A business view for NGN service usage

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Abstract. Next Generation Networks are expected to deliver services tailored to all users, hence Next Generation Services are moving toward user centric services, relying on multiple cooperating service platforms. To accomplish successfully the usage continuity between these user centric services, we need to model the link between the service as perceived by their end-users and the service platforms involved in the service implementation. Including the studies on services in ETSI and ITU-T with the concepts of the TMF, we propose a service business modeling approach to optimize NGN services architectures.

Keywords: NGN, Service, Business view

1 Introduction

NGN (Next Generation Network) is a concept that has been introduced to take into account the new situation and changes in the telecommunications fields. This new situation is characterized by a number of aspects: the deregulation of markets, the new demand from users for innovative services to meet their needs, and the explosion of digital traffic (increase of Internet usage). The introduction of NGN comprises economical and technical aspects. Economically it allows increasing productivity by creating new usage [1] based on user preferences and related to voice and data services (e.g. voice over IP, Instant messaging, Presence, Streaming and push to talk). It also permits reducing costs for infrastructure maintenance, with only one type of transport network instead of specific ones for each access network. Technically NGN makes the network architecture flexible in order to define and introduce new services easily.

However this flexibility can not be used without a clear definition of what kind of services is possible within the NGN scope and how a user can interact with these services. Next-Generation services are typically described in the literature as I-centric services [2], supporting ambient awareness, personalization and adaptability and using semantic mechanisms for service discovery. But these mechanisms can not directly be used in the scope of the NGN as standardized in ETSI and ITU-T.

In this paper, we propose a business view that defines the possible business relationships between an end-user and NGN services. This view is founded on the

current standards and may evolve with the introduction of new principles in the NGN. Within this paper, the terms user and end-user will be used indistinctively.

2 Current principles of NGN

The promise of the NGN, as defined in the late 90s, was to move from a vertical approach (where access, control and services are closely tied) to a horizontal approach (where each layer provides re-usable elements to other layers). Specification work is ongoing at ITU-T (as described in [3]) to formalize the separation (e.g. through standard protocols or APIs) between a transport stratum and a service stratum. The IP Multimedia Subsystem (IMS) architecture is a realization of NGN principles, relying on the SIP protocol for the session control. The ETSI TISPAN (Telecommunication and Internet converged Services and Protocols for Advanced Networking) project has specified adaptations for xDSL access to IMS.

The transport stratum is composed of:

- Transfer functions from various access networks (UTRAN, WLAN, xDSL) and from the core networks,
- Control functions for these transfer functions (e.g. network attachment control or resource and admission control),
- Transport user profiles (e.g. to store the data linked to network attachment),
- Media handling functions (e.g. for playing announcements or for transcoding).

The service stratum that is composed of:

- Access-independent service control functions (e.g. session establishment control or service triggering control),
- Application functions ; application functions are independent from the service control functions and offer flexibility to answer to user needs,
- Service user profiles (e.g. the list of subscribed services to trigger).

This NGN technical architecture with 2 strata is defined at the ITU-T (figure 1). The NGN architecture may also be represented with 3 layers instead of 2 stratums (this is for instance the case at ETSI). In this case, service control functions and transport control functions are grouped into a control layer. The separation is then between a transfer layer (with transfer functions), a control layer (with transport control functions and service control functions) and an application layer (with application functions).

Beside the definition of the technical architecture, shown in the figure 1, the NGN standardization bodies (ITU-T, ETSI), has also defined which types of services could be realized with this technical architecture.

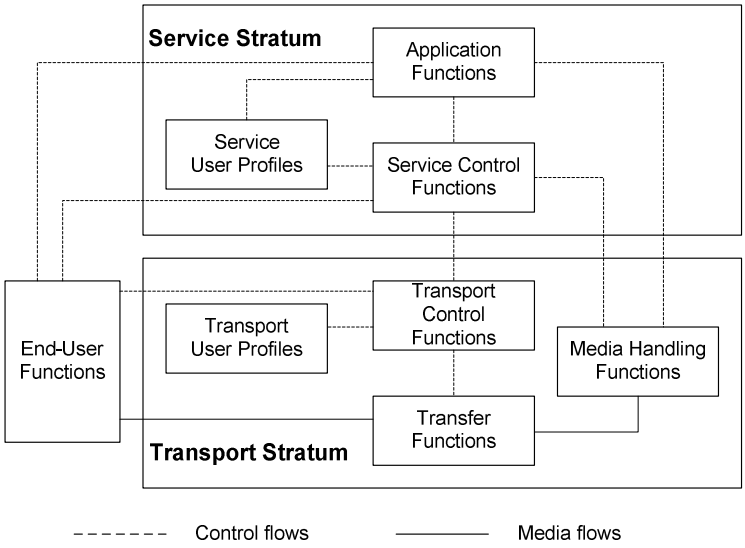

Fig. 1.. NGN technical architecture [3]

3 Standardization of NGN services

A telecommunication service is usually defined as a commercial service fulfilling telecommunication needs from end-users. Telecommunication services are traditionally divided into *bearer services*, *teleservices* and *supplementary services*. According to [4], "a *bearer service* is a type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces" while "a *teleservice* is a type of service that provides the complete capability, including terminal equipment functions, for communication between users". Examples of basic *teleservice* are telephony, facsimile, or data transmission. In ITU-T terminology, a "*supplementary service* modifies or supplements a *basic teleservice*".

As recognized in [5], existing systems have traditionally standardized the complete sets of teleservices, applications and supplementary services which they provide. As a consequence, substantial efforts are often required to introduce new services or simply to modify the existing one (customization). This makes it more difficult for operators to differentiate their services. The trend of ETSI, ITU-T and OMA is thus now to standardize functional service building blocks. These service building blocks are called Service Capabilities at 3GPP, Service Support Capabilities at ITU-T and Service Enablers at OMA. Service Support Capabilities studied at ITU-T [6] typically include presence, location, group management, message handling, push and session handling or device management. Service Enablers at OMA [7] include for example data synchronization, device management, digital rights management, downloading,

e-mail notification, instant messaging, presence and mobile location or multimedia messaging. Service capabilities defined at 3GPP typically include; presence [8] and messaging [9] or conferencing [10].

But if these are deployed in an uncoordinated way by a service provider, the end-user will have to self handle the interaction between the services. In addition, advanced services that combine many service functional service building blocks (like routing voice calls according to the originating community and the availability state) are not possible without coordination between building blocks. The definition of a NGN business view aims to answer to this requirement by specifying how an end-user may interact with NGN services.

4 Definition of a business view for NGN service usage

4.1 Definition of the view

Defining several views of a system is a classical approach in the IT field in order to deal with the full complexity of a system by strictly separating the concerns of the different stakeholders. This principle has been specified in the IEEE standard 1471 [11], following OMG studies. According to IEEE 1471, a view is a representation of a whole system from the perspective of a related set of concerns from stakeholders. A viewpoint is a specification of the conventions for constructing and using a view.

Because we focus on the service usage and the service providing, we do not take into account the customer but only the end-user. The customer is defined in [12] as a person that buys products and services from the enterprise or receives free offers or services. The distinction between subscriber and end-user is introduced in [13] concerning e-business: a Subscriber role is responsible for concluding contracts for the service products subscribed to and for paying for these product; the End User role makes use of the products. The subscriber may define access rights for the end-users when subscribing the product. For example, in a family, the subscriber may be one of the parents, and the children may be end-users. The subscriber usually assigns rights to end-users to use the services he has obtained. The same person may be both subscriber and end-user.

Concerning the term "service", the various meanings of this word are surveyed in [14]. Following [14], a service is here defined as any business activities that have a value added result for an end-user; this activity is offered by a service provider which profits from providing this action. [15] [16].

The first step to define our business view for service usage is to study the stakeholders that will take benefits from this model and to precise their concerns. As we focus here on the usage of NGN services, we take only in consideration the

stakeholders that are involved at a business level in the usage of such services. These stakeholders are:

- Business manager who defines business requirements of the whole telecom services portfolio, are concerned by coherence between services for end-users and by the service added value,
- End-user (i.e. the person who uses telecom services) is interested in realizing his needs with his services, and in the coherence between all the services that he uses,
- Service designer is focusing on the coherence between all telecom services in terms of usage, reusability of service components, functional interactions between services, software and network integration,
- Helpdesk (after sale) are helping users in case of problems when using their services.

We propose thus to define the NGN business viewpoint as addressing the following concerns for the business managers, end-users, service designers and helpdesks:

- The coherence between telecom services
- The interaction between services and a common environment
- The end-user perception of the service: which needs fill the service

The TMF (TeleManagement Forum) has produced important concepts for modeling business processes, especially in the SID (Service Information/Data model) [12] and in eTOM (enhanced Telecom Operations Map) [13]. The TMF has specified a whole set of processes for fulfillment, assurance and billing of services. However, processes for the service usage were not specified. This is because the usage of the services is traditionally handled by the resources and not by the OSS/BSS.

In addition to eTOM and SID, we introduce here a business modeling of the service as it is perceived from the end-user. As mentioned before, the end-user is a different stakeholder of the customer. In the context of NGN services, we propose then to introduce and to focus on the processes for the usage of services: User Relationship Management (rather than Customer Relationship Management) and Service Usage Operations (rather than Service Management & Operations). These processes are an abstraction of the business activities that have a value added result for en and-user.

4.2 Processes for the usage of NGN conversational services

Various categories of telecom services are described in [5]: conversational services, messaging services, retrieval services (to retrieve information stored in one or many information centers) and distribution services (broadcast services). We consider in this paper only the processes that are required for conversational services. The other categories of services will be studied in a future work.

As mentioned above, the processes for service usage may be divided into two high level processes. As indicated in their names, the User Relationship Management processes aim to manage the direct relationship with the end-user. And the Service Usage Operations processes aim to provide operations for the service usage. These processes are all involving end-users (figure 2).

Considering conversational services, **User Relationship Management** includes the following processes:

- **User Interface Management**. The aim of this process is to authenticate an end-user before he may access to the NGN and to register him by creating a NGN session for this end-user
- **User Retention & Loyalty**. The aim of this process is to initiate and to fill-up the static and dynamic profiles for a NGN end-user
- **Request Composition**. The aim of this process is the composition of a communication request by a NGN caller (e.g. by dialing a phone number)
- **Request Delivery**. The aim of this process is the delivery of a communication request to a NGN callee (e.g. ringing tone and picking-up the phone)
- **Media Session Usage**. The aim of this process is the exchange of media (in a unidirectional or bidirectional way) within a media session.

The **Service Usage Operations** processes provide added value between the request composition and the request delivery, or after the request delivery. It includes:

- **Request Transmission**. The aim of this process is to transmit communication requests by routing them and modifying them according to the subscribed services.
- **Media Session Management**. The aim of this process is to initiate, to modify or to terminate a media session.

Some processes may be further decomposed in lower level activities:

- **User Retention & Loyalty** includes
    - **Establish & Terminate User Relationship** that initiates a profile for the end-user in the NGN services
    - **Build User Profile** that acquires information on end-users. End-user can access to this information, complete it and grant access rights to other users.
- **Request Transmission** includes
    - **Request Admission** that check and authorize a communication request (e.g. according to the user's rights or operator policy rules).
    - **Request Routing** that determine the destination of a request.
    - **Service Matching** that compares a communication request with a list of subscribed services to trigger.
    - **Request Handling** that modify a given request according to service logic.

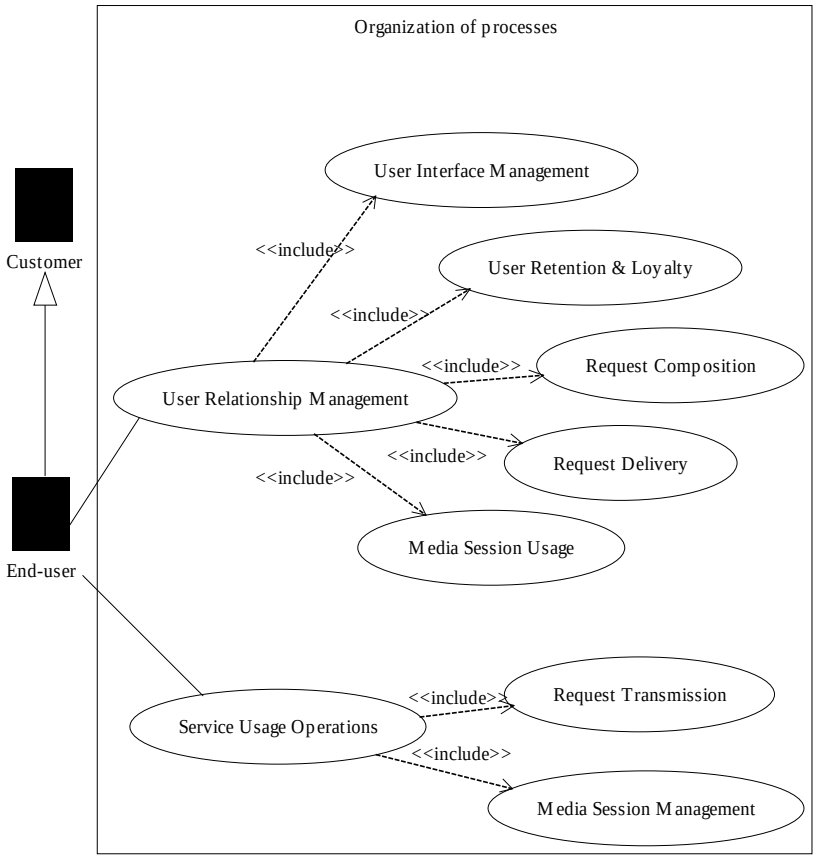

Fig. 2. Processes for NGN **s**ervices usage

These processes are used together to enable the usage of an NGN service by an end-user. The figure 3 below illustrates a typical chain of these processes: The user first register (technically, the NGN system checks his identity by authenticating him) and can then modify his profile or access to a communication service (by composing a communication request). If the user composes a communication request, this request is first checked and authorized. Then this request is compared to the service profile of the user, in order to determine if services (technically application servers) should be triggered. If a service is triggered, this service modifies the initial communication request. When all services are triggered, the destination of the request (generally another end-user, i.e. the callee) is determined and the request is delivered to this destination. If the callee accepts the communication request, a media session is established and end-users can exchanges media through this session.

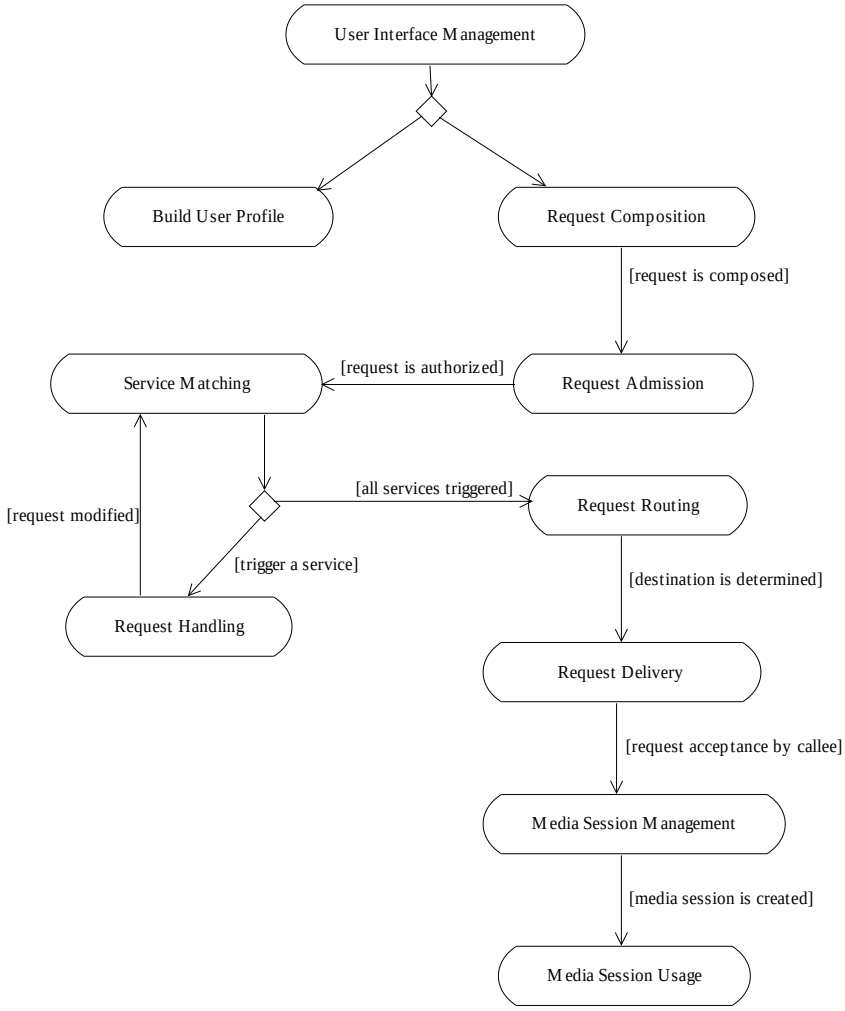

Fig. 3. Activity diagram of NGN service usage processes

4.3 Realization with technical functions

These processes and activities illustrate a business level interaction between the end-user and the NGN service provider. These processes may be used as a common scheme to ensure coherence between the NGN services, at least from the end-user point of view. These processes are realized by the technical functions presented in the section 2, as detailed in the table below.

Table 1. Mapping between processes and technical functions.

NGN service usage processes	*Technical functions*
Establish & Terminate User Relationship	Operator's OSS
User Interface Management	Transport Control Function – Network Attachment Control (network level) Service Control Function (service level)
Build User Profile	Service User Profiles function
Request Composition	End User Functions
Request Admission	Transport Control Function – Resource and Admission Control (network level) Service Control Function (service level)
Service Matching	Service Control Function
Request Handling	Application Function
Request Delivery	End User Functions
Media Session Management	Service Control Function
Media Session Usage	End User Functions

This mapping shows business goal of each NGN technical function. We can thus see which technical function is involved for the realization of a given process and how the realization of a process may be split between many technical functions (e.g. between the network level and the service level).

5 Conclusion

In this paper, we propose to define a business view for the usage of NGN services. This view would be used by NGN operators in order to assure coherence between all NGN services from the end-user point of view. Our proposal is illustrated with a definition of what could be the User Relationship Management and Service Usage Operations processes and activities for conversational services.

This work will be continued with a detailed description of the processes for the other types of services defined in [5]: messaging services, retrieval services and distribution services. This will lead to complete the mapping between processes and technical functions.

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