forwarding can not be activated towards mobile phone.
  - Service can be used only in xDSL access.
- David Son: Voice with no supplementary services.
  - Service can be used only on xDSL access.

A.2 Example 2

The following examples are related to the users diversity within TISPAN NGN, depicts some scenarios that are possible within TISPAN NGN and thus supported by TISPAN SUM:

- One subscriber, having only one user. This user has one fixed terminal (SIP phone) connected on a DSL access.
- One subscriber having only one user. This user has several fixed terminals on a DSL access: as an example 2 Pots connected behind a residential gateway plus a SIP Visio Phone on his personal computer.
- The family case with a head of family as subscriber, with several users that are anonymous, with several Pots connected behind a residential gateway, all used in a shared way.
- The family case with a head of family as subscriber, with several users, with several Phone sets behind the same residential gateway with two in a shared way (e.g. in the living room, and in the kitchen), with one dedicated to the teenager in its room , and one dedicated to parents in their bedroom. There is a family phone number and also a personal number for each family member.

Annex B (informative): Bibliography

- ETSI TR 182 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Organization of user data".
- ETSI TR 121 905: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Vocabulary for 3GPP Specifications (3GPP TR 21.905 version 7.4.0 Release 7)".
- ETSI TR 180 000 (V1.1.1): "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN Terminology".

History

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