Information model for enhanced service configuration

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Abstract: **The paper presents a management information model that covers telecommunication management functional areas of service design, provisioning, customer control and query and configuration. It considers the different management requirements of the network operator, service provider and service subscriber. An object-oriented approach to structuring the management information is applied.**

Key words: **TMN, OSI management, IN services.**

I. INTRODUCTION

The main goals of introducing services using the intelligent network concept are to eliminate inflexibility and to reduce the time required implementing a new service. This can be accomplished by using a stable platform that contains common functionality for many services. The unique parts of a particular service are placed on the top of the platform, creating complete service for users. Only a minor part of the service has to be developed. Unique parts are built using SIB (Service Independent Building Blocks) technique. SIBs, which are large software building blocks, are combined in a particular way to form a complete service. When the appropriate SIBs have been combined, only a few parameters need to be established to make service ready. Service provisioning and customization means to adapt the service to the special needs of each customer as different users have different requirements.

In the future intelligent networks where the service subscriber will be able to create his own services it is important to define the management information he accesses to. Service subscriber whether acting as an end-user or service provider requires in addition to the basic service functionality some service-specific management functionality, which can be part of the "core" service or realized as a separate management service offered in addition to the service but belonging to the same commercial offer of that service. It means that the service contract between the service subscriber and the network operator has to involved activities for service design, provisioning, customer control and configuration. These activities are concerned with the so-called "pre service" functions that take place prior to service being putting in place and the functions, which provide access to routing information and (re) configuration at the operational phase. The complicated requirements for service "enhanced configuration" impose the definition of an information model, which specifies managed objects classes and reflects connections between them in the telecommunications management functional areas: design, provisioning, customer control and configuration.

The paper proposes an information model for enhanced service configuration and does not consider the management activities needed for the fault management, performance management, accounting management, and security management. IN configuration management information is structured according to the object-oriented approach, recommended in GDMO (Guidelines to Definition of Managed Objects).

Before defining an information model for service provision the roles, involved in intelligent network service management have to be identified.

II. PARTIES INVOLVED IN SERVICE CONFIGURATION

Service subscribers and service users are the first group who come to mind when intelligent network users are considered. The distinction between the two is that service users use the services and service subscribers own the subscription (pay bills). Often they are the same people, but not always. The services themselves are provided by service providers, who can be network operators or external providers offering service via network. Users want services well suited to their private and/or professional lives. Customer control is an important feature for service subscribers. They want good, easy-to-use and stable service. These same requirements apply to the user interface. An important issue in this context is the requirement for enhanced subscriber control, which comprises the control of subscriber specific service attributes and the generation of and access to the data, representing a special kind of service management.

Service providers, who offer services to the customers of a network operator, are another kind of users of intelligent networks. They are responsible for the creation of new services, which should be carried out on the basis of reusable service components. Their role is mainly involved in service management and comprises service creation, service administration and service operation.

Network operators are also intelligent network users. Many of the services in a network are only used by network operators, for example, operation, administration and maintenance services. Network operators are, of course, responsible for financial transactions between service subscribers and service providers for premium rate services, televoting services and so on.

In deregulated structured as intelligent network communications environment management capabilities are given to the service subscribers, service providers and

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network operators. The harmonized coexistence of different network operators offering basic network infrastructure, different service providers connected with management of their services and a variety of subscribers who take part in network and service customization to their specific needs complicates the management requirements. This imposes standardized method for structuring and access to management information to realize the appropriate functionality for service management.

III. REQUIREMENTS TO SERVICE CONFIGURATION MANAGEMENT

According to the work done within RACE[3] program service configuration has to be spread on service design, service installation, service provisioning and customer control and service configuration in contrast to the traditional definition of "Configuration" TMFAs (Telecommunication Management Functional Areas) [2].

Within TMFAs *service design* covers conceptual design and specification of services i.e. refinement of detailed service description, functional analysis, generation and verification of services specification. It means definition of a high-level structure design of the service. It is important at this phase to consider the possible service interactions, which may cause undesired service behavior. Service provider has to provide tools for transformation of a high level structured design into software components, data definitions, etc. and for service verification (modeling, optimization and simulation).

Provisioning means provision a service to a specific subscriber, i.e. service negotiation, resource assignment, contract and activation. Creating his own service the service subscriber requires the following functionality: provision of help desk facility for customer interaction, service negotiation, service contracting, network resource assignment and a possibility for subscription withdrawal. The activities involved in service provisioning are: creation and setting of subscriber contract, creation of subscriber profile and setting subscriber specific information, deletion of subscriber profile. All these provide a basis for management activities related to customer query and control.

The *customer query and control* covers activities for access to subscriber specific parameters, statistics, quality of service and accounting data. It addresses aspects of customer interaction with service management, that take place after provisioning of the service. It provides the service subscriber access to subscriber-specific management operations as: changing the state of the service, manipulation of specific parameters, provision of customer-specific statistics and drawing up customized bills.

At the service operational phase *configuration* encompasses all the activities for service activation/deactivation, modification of service configuration data and service dismantlement. It includes functions to modify, extend and reconfigure installed services and their state in a global way. Apart of customer specific activities configuration requires a special functionality for: global service enabling, disabling, changing global service parameters, explicit reconfiguration of service components due to performance or maintenance problems, introduction or replacement of new service components. The service subscriber requires the following activities in configuration functional area: changing of service profile according to global modification/reconfiguration, service activation/deactivation, introduction of new service components, reconfiguration of service components.

Consequently, configuring the service for the specific subscriber the network operator has to consider the above mentioned requirements in order to provide management facilities.

IV. SERVICE CONFIGURATION MANAGEMENT INFORMATION MODEL

Using the object-oriented approach to intelligent management information all configuration management entities are grouped in specific managed objects (MOs). There are relationships of association and containment between MOs, showing how these MOs are related. The containment tree is shown on figure 1. The main MOs that are involved in the model are briefly explained as follows.

There is a contract between the service provider and service subscriber, who contains the agreements between them, related to provide service features. The contract also contains the agreements concerning QoS and tariffs. The *Contract MO* represents the legally binding document that specifies the service subscribed to. It indicates the subscriber requirements to a provided service, like tariffs and billing information for the service, plus security, QoS and control capabilities.

The *Network Operator MO* represents the information about the organization, which provides the network infrastructure for IN services.

The *Service Subscriber MO* contains information about an individual person/company who enters into a contract with the operator for the supply of a service. Subscribers can be classified into either domestic or business, which distinguishes between the types of services available.

The *Subscriber Profile MO* represents the services in a given subscription. A customized service, that is tailored from a basic service, provided from a service provider and is adapted to specific subscriber needs, is a part of the subscription.

The *Service Provider MO* contains basic information, which may be important for the network operator. The service provider offers the basic services.

All global information related to IN service is represented by a corresponding *Basic service MO*. The specification refers to a specific functionality, which may be provided to one or more service subscribers. It contains the description of the service features from the service provider viewpoint. In order to fit to the subscriber specific needs the basic service is customized and the result is an adapted service. The *Adapted MO* comprises subscriber-specific service data.

The *Interaction MO* represents the interaction between different service features in one service and also between different services. When the interaction is desired, this is cooperation. When the interaction is undesired or harmful,

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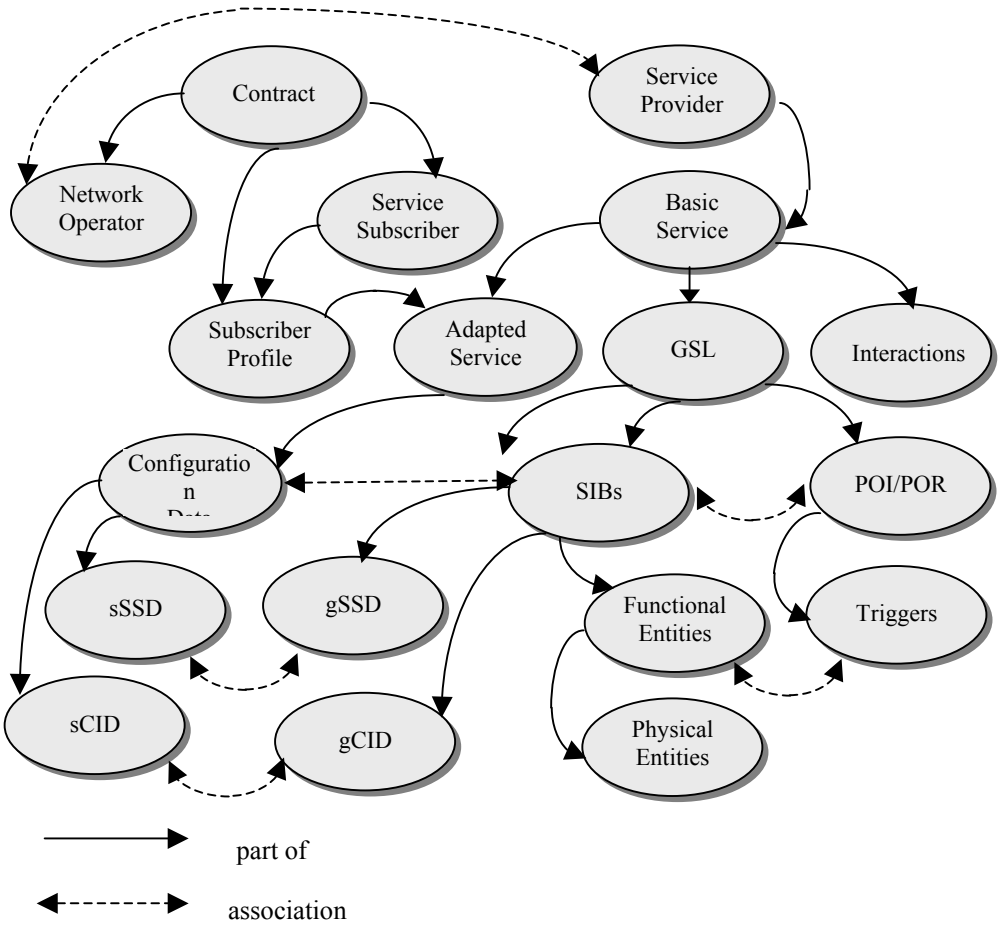

Figure 1 Managed Objects related to Service Configuration

this is interference. Interactions appear because of the different objectives of the services. Despite the IN Services are independent from the concept interference can appear by their execution during the same call.

The service logic is implemented by a service script, representing the global service logic. The *GSL MO* represents the "glue" that describes the order in which the reusable modules SIBs (Service Independent Building Block) are chained together to accomplish services.

The *SIBs MO* represents the global network capabilities that exist in an IN structured network. Its definition enforces the concept of service and technology independence by separating the services from the technology on which services are provided. It is related to *Configuration data MO* that is a part of Adapted Service MO.

In order to be used in a specific service the SIB has to be parameterized with Service Support Data. The *gSSD MO* and *sSSD MO* represent global and subscriber-specific data correspondingly, depending on the relevant Service Feature. For example, the *gSSD MO* may contain elementary call origins and basic announcements, while the *sSSD MO* may contain customized call origins and customized announcements.

Call Instance Data are dynamic data during the execution of an IN service. These can be the following types of data: connection data (e.g. the calling number), data from another SIB (e.g. a translated number), data which identify the service subscriber during an IN-Service etc.

The *gCID MO* and *sCID MO* are the two objects containing these data. The *POI/POR MO* represents the SIB connection with the Global Service Logic, consisting of the SIBs chain. A POI (Point of Invocation) defines the functional launching point from the Basic Call Process to the SIB chain. A specific set of PORs (Points of Return) defines where the SIB chain can logically return to the Basic Call Process.

SIBs involved in service logic are mapped on Functional Entities that describe distributed functionality in IN. The *Functional Entity MO* represents a series of functions in a network element. This series of functions cannot be distributed on different network elements.

Triggers are used to trigger a transaction with service logic. Some of the triggers are common and appointed on a request to business group lines. Others are attached to lines and bundles for private usage or to telephone numbers on subscriber's request. *Triger MO* represents the marked (encountered) triggers for the service.

The *Physical Entity MO* comprises data for the network elements where the Functional Entities are hosted.

V. CONCLUSION

The main result, presented in the paper is the definition of an information model for IN service configuration. The model represents different management requirements of network operators, services providers and service subscribers. The basic approach chosen for structuring the analysis of functional management requirements and the definition of the corresponding management information by means of appropriate object classes is the identification of a set if TMFAs taken from RACE projects. The management information model contains information of global relevance and subscriber-specific information. It may be used for realization of management system.

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