FRAMEWORK SPECIFICATION

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TINA-C IPCM Initial RfP Submission

Submission to TINA-C IPCM RfP:

"A Framework for Connectivity Service Delivery Process (Client/Server & Federation)"

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1. Introduction

1.1. Document Scope

The scope of the final version of the RfP submission is to cover necessary specifications that all together describe a connectivity service delivery system for providers of telecommunication services.

This submission is written from a network operator's point of view. The RfP submission will therefore NOT focus to produce any detailed specifications of any system or element specific implementations. This level of detail is left for the vendors that feel the urge of implementing systems and elements that follows the requirements specified herein.

There are some exceptions to the statement above and the reason for those are motivated by the fact that a detailed specification will hopefully result in faster implementations by motivated vendors. This will in turn result in a less complex world to live in, as a network operator of today. One exception example is the fact that the RfP submission contains a rather detailed proposal to a generic connectivity model that enables to open up the systems, preferable used by network operators. The motivation for this is to enable operators to develop a strategy for building a more vendor independent system architecture.

This version will NOT in detail specify any product descriptions of connectivity service business cases applicable for the two inter-domain RP:s, ConS-RP and FCon-RP. It has been identified by Telia that this work has to be preceded by internal work done by IPCM to agree on, and recommend, a list of suitable business cases for ConS-RP and FCon-RP. One of the main reasons behind this standpoint is that the IPCM WG has to agree on how to apply the concept of facets to the TINA access and usage phase concept before specifying specific business cases. The decision on how to do this mapping will very much affect the definition of what a reference point business case description should contain in terms of TINA access and usage phase facets.

The Telia RfP submission will contain a recommendation on how to do the mapping between facets and the TINA access/usage phase concept.

1.2. Document Purpose

This document has the purpose of being the Telia submission to the TINA-C IPCM Request for Proposal (RfP) named "A Framework for Connectivity Service Delivery Process; Client/Server and Federation" [1]. The submission do NOT have the purpose of by itself replacing any of the existing

specifications, the purpose is instead to propose new input and updates to selected parts within relevant TINA documents.

The work behind the production of this RfP submission was initiated by identifying the following unsolved Issues regarding automated delivery of IP based connectivity services:

- An information model also supporting all kinds of IP connectivity.
- Separation principles between intra- and inter-domain delivery of connectivity services.
- Descriptions on a generic role-based solution how interfaces defined in intra-domain reference points are exported to inter-domain reference points and thus can be reached by inter-domain users/customers.
- How to make practical use of the facet concept defined in TINA-C Compliance and Testing WG (CAT WG).
- How to align the TSAS specification to also include generic service access and subscribtion of telecommunication based connectivity services provided by the TINA Connectivity Provider busienss role.

The purpose of the submission itself is to propose a solution to the problems described above and forms the scope for this version of the submission.

1.3. Assumptions

The reader is assumed to have working knowledge of system modelling/engineering and commonly used system description methods, such as ITU-T ODP, UML etc.

It is also assumed that the reader is fully updated with the TINA Service and Network architecture specifications, together with basic knowledge of correlating work within other standard bodies and industrial groups, e.g. OMG, ITU-T, IETF, Parlay etc.

1.4. Document Revision Status

The revision status of the document is a DRAFT version and is NOT the final submission from Telia. This DRAFT version is intended to be the first input to the RfP process. The final version will be the revised submission with a preliminary delivery date set to June 2000.

2. The TINA Business Model

2.1. Changes to the TINA Business Model

The submission recommends the following change to the TINA Business Model:

- Change the name “TINA Business Model” to “TINA Business Role Model”, with the following motivation:
  - The TINA Business Model does not show the business model for TINA systems. The TINA Business Model describes different business roles that stakeholders of TINA systems can undertake and the identified inter-domain reference points between the different business roles. The notion “TINA Business Role Model” is therefore considered as more suitable.
- Exchange the two reference points LNFed-RP and CSLN-RP with the reference point FCon-RP, with the following motivation:
  - The use of two inter-domain reference points for describing the interactions between the Connectivity Provider and Connectivity Provider business roles is very confusing. It conflicts with the definition of an inter-domain reference point. See [3], [6].
  - The use of having one RP describing all interactions between business roles is therefore fully satisfying.
  - The naming of the RP as FCon-RP is motivated by the fact that the connectivity services provided via the RP are aimed for federation between CP network domains. The federation could be either peer-to-peer federation (LNFed), or client/server federation (CSLN), between network domains.

The suggested change will result in the following TINA Business Model.

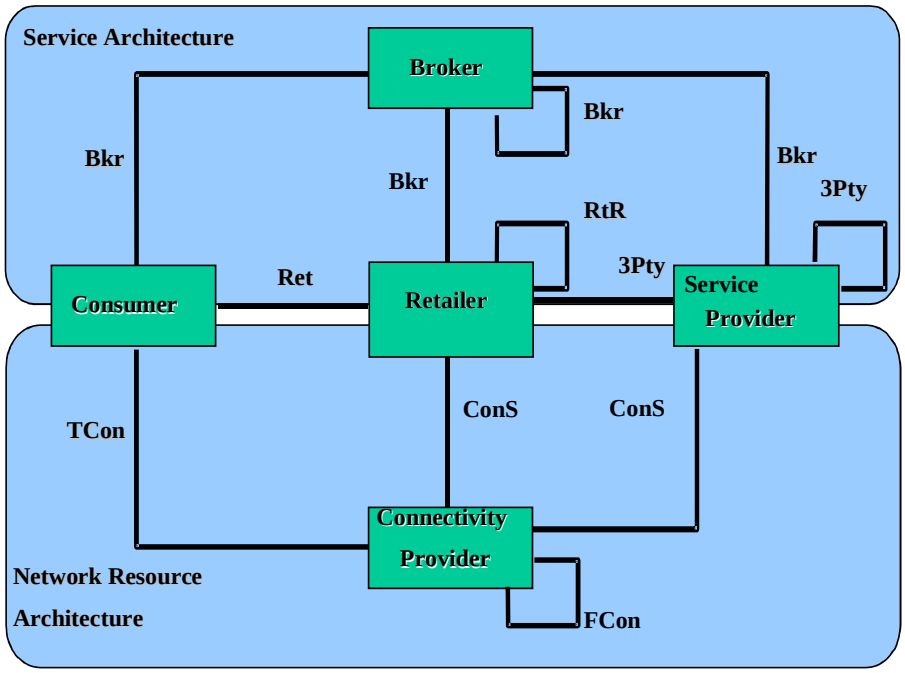

Figure 1 – The proposed TINA Business Role Model

Additional comment to the business role model is that the observant reader will notice the removal of TCon-RP between the Connectivity Provider and the Retailer/Service Provider.

Shortly, the reason for the removal is because of the fact that the motivation behind the existence of TCon-RP has so far been very little documented within TINA-C. From our point of view, necessary specifications describing how Retailers and Service Providers are provided with “terminal connectivity”, could easily be described in the ConS-RP. The existence of TCon-RP (except as the “technical reference point” between Consumer and Connectivity Provider) is also contradictory to one of the positions that characterises the scope of this submission, namely the fact that there can only exist one inter-domain RP between two TINA business roles.

2.2. Business Roles and Reference Points

The business role model used within this submission is based on the TINA Business Model and Reference Points (TINA BM) specification [3]. The most relevant assumptions taken as input to this submission are:

- A Business Role is the least common entity for a TINA Stakeholder.

- Any TINA Stakeholder can have several business roles.
- An inter-domain reference point describes the interactions between two business roles administered by two separate stakeholders.
- An intra-domain reference point describes the interaction between two autonomous systems administered by the same TINA Stakeholder

The relations and differences between the intra- and inter-domain reference points have been identified as an unclear issue in the TINA BM specification.

The submission suggests some necessary clarifications for a better understanding of what exactly differ in concept between inter- and intra-domain reference points.

- An inter-domain reference point may consist of inter-domain RP parts (i.e. defined as RP-facets, see [8]) that are exportable outside the administrative domain.
- An inter-domain reference point consists of (for further details, see section 3):
  1. A generic core facet applicable on all TINA inter-domain reference points.
  2. An RP-specific core facet
  3. RP service-specific facets
  4. Exportable facets belonging to the business role intra-domain RP.

2.3. Connectivity Provider Related Reference Points

Except from the introduction of FCon-RP, this submission also introduces the separation between connectivity service management systems and the underlying network related systems. The intra domain reference point, defined as ConC-RP, describes this separation.

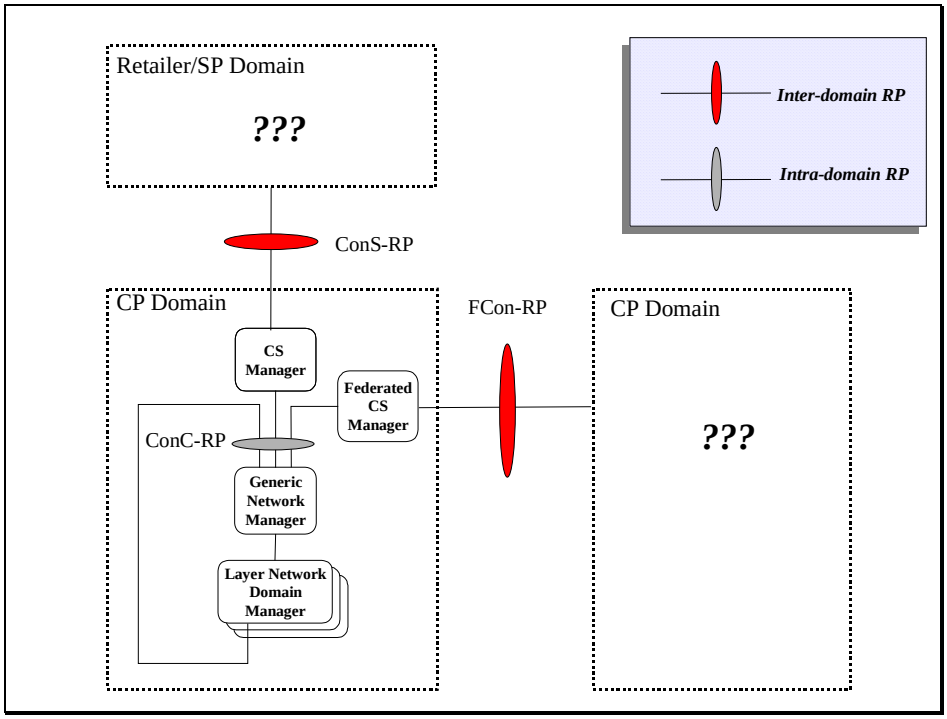

Figure 2 – Connectivity Provider reference points

Figure 2 describes the reference points, both intra- and inter-domain, that are relevant for this submission.

2.4. Mapping between TINA BM and TSAS Domains

The OMG Telecommunications Service Access and Subscription specification [5] intends to describe how to enable end-users to access telecommunication services according to their wishes and to allow service providers to offer their value-added services to end-users.

One of the objectives behind this IPCM RfP submission is to propose extensions to the TSAS specification, that enables a generic framework for telecommunications service access and subscription also including the TINA defined business role named Connectivity Provider (see section 2.4.3).

2.4.1. TSAS Domains of today

Figure 3 describes the different domains defined by TSAS between which user - provider interaction occurs. This proposal is very much influenced by the TINA BM, though in many respects it can be considered more simplified.

The TSAS Domains are Consumer Domain, Retailer Domain and Provider Domain. The Consumer Domain is the customer that consumes the services that are retailed by the Retailer role. Retailers act as the middlemen for Service Providers. The Service Provider role provides the Retailer with “suitable” services.

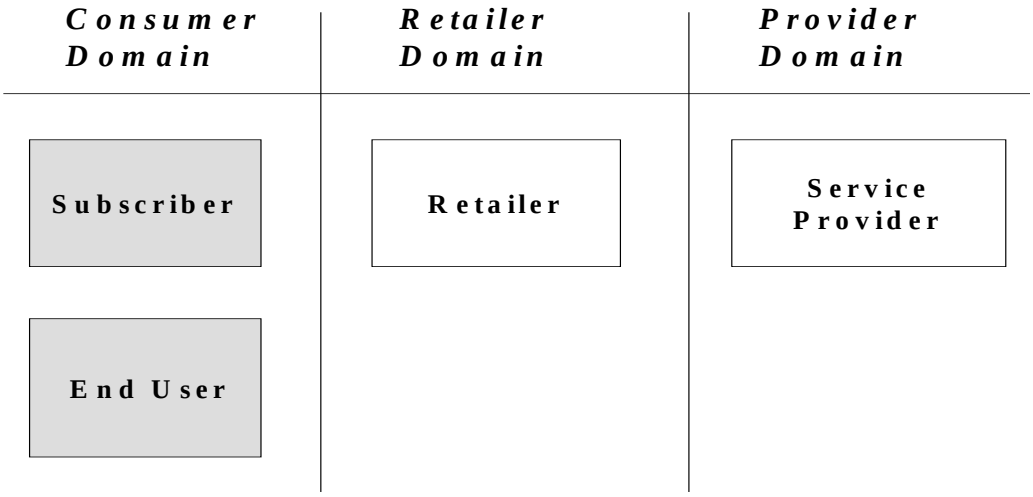

Figure 3 - TSAS Domains

One identified lack of consistency regarding the TSAS model is that a subscriber/user is defined only for the Consumer domain. This is not always the case. Stakeholders providing some kind of value-added service could very well be subscribers towards another stakeholder, this without undertaking the role of a Consumer. Therefore we recommend including the user/subscriber parts in all of the TSAS domains.

We also identified the need for partitioning the provider domains into one service provider domain and one connectivity provider domain.

2.4.2. Motivations behind the TSAS extension proposal

The proposal is based on the following definitions:

- A specific TINA business role behaves differently depending on the counterpart business role. I.e. it may have different *operative* roles towards different business roles.
- Following the above statement, a specific TINA business role may be allowed to behave both as a retailer/provider and/or user/subscriber. This depending on if the TINA stakeholder is requesting or providing services

from/to another TINA stakeholder. This statement does not concern the Consumer business role since the Consumer is defined and introduced to only consume services and therefore unable to provide services of any kind.

- The TSAS domains must be able to represent the Connectivity Provider business role.

The motivations behind the extension definitions are the following:

1. Without having a separation between services provided as value-added services and connectivity services, the Retailer – Provider reference point will be very complex to specify and implement. Using the TSAS defined notion of segment (except from right here, the facet definition [8] is used within this document) the conclusion is that – service specific segments describing provided services will differ too much in the specification of the services (e.g specification of SLA:s describing user manageability, user presentation, service quality etc.).
2. According to bullet 1, a business case describing the provisioning of connectivity compared to the provisioning of a value-added service are not suitable to be described over the same inter-domain reference point (set of interfaces describing the interactions between two business roles). This will be the result if NOT the generic service access and subscription framework, described by the TSAS specification, also includes the Connectivity Provider domain.
3. Specifications describing federations between provider domains will not be able to distinguish between Service Provider – Service Provider federation and Connectivity Provider – Connectivity Provider federation. I.e., federations that extend value-added service domains are described over the same inter-domain reference point as federations that extend network domains.

2.4.2.1. Complexity Considerations

The conclusions drawn from the statements above is that having such a simplified description of roles and domains, as defined in the TSAS submission, will result in very complex descriptions of reference points and their related systems. Examples of systems are; service delivery systems, policy framework systems, service and network management systems etc.

By introducing a partitioning of the provider domain into a Service Provider and a Connectivity Provider domain, stakeholders are able to reduce the complexity of their different management systems. The consequence will be less complex reference points to implement, resulting in a simplified compliance and testing framework, either on a system-to-system or a domain-to-domain basis.

One example of system complexity is the considerations taken for a policy framework system, which would have to include all kinds of policies related to the provided services, ranging from the most basic connectivity services up to very high-level value-added services. Without a delegation of policy management responsibility to different domains, a policy system for the TSAS provider domain will be unnecessarily complex, non-scalable and therefore also very inefficient in the long run, i.e. not future proof. Limiting the policy management responsibility to handle connectivity services and value-added services separately will drastically reduce the complexity of the policy system.

2.4.2.2. Delegation of Responsibility within a Business Role

We like the idea of having the client part of a business role to be divided into a subscriber and a user part. These two parts form the aggregate, from here on defined as the customer part of a business role. The customer part concept is recommended to be applicable to all business roles. This is described in Figure 4, which shows the recommended extension to the TSAS domain model.

One of the aspects of an inter-domain reference point is to describe the business relations between domains. Therefore the resources allocated between domains must be delivered in forms of business objects describing necessary business agreements made between the related counterparts. The business agreements describe issues such as how and by whom resources should be allocated. The common notion for a business object within TINA is service, which this submission specializes to be either a value-added service or a connectivity service.

2.4.3. Summary of TSAS Domain Extensions

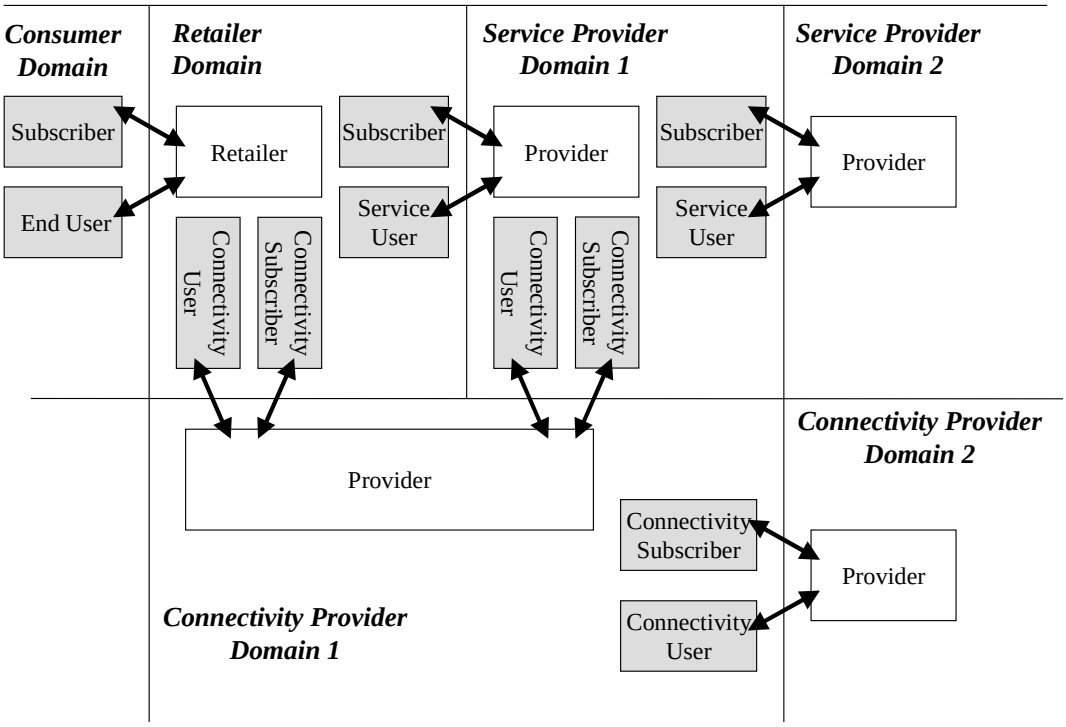

Figure 4 - TSAS Domain extensions

The suggested extensions can be summarised into the following bullets:

- Extend the model to allow stakeholders to provide services not only aimed to the consumer business role.
- Extend the model to allow stakeholders to undertake the connectivity provider business role.
- Extend the model to allow stakeholders to act both as customer and/or provider/retailer when undertaking a certain business role.
- Extend the model to include the user/subscriber part in all specified domains.

3. Applicability of the Facet concept

3.1. An Overview of the Facet Concept

The concept of *reference point facets* (RP-Facet) is not yet finalized within TINA, but the concept is appealing, and therefore this answer to the IPCM RfP includes a draft model describing principles for partitioning the relevant reference points into RP-facets. The model is based on the TINA CAT RfP submission by GMD FOKUS [8].

Below follows some characteristics of RP-Facets as described in the GMD FOKUS model as well as short definitions of reference point concepts.

- ODP-RM [6] provides reference point concept to facilitate conformance assessment of OO systems.
- A reference point (RP) is defined as the specification of a particular set of conformance requirements.

  ➢ Inter-domain Reference Points [3]

  An inter-domain RP is the specification of a set of interfaces which are defined as conformance requirements that apply to a relationship between business administrative domains.

  ➢ Intra-domain Reference Points [3]

  An intra-domain RP specifies conformance requirements that exclusively apply within an administrative domain. These RPs enable stakeholder to build (compose) a system of components that are developed by different vendors.
- TINA RPs [3] consist of interfaces that describe potential interactions between TINA entities.
- An RP-facet is a subset of a reference point.
- An RP-facet is always associated with one of the architectural parts separated by the RP, referred as RP-facet role.
- An RP-facet is defined in terms of purpose-oriented scenarios that describes potential interactions between the RP-facet role and its environment.
- The smallest element of an RP-facet is an operation. An RP-facet contains at least one interface.
- An RP-facet is self-contained in terms of functionality.

- An interface can appear in multiple RP-facets. Operations of an interface may be used only partially in a RP-facet.
- A reference point has a core and may have zero or more additional cohesive facets.
- Dependency between RP-facets of the same RP:

  If operation o2 is only executable when operation o1 returns x, an RP-facet containing the interface of o2 must also contain the interface of o1.
- An RP-Facet is either of:
  - Core RP-Facet

    The Facet containing mandatory operations and interfaces
  - Core-based RP-Facet

    An RP-Facet which is dependent on The Core RP-Facet.
  - Cohesive RP-Facet

    An RP-Facet which is independent of the Core RP-Facet.

3.2. Extensions to the Facet Concept

The authors have identified a need for adding a generic core facet to the model defined by GMD FOKUS. It contains the most basic objects that we feel should be mandatory in a TINA RP. This includes functionality for *initial contact*, *authentication* and *service access*. In order to correlate with OMG and in alignment with the TINA-influenced OMG TSAS submission, we have decided to let the Generic Core be based on TSAS joint revised submission [5]. *This decision is still considered an open issue and left as an item for discussion within the TINA community.*

3.3. The Generic Core Facet

3.3.1. Introduction of the Generic Core Facet

We recommend the following extension to the RP-Facet concept:

- The introduction of a generic core to the facet concept.
- The Generic Core is based on Telecommunications Service Access and Subscription, Joint Revised Submission [5]. The *segment* object from TSAS has been replaced by *facet*. From our point of view, facets provide the same functionality and more and they are very well specified in [8].

- All RPs include the Generic Core.

In the subsequent sections, the Generic Core facets and their interfaces are shortly specified. For the full definition and ancillary documentation, the reader is referred to the TSAS submission, see [5].

3.3.2. Initial Access Facet

The Initial Access Facet defines the first point of contact for a customer to access services provided by a provider. The first step is to initiate an authentication procedure. After authentication has been performed, the authenticated user can request access to the provider domain which contains services and other facets offered by the provider.

Initial interface

This interface allows a user to initiate an authentication procedure, and to request access to the provider domain. The operations provided are:

- initiate_authentication() - allows the user to initiate an authentication procedure.
- request_access() - allows the user to request the provider to initiate an access session. If successful the user gains access to an interface for accessing services and other facets offered by the provider.

Authentication interface

This interface allows a user to proceed through an authentication procedure. It provides the following operations:

- select_auth_method() - is used for selecting the authentication procedure
- authenticate() - is used to perform the authentication. (It can be invoked several times to complete authentication procedure).
- abort_authentication() - is used to abort the authentication procedure.

Access interface

This interface allows an authenticated user to access services and other facets offered by the provider. The interface provides the following operations:

- select_service() - is used by the user to select the service to be provided, and provide configuration information
- start_session() – is used by the user to start a service session
- get_facet() - is used by the user to set-up a facet

- list_facets() - is used by the user to list the facets that are available from the provider
- release_facets() - is used by the user to release facets
- end_session() - is used by the user to end service sessions
- end_access() - is used by the user to end the access session.

3.3.3. Service Access Facets Specification

This part of the document describes facets that are defined for controlling the access between domains, and for controlling the access to services.

3.3.3.1. Base Interface

All the facets that are set up can be released with an operation release_facet() available in the facet itself. This is the case for the service access facets, as well as for the subscription facets. The service access facets that define two interfaces, one to be supported by the user domain and the other by the provider domain, will provide the release_facet() operation on both interfaces. That means that all the interfaces defined by the service access facets provide the release_facet() operation. This is specified by defining the operation release_facet() on a base interface called FacetBase.

3.3.3.2. Invitation Facet

The Invitation facet allows controlling invitations and announcements. It definestwo interfaces.

UserInvite interface

The UserInvite interface allows the provider to send invitations to join service session, during an access session.

- invite_user() - allows the provider to invite the user to join a service session. A session description and sufficient information to join the session is available in the parameter list. The session can only be joined using the join_session_with_invitation() operation on the ProviderInvite interface.
- cancel_invite_user() - allows the provider to inform the user that an invitation previously sent to the user has been cancelled.

ProviderInvite interface

The ProviderInvite interface allows a known user to get a list of session invitations and session announcements and to join these sessions, and to reply to invitations.

It provides the following operations:

- list_session_invitations() - lists the invitations to join a service session that have been sent to the user.
- list_session_announcements() - lists the service sessions with have been announced. It can be scoped by some announcement properties.
- join_session_with_invitation() - allows the user to join a service session, to which he has been invited.
- join_session_with_announcement() - allows the user to join a service session, which has been announced.
- reply_to_invitation() - allows the user to reply to an invitation. It can be used to inform the service session to which they have been invited, that they will/will not be joining the session, or to send the invitation somewhere else (it does not allow the user to join the session).

3.3.3.3. Context Facet

The Context Facet allows controlling configuration (context) information. It defines two interfaces.

UserContext interface

The UserContext interface allows the provider to gain information about the user domain's configuration, and applications.

- get_user_ctxt() - allows the provider to retrieve information about the user domain's configuration.

ProviderContext interface

The ProviderContext interface allows a known user to set configuration information at the provider domain side.

It provides the following operations:

- set_user_ctxt() - allows the user to inform the provider about interfaces in the user domain, and other user domain information. (e.g. user applications available in the user domain, operating system used, etc.).
- get_user_ctxts() - allows the user to retrieve one or more set of configuration (context) information that has been stored in the provider domain.

3.3.3.4. Access Control Facet

The Access Control Facet provides supplementary functionality for access session control. It defines one interface.

AccessControl interface

The AccessControl interface allows a known user to get a list of running access sessions, to end one or more of them, and to get the user information stored at that moment in the provider domain.

It provides the following operations:

- list_access_sessions() - allows the user in this access session to find out about other access sessions that he has with this provider. (e.g. a user such as a consumer is at work, but has an access session set up at home which runs an active security service session.)
- end_access_sessions() - allows the user to end one or more specified access session(s). This can include the current one, or others, found using list_access_sessions(). The user can also specify some actions to be performed if there are active service sessions within the access session(s) to be ended.
- get_user_info() - gets the user's username, and other properties.

3.3.3.5. Service Discovery Facet

The Service Discovery Facet supports functionality helping to learn about (new) services. It defines one interface.

ServiceDiscovery interface

The ServiceDiscovery interface allows a known user to get a list of subscribed services, to discover new services, and to get supplementary information on services.

It provides the following operations:

- list_user_services() - lists the services to which the user is subscribed. Scoping of subscribed services can be done using property lists. The operation returns sufficient information for the user to start a particular (subscribed) service.
- discover_services() - lists all the services available from the provider. The user can scope the list by supplying some properties that the service should have, and a maximum number to return.

- get_service_info() - returns the service information for a particular service (identified in the invocation by its service_id). Similar information (ServicePropertyList) can be obtained with the list_user_services or discover_services, but the get_service_info is a simplified version, targeting on a single service, and independently from the subscription status.

3.3.3.6. Session Control Facet

The Session Control Facet provides functionality for service session control. It defines one interface.

SessionControl interface

The SessionControl interface allows a known user to get a list of running service sessions and to resume service sessions or participation to service sessions (when these have been suspended).

It provides the following operations:

- list_service_sessions() - lists the service sessions of the user. The request can be scoped by the access session, and session properties, (e.g. active, suspended, service type, etc.).
- end_sessions() - allows the user to end one or more service session.
- end_my_participations() - allows the user to end his participation into one or more service session, without ending the service session.
- resume_session() - allows the user to resume a service session.
- resume_my_participation() - allows the user to resume his participation in a service session.

3.3.4. Subscription Facets

The subscription facet interfaces are only available after successful access to the retailer/provider from either the business role customer side to manage subscribers and users or from the provider side to manage service templates. If the retailer/provider supports the subscription facets, the access of a service needs prior subscription.

3.3.4.1. Subscriber Administration Facet

The Subscriber Administration Facet allows subscribers to manage its subscription. Four interfaces are defined.

SubscriberMgmt

This interface is used by the subscriber to create, modify or delete subscriber entries.

- create_subscriber - allows a subscriber to create a subscriber entry.
- modify_subscriber - modifies subscriber entries.
- delete_subscriber - removes a subscriber from the system.

SubscriberInfoQuery

This interface is used to retrieve subscriber related information.

- get_subscriber – returns information about an existing subscriber

ServiceContractManagement

This interface allows subscribers to create modify and delete service contracts.

- create_service_contract - is used by the subscriber to provide the contract relevant.
- modify_service_contract - is used to modify an existing service contract.
- delete_service_contract - removes an existing service contract.

ServiceContractInfoQuery

This interface allows subscribers to have a look into its contracts and the list subscribed services.

- get_service_contract - allows to query information about a single service contract.
- list_subscribed_services provides a list of all services for which the subscriber has a subscribed by a contract.

3.3.4.2. Provider Administration Facet

The Provider Administration Facet allows service providers and connectivity providers to provide new (connectivity) services into the retailer/provider domain. Two interfaces are defined:

ServiceTemplateMgmt

This interface allows a provider to deploy, modify or withdraw a service in the retailer/provider domain.

- deploy_service - allows the provider to define a new instance of a service template.

- modify_service - allows a provider to modify existing service templates (service offers).
- withdraw_service - allows a provider to delete existing service template.

ServiceTemplateInfoQuery

This interface allows providers to list all its deployed service templates or get a specific deployed service template.

- list_service_templates - returns a list of all service templates for a provider.
- get_service_templates - returns the structure of a single service template.

3.3.4.3. User Administration Facet

The User Administration Facet allows a subscriber to manage its users and groups. Four interfaces are defined.

SagMgmt

This interface is used for the management of user groups.

- create_sag - the subscriber can use this operation to create a new SAG and to add users (which have been created by create_user).
- modify_sag - allows an subscriber to modify an existing SAG.
- delete_sag - allows a subscriber to delete an existing SAG.
- create_user - creates a new user.
- modify_user - modifies an existing user.
- delete_user - deletes an existing user.
- add_sag_users – allows a subscriber to add users to specific SAGs.
- remove_sag_users - removes a single user or a list of users from a SAG of a subscriber.

SagInfoQuery

This interface allows subscribers to get information about existing subscription assignment group and users.

- list_sags - allows a subscriber to get a list of already created sag_ids.
- get_sag - allows a subscriber to query information about a single SAG.
- get_user - allows a subscriber to query information about a single user.

- list_sag_users - allows a subscriber to get a list of all users_ids for a single SAG.
- list_users - allows to get a list of all users_ids of one subscriber.

ServiceProfileMgmt

This interface allows subscribers to manage service profiles and assign these to subscription assignment groups.

- create_service_profile - allows a subscriber to create new service profile.
- modify_service_profile - allows a subscriber to modify an existing service profile.
- delete_service_profile - allows an subscriber to delete an existing service profile.
- assign - allows a subscriber to assign a service profile to a SAG.
- deassign - allows a subscriber to remove a service profile from a SAG or user.

ServiceProfileInfoQuery

This interface allows subscribers to retrieve information about service profiles and assignment of profiles to subscription assignment groups.

- list_service_profiles - provides a list of all service profiles Id.
- list_assigned_service_profiles - provides a list of service profiles assigned to a single SAG.
- get_service_profile - returns a single service profile.
- list_assigned_sags - returns a list of SAG Ids assigned to single service profile.
- list_assigned_users - returns a list of users assigned to single service profile.

3.3.4.4. User Customization Facet

The User Customization Facet allows users to customize the service in the range of predefined settings. Two interfaces are defined:

UserDescriptionMgmt interface

This interface allows user to modify the user profiles and the user service profile settings.

- modify_password - provides the possibility to change the user password.

- modify_user_profile - allows and user to detail its personal entries in the user_profile.
- modify _user_service_profile - provides user with the ability to change the personal preferences for the usage of a service predefined by the provider.
- delete_user_service_profile - removes the user service profile in the retailer/provider.

UserDescriptionInfoQuery interface

This interface allows user to request information about its user profile.

- get_user_description - provides the user with information about its user properties and password.
- list_service_profiles_ids - returns a list of subscribed user service profiles which are associated with the retailer/providers service template_ids.
- get_user_service_profile - returns the user service profiles which is associated with the retailer/providers service template Ids.

3.4. The ConC-RP Facet

The ConC-RP Facet consist of three main parts; a core facet and two core-based facets:

- ConC-RP Core Facet contains ConC-RP mandatory conformance requirements, including those specified in the Generic Core.
- ConC-RP Access CB Facet contains conformance requirements for the access phase between federated connectivity providers. It is a core-based facet.
- ConC-RP Usage Facet contains conformance requirements for the usage phase between federated connectivity providers. It is a core-based facet. This Facet is further partitioned into core based facets representing the use cases defined over the ConC-RP. This submission presents three proposals on ConC-RP business cases, namely:
  1. ConC-RP NF Provisioning Facet; this use case provides a connectivity user client, authorized as an intra-domain client system, with features of provisioning network flows.
  2. ConC-RP NAG Provisioning Facet; this use case provides a connectivity user client, authorized as an intra-domain client system, with features of provisioning network access groups.

3. ConC-RP NA Provisioning Facet; this use case provides a connectivity user client, authorized as an intra-domain client system, with features of provisioning network accesses.

The use cases will be specified in detail in the final submission.

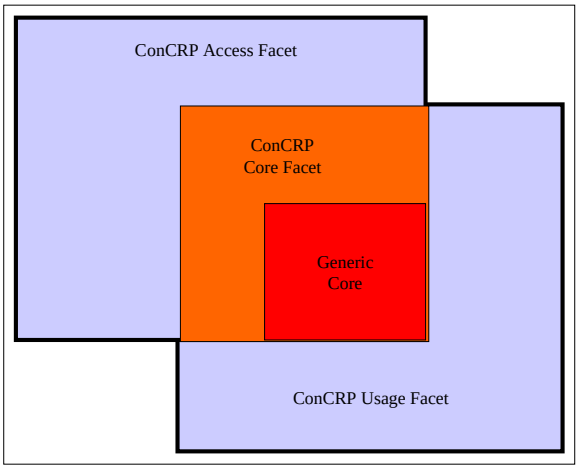

Figure 5 – The ConC-RP Facet

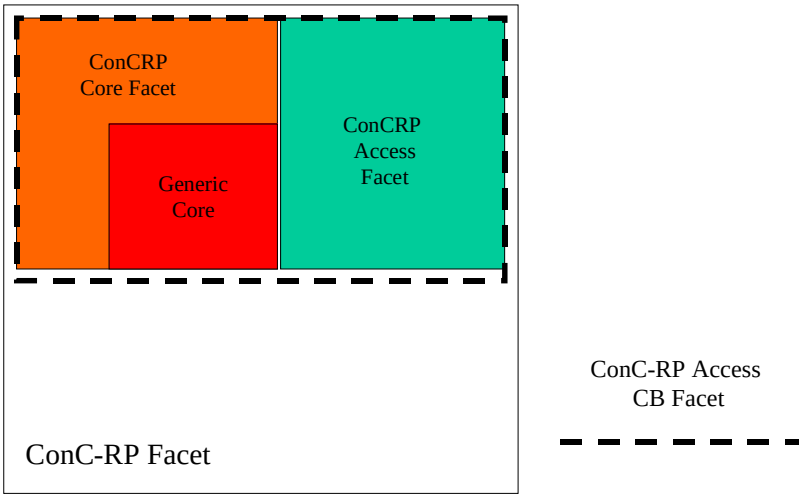

Figure 6 - ConC-RP CB Access Facet

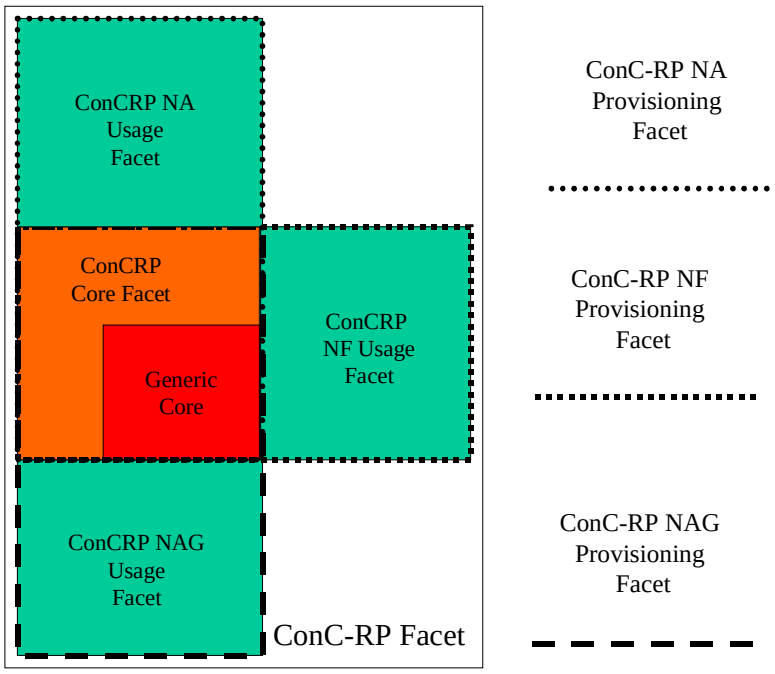

Figure 7 – ConC-RP Usage Facet

3.5. The ConS-RP Facet

The ConS-RP Facet consist of three main parts; a core facet and two core-based facets:

- ConS-RP Core Facet contains ConS-RP mandatory conformance requirements, including those specified in the Generic Core.
- ConS-RP Access CB Facet contains conformance requirements for the access phase between Connectivity Provider and Retailer/Service Provider business roles. It is a core-based facet.
- ConS-RP Usage Facet contains conformance requirements for the usage phase between Connectivity Provider and Retailer/Service Provider business roles. It is a core-based facet. This Facet is further partitioned into core based facets representing the usage business cases defined over the ConS-RP. This submission presents one proposals on ConS-RP business cases, namely:

1. ConS-RP VPN Provisioning Facet; this business case provides a customer undertaking the Retailer/Service Provider business role with feature of provisioning it's own VPN:s.

The business cases will be specified in detail in the final submission.

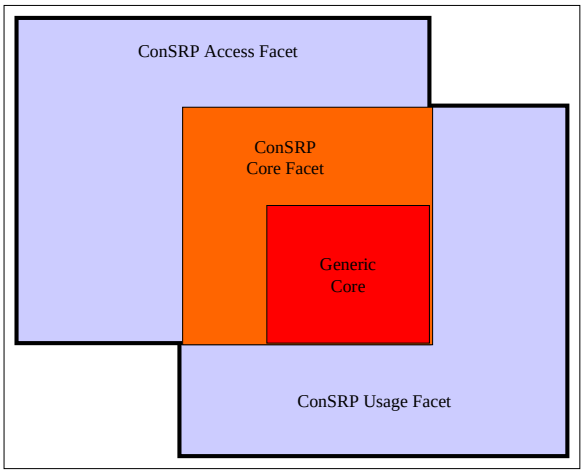

Figure 8 – ConS-RP Facet

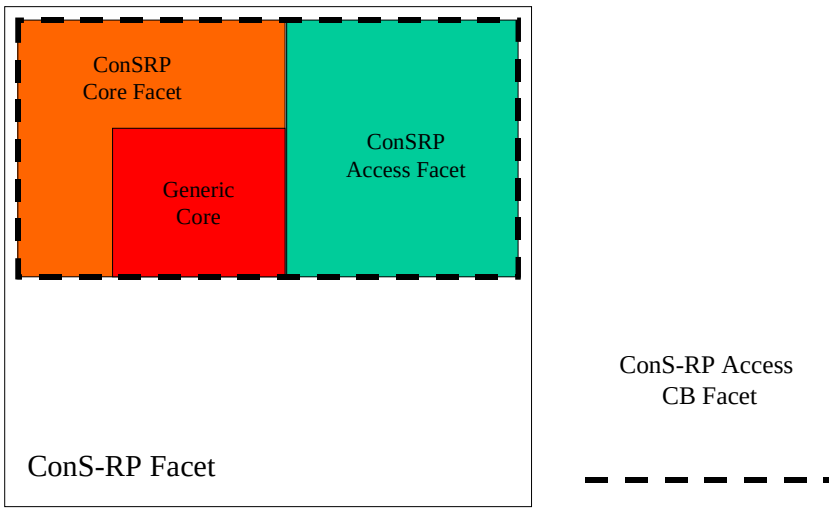

Figure 9 – ConS-RP Access CB Facet

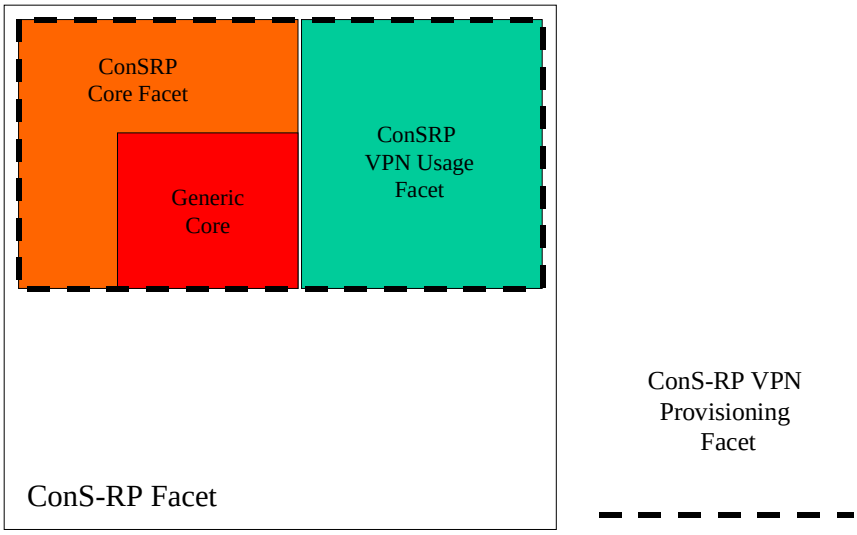

Figure 10 – ConS-RP Usage Facet

3.6. The FCon-RP Facet

The FCon-RP Facet consist of three main parts; a core facet and two core-based facets:

- FCon-RP Core Facet contains FCon-RP mandatory conformance requirements, including those specified in the Generic Core.
- FCon-RP Access CB Facet contains conformance requirements for the access phase between federated connectivity providers. It is a core-based facet.
- FCon-RP Usage Facet contains conformance requirements for the usage phase between federated connectivity providers. It is a core-based facet. This Facet is further partitioned into core based facets representing the usage business cases defined over the FCon-RP. This submission presents two proposals on FCon-RP business cases, namely:

  1. FCon-RP VPN Provisioning Facet; this business case provides a customer undertaking the Connectivity Provider business role with feature of provisioning it's own VPN:s.

2. FCon-RP Link Provisioning Facet; this business case provides a customer undertaking the Connectivity Provider business role with feature of provisioning it's own network links.

The business cases will be specified in detail in the final submission.

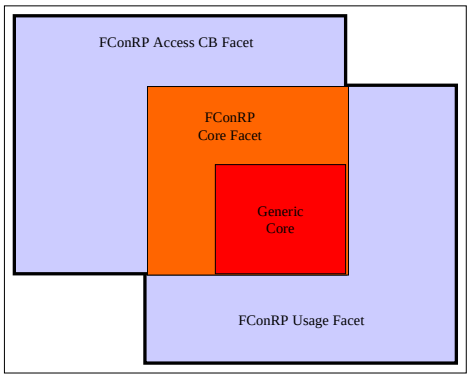

Figure 11 – FCon-RP Facet

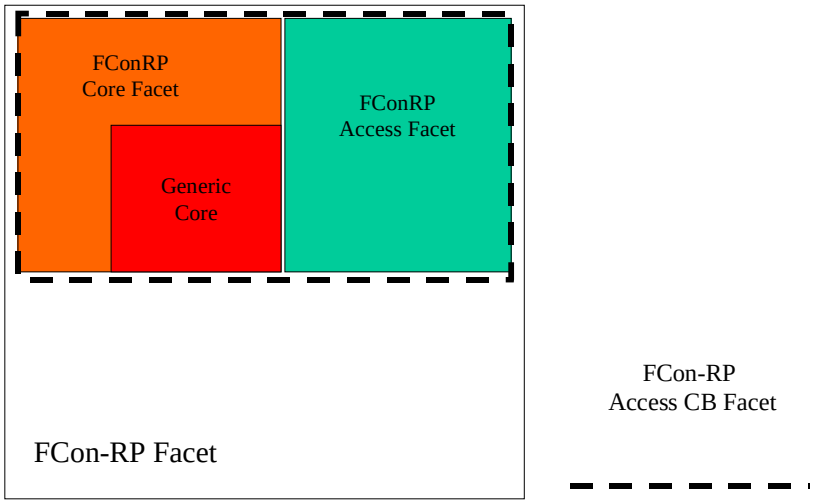

Figure 12 – FCon-RP Access CB Facet

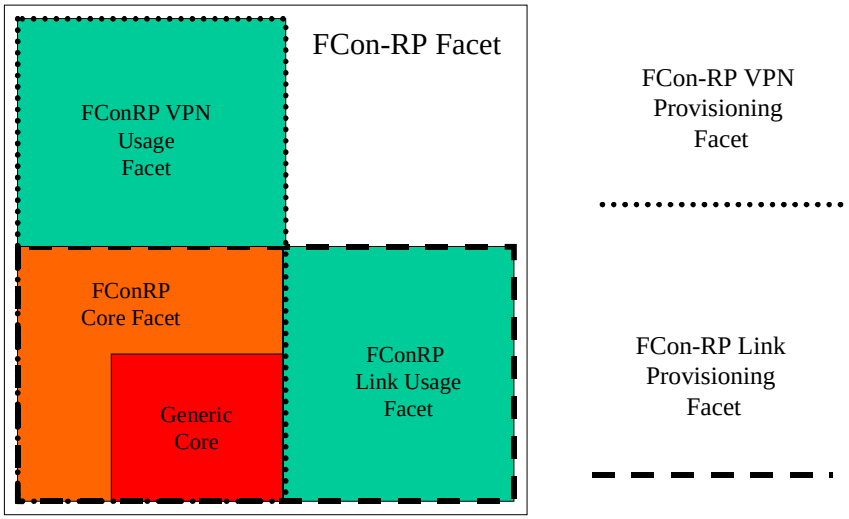

Figure 13 – FCon-RP Usage Facet

4. General Description

4.1. Overview

This section describes the changes made to the TINA Network Resource Information Model, Version 3.0. The information models describing the delivery objects for each of the reference points ConC-RP, ConS-RP and FCon-RP are not specified in this chapter. The reader is referred to reference point specific chapters within this document.

The motivation is to describe the necessary changes of the TINA NRIM to support the issues described in chapter 1.2. TINA NRIM objects, not having any relevance to the proposed changes, are not included in the models. The reason is to simplify the models as much as possible for a better understanding of what we are proposing. The information models specified in the following information view chapters (i.e. this section and section 5.3, 6.3, 7.3) are therefore not fully comprehensive compared to the TINA NRIM.

To clarify which type of objects that has no relevance to the proposed changes we give the following example: Objects such as link connection, subnetwork connection are purely connection-oriented and layer network internal. They have therefore deliberately been left out from our models. Also objects not viewable over any of the reference points are taken out.

4.2. Information View

4.2.1. Class Diagram package dependencies

Figure 14 describes the dependencies between class diagram packages. The figure only depicts the packages relevant to the submission, i.e. reference point packages and the packages which are directly dependent to those. The reference point packages are, ConC-RP, ConS-RP and FCon-RP and the directly related packages are Abstract Connectivity Service, Traffic Condition Agreement (TCA), Sevice Level Agreement (SLA), Common Information Model (CIM) [9], [10] and Policy Core Information Model (PCIM) [12].

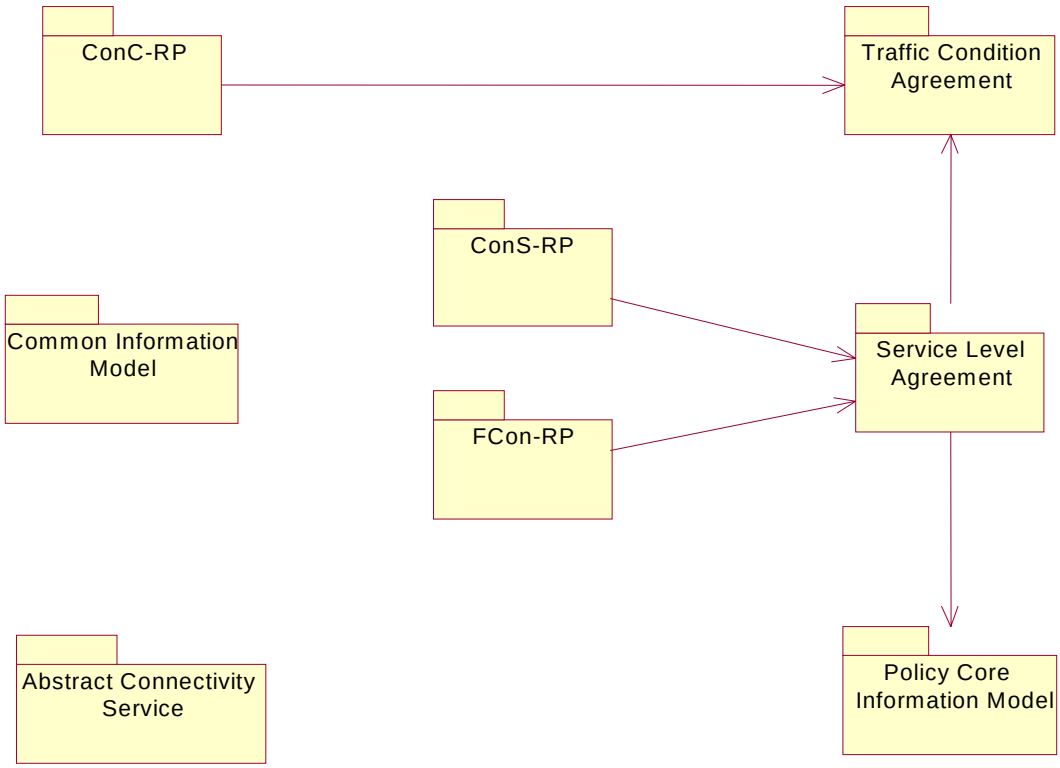

Figure 14 – RfP submission package dependencies

4.2.2. Abstract Connectivity Service Package

Figure 15 shows the inheritance relationships between the abstract connectivity service classes (AbstractConnectivityService and AbstractConnectivityServiceAccess) and the delivery object classes that are defined in the CP inter-domain reference points, ConS-RP and FCon-RP.

The abstract connectivity service classes are derived from the CIM Service and ServiceAccessBySAP classes [9].

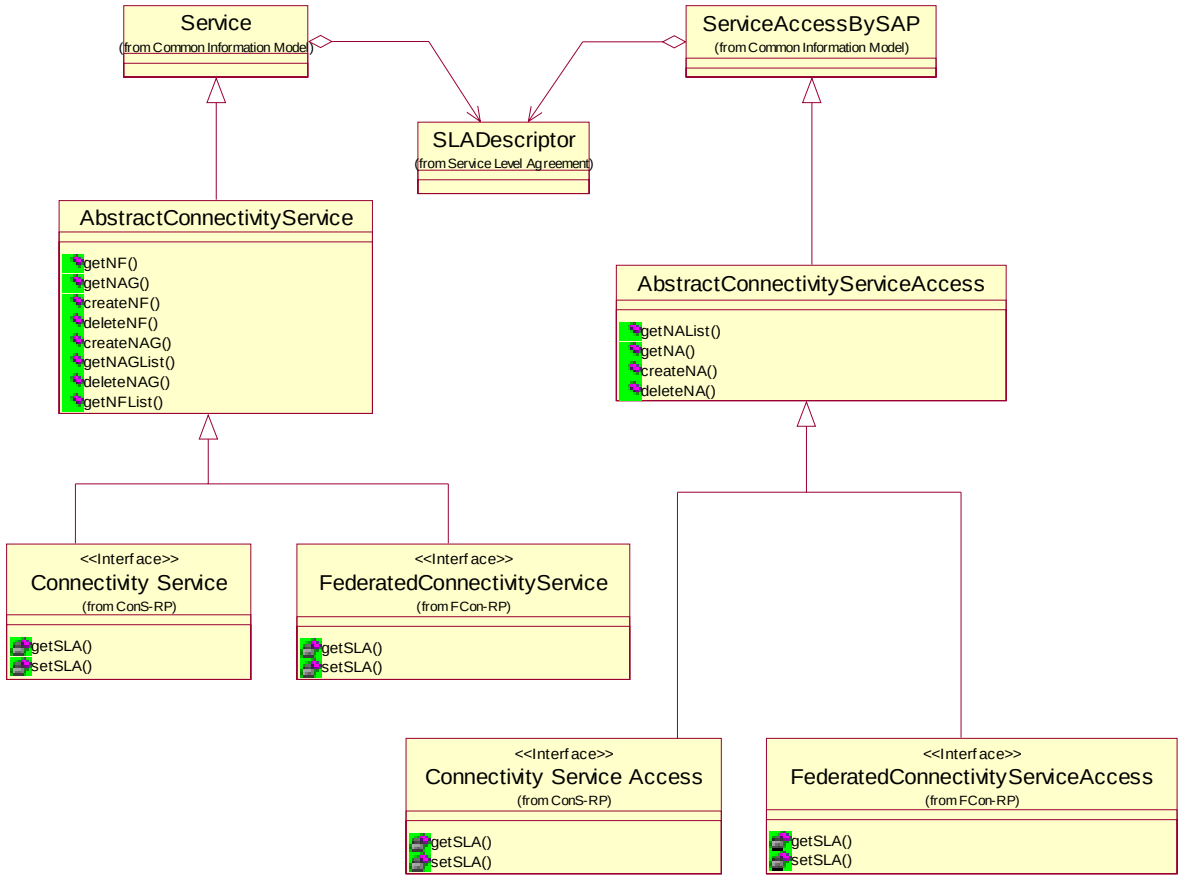

Figure 15 – Connectivity Service Inheritance Package

Class	Description
Service	This class is derived from the DMTF CIM. It is an abstract class only used for inheritance. A CIM Service is a logical element that contains the information necessary to represent an manage the functionality provided by a Device and/or Software feature.
ServiceAccessBySAP	This class is derived from the DMT CIM. It is an abstract class only used for inheritance. CIM ServiceAccessBySAP is an association that identifies an accesspoint for a service.
AbstractConnectivityService	This is an abstract class only used for inheritance. Represents the services provided between administrative domains by the

	Connectivity Provider role.
AbstractConnectivityServiceAccess	This is an abstract class only used for inheritance. Represents the service access provided between administrative domains by the Connectivity Provider role.

Table 1 - Classes defined in the AbstractConnectivityService Package

Descriptions of the other classes depicted in the figure can be found in the RP-specific sections. Description of the SLADescriptor can be found in SLA Package section 4.2.3.

4.2.3. Service Level Agreement Package

Figure 16 describes how a SLA is modelled. There is one SLADescriptor object instantiated for each service instance. The SLADescriptor can be seen as the “template of agreement” for a specific service, between the service subscriber and the service provider.

One part of the agreement, the traffic condition agreement, is contained in the TCADescriptor class.

Another part of the SLA is about how and on what level the user/subscriber is allowed to control and manage the service required. The ManageabilityDescriptor describes this part of the agreement. This object contains one or more policies that describe the above constraints. The Policy class, derived from the Policy Core Information Model [12], contains the policies associated with the ManageabilityDescriptor.

The ManageabilityDescriptor can be derived into specialised classes, applicable to a specific layer network. Since this is layer network internal issues, and since the scope for this RfP submission version focuses on describing reference generic parts only, layer network specific relations and class descriptions has been left out in this version.

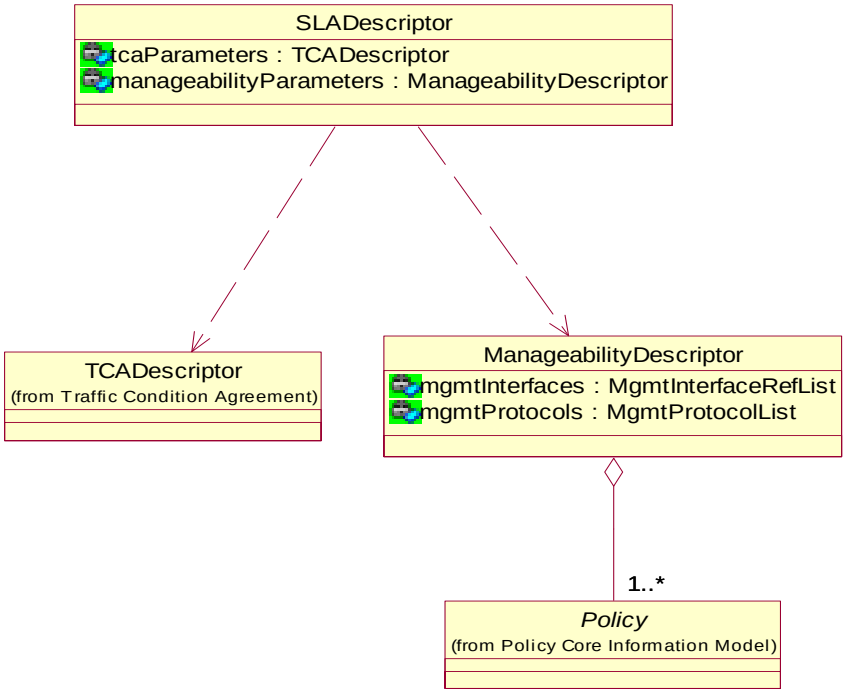

Figure 16 – Service Level Agreement (SLA) Descriptor

Class	Description
SLADescriptor	A SLADescriptor is a data class for representing the Service Level Agreement associated with a service.
ManageabilityDescriptor	Represents the information on how the client user is allowed to control and manage the requested service(s). It contains references to internal c&m interfaces, used management protocol etc.
Policy	This is an abstract class only used for inheritance. It represents a policy-related instance that are used to be able to apply "if-condition, then action" semantics associated with user related services.

Table 2 - Classes defined in the SLA Package

5. ConC-RP Detailed Description

5.1. Overview Description

The ConC-RP specifies how connectivity is provided between management domains as generic delivery objects.

Within TINA-C, the client/server relations between different layer networks has so far only been addressed (CSLN-RP), but not at all specified. One of the main objectives behind this RfP submission is to propose a generic solution to how resources in a server layer network domain are allocated by any client domain. The notion client domain means here e.g.

1. a local LND management domain (e.g. IP layer network management system),
2. OR a foreign LND management domain (e.g. a Federated Connectivity Provider's IP management system that is authorized as an intra-domain client system),
3. OR a connectivity provider's service delivery system, providing connectivity services towards external customers (i.e. TINA stakeholders undertaking either a Retailer/SP or a CP business role).

5.2. Use Case View

ConC-RP NF Provisioning Facet: To be specified in the final version.

ConC-RP NAG Provisioning Facet: To be specified in the final version.

ConC-RP NA Provisioning Facet: To be specified in the final version.

5.3. Information View

Figure 17 describes the class relationships for the ConC-RP reference point.

The CLNW and the CPE objects are described in the figure with the motivation of pointing out that an abstract NFEP could either be owned by a connectivity layer network or a customer premise equipment.

The CLNB object represents the binding over the connectivity layer network between connectivity related termination point objects, which are described in the figure as Abstract Network Flow Endpoints (AbstractNFEP).

The AbstractNFEP is specialised into the following two classes:

- Network Flow End Point (NFEP), which represents the termination point at which information is accepted and delivered over the connectivity layer network through a network flow. Examples of NFEP:s are specific ATM VC/VPI numbers, or IPv4 address+port or IPv6 address+flow label ID.
- Network Flow End Point Pool (NFEP Pool), which represents a collection of NFEP:s and terminates a Network Access. E.g. one IP address or a collection of IP addresses (i.e. IP subnets).

The connectivity provided by the connectivity layer network are comprehensively represented by the following classes:

- Network Flow (NF), which represents a bit flow of information that is terminated by single network flow endpoints (NFEP). E.g. a TCP connection terminated by TCP-ports, or an ATM trail terminated by specific VCI/VPI numbers.
- Network Access Group (NAG), which represents a bit flow of information that is terminated by NFEP Pools. E.g. different kinds of IP VPN:s such as Virtual Routed Private Networks, Virtual Private Dial Networks, Virtual Private Lan Segment, etc [13]. Other examples of NAG:s are, IP-Tunnels, ATM SVC Subnetwork Domain, etc.
- Network Access, which represents how a NFEP Pool accesses a certain Network Access Group. E.g. if the NAG is built carrying video traffic strings, it is not suitable to have an Network Access between a CPE termination and a NAG point of presence (PoP) implemented by a PSTN connection.

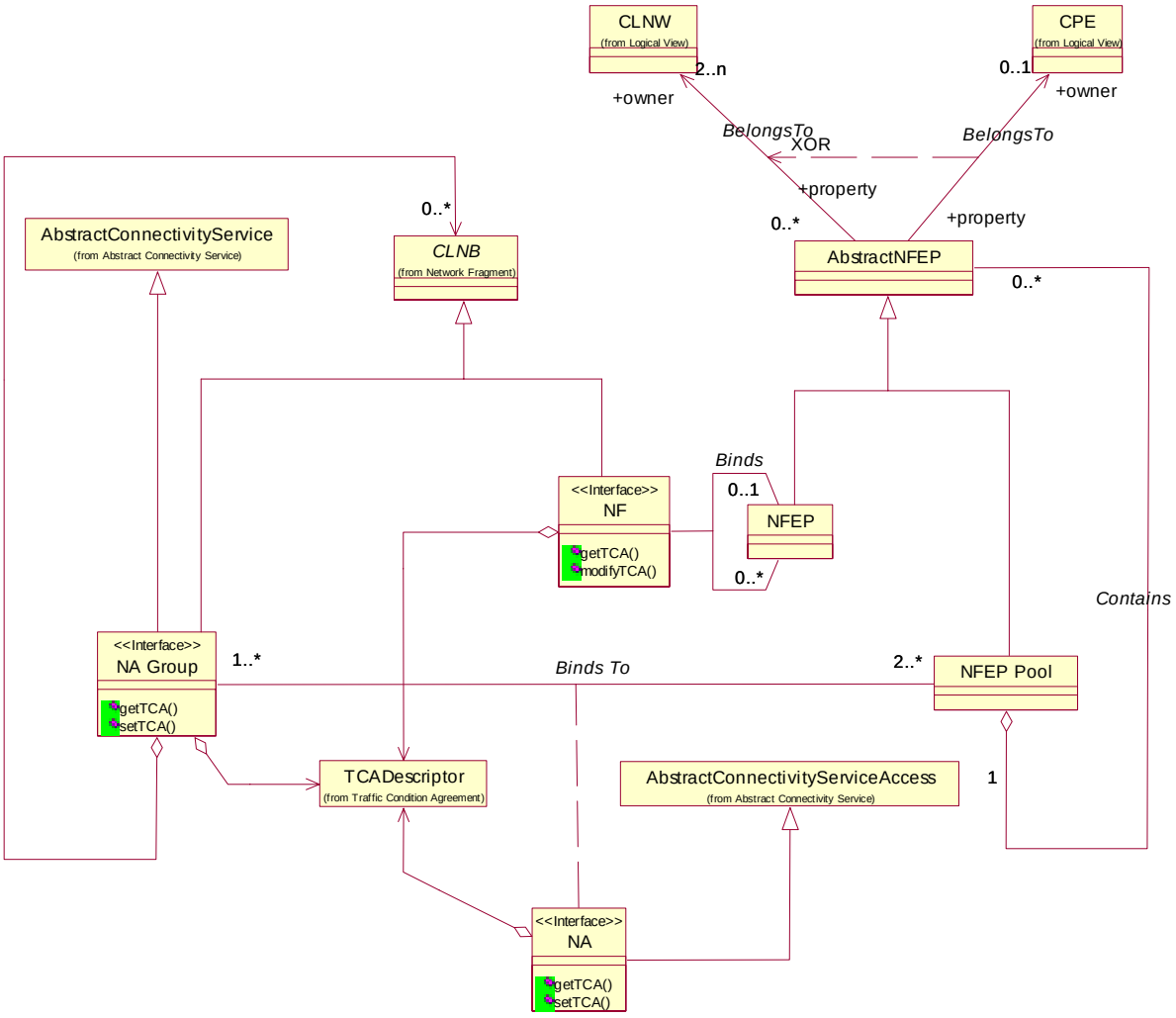

Figure 17 – ConC-RP Information Model

Class	Description
Customer Premises Equipment (CPE)	Represents the network elements that belong to the Customer of the Connectivity Provider. A CPE is not manageable from the Connectivity Providers point of view.
Connectivity Layer Network (CLNW)	Represents the connectivity layer network that makes up the TINA network from the perspective of a Connectivity Provider.

Connectivity Layer Network Binding (CLNB)	This is an abstract class defined only for inheritance. It represents the resource that transfer information (i.e. the bit stream) across the connectivity layer network of a TINA network. This class is specialised into either a NF class or a NAG class.
Abstract NFEP	This is an abstract class defined only for inheritance. This class is specialised into either a NFEP or NFEP Pool.
Network Flow Endpoint (NFEP)	Represents an endpoint of a Network Flow. Models the point at which information is accepted and delivered over the CLNW through the NF.
NFEP Pool	Represents a collection of NFEP:s. It is an endpoint of a NA. A NFEP Pool is configured using one or more LTP:s.
Network Flow (NF)	This class inherits from the CLNB. It represents a bit flow of information that binds single NFEP:s together. It represents the generic view of a layer network trail. The flow topology may be point-to-point unidirectional, or point-to-multipoint unidirectional.
Network Access (NA)	The resource that represents the binding between a NFEP Pool and a NAG.
Network Access Group (NAG)	This class inherits from the CLNB class. It represents the binding between NFEP Pools. The NAG groups valid NA:s together. The NA class, that describes how the NFEP Pool is bound to the NAG, must fulfill the traffic condition requirements of the NAG.

Table 3 - Classes defined in the ConC-RP Package

5.3.1. Traffic Condition Agreement

Figure 18 describes the constitution of a traffic condition agreement, between a connectivity user client and a providing server network domain. There is one TCADescriptor object instantiated for each NF, NAG and NA instance. See Table 4 for class definitions.

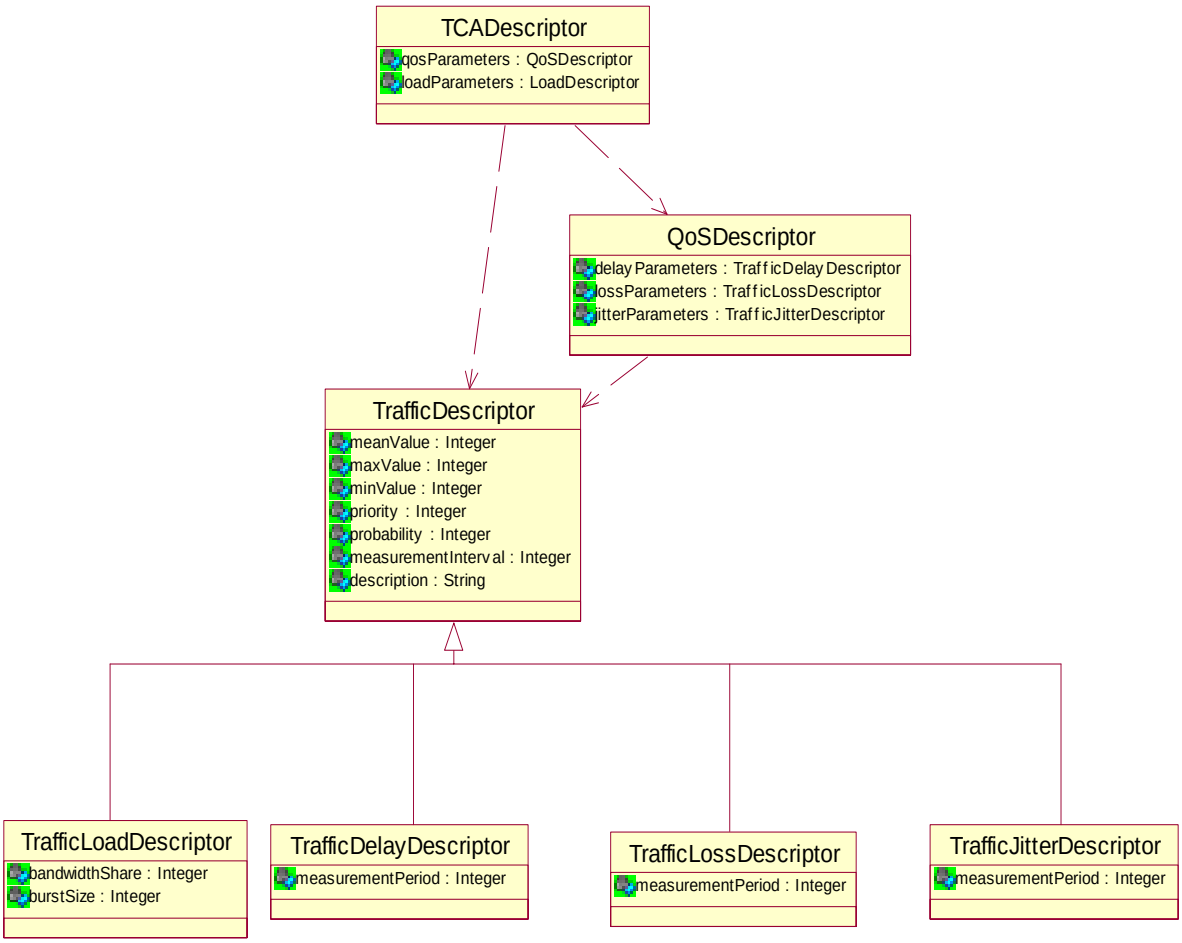

Figure 18 – Traffic Condition Agreement (TCA) Descriptor

Class	Description
TCADescriptor	A TCADescriptor is a data class for representing the Traffic Condition Agreement associated with a network flow, network access group or network access instance.
QoSDescriptor	A QoSDescriptor represents the quality of service associated with a traffic condition agreement.
TrafficDescriptor	This as an abstract class only used for inheritance. TrafficDescriptor represents the traffic characteristics associated with a traffic

	condition agreement.
TrafficLoadDesriptor	A TrafficLoadDescriptor represents the traffic load associated with a traffic condition agreement.
TrafficDelayDesriptor	A TrafficDelayDescriptor represents the traffic delay associated with a traffic condition agreement.
TrafficLossDescriptor	A TrafficLossDescriptor represents the traffic loss associated with a traffic condition agreement.
TrafficJitterDescriptor	A TrafficJitterDescriptor represents the traffic jitter associated with a traffic condition agreement.

Table 4 - Classes defined in the TCA Package

5.4. Interface Specifications

5.4.1. Network Flow Interface

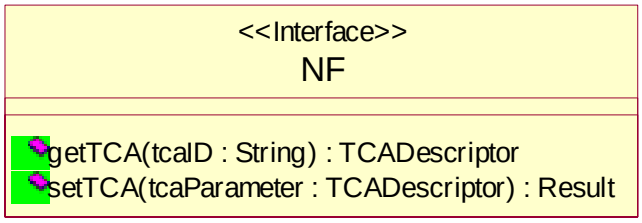

Figure 19 – Network Flow Interface

getTCA (tcaID : String) : TCADescriptor

setTCA (tcaParameter : TCADescriptor) : Result

5.4.2. Network Access Group Interface

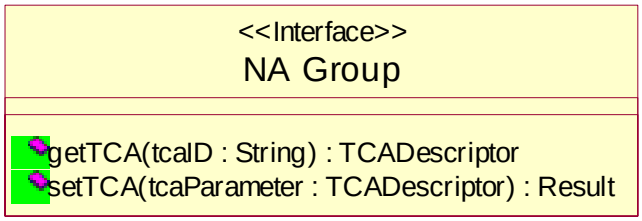

Figure 20 – Network Access Group Interface

Operations inherited from AbstractConnectivityService class:

getNFList () : NFList

getNAGList () : NAGList

getNF (nfID : String) : NFInterfaceRef

getNAG (nagID : String) : NAGInterfaceRef

createNF (nfInfo : NFTemplateRef) : NFInterfaceRef

deleteNF (nfID : String) : Result

createNAG (nagInfo : NAGTemplateRef) : NAGInterfaceRef

deleteNAG () : Result

Public Network Access operations:

getTCA (tcaID : String) : TCADescriptor

setTCA (tcaParameter : TCADescriptor) : Result

5.4.3. Network Access Interface

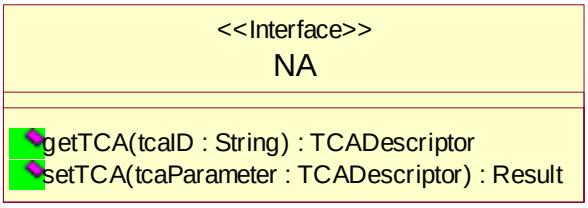

Figure 21 – Network Access Interface

getTCA (tcaID : String) : TCADescriptor

setTCA (tcaParameter : TCADescriptor) : Result

6. ConS-RP Detailed Description

6.1. Overview Description

The ConS-RP is the reference point between stakeholders acting as Connectivity Provider and stakeholders acting as Retailer/Service Provider. Services delivered over ConS-RP are provided by the Connectivity Provider business role as Connectivity Services (CS). The Retailer and Service Provider business roles undertake the user and subscriber role and the Connectivity Provider undertakes the provider role.

CS defines the type of services that may be provisioned over ConS-RP. Connectivity Service Access (CSA) defines the ability to reach a CS from specific termination points (represented on the ConC-RP level by Network Accesses).

6.2. Use Case View

6.2.1. Business Case Description

ConS-RP VPN Provisioning Facet: To be specified in the final version.

6.3. Information View

Figure 22 describes the ConS-RP related delivery objects and important relations to those.

A user/subscriber authorised as a Retailer/Service Provider is allowed to access ConS-RP interfaces, which are Connectivity Service (CS) and Connectivity Service Access (CSA) class interfaces.

The CS class consists of one or more connectivity layer network bindings (CLNB). This grouping form the connectivity service provided to the user/subscriber client.

The CSA class consists of one or more network accesses. This grouping form the connectivity service accesses provided to the user/subscriber client.

See Table 5 for class definitions.

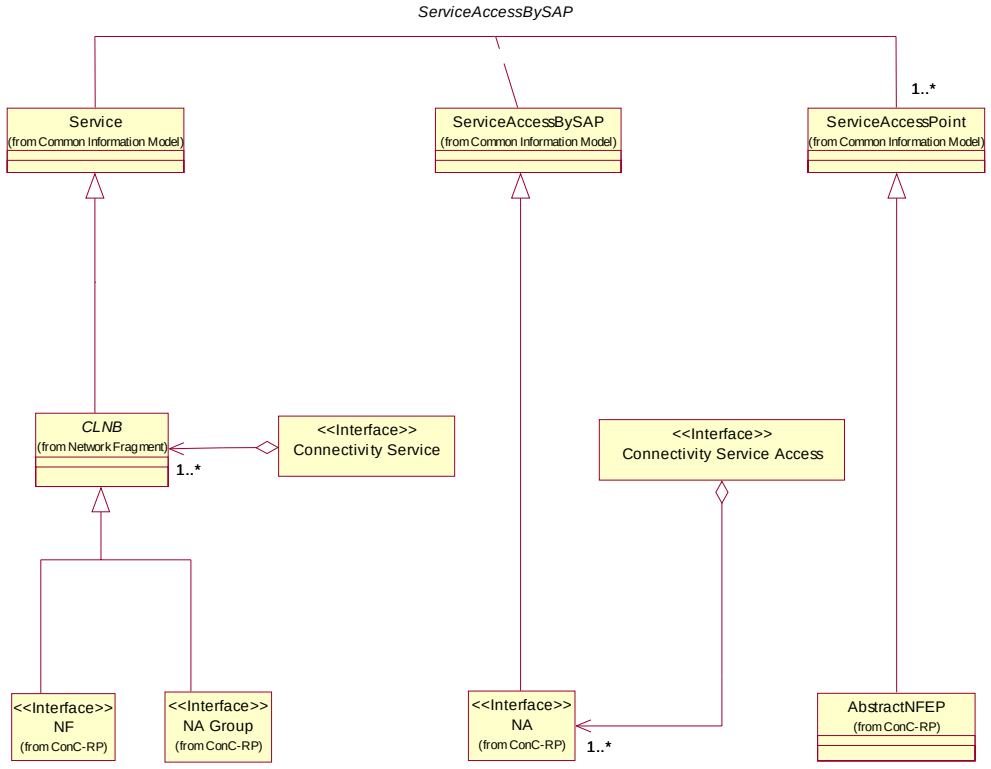

Figure 22 – ConS-RP Information Model

Class	Description
Connectivity Service (CS)	The unit of reference between the stakeholders of ConS-RP that defines the type of service offered.
Connectivity Service Access (CSA)	The unit of reference between the stakeholders of ConS-RP that defines the ability to reach a CS from specific termination points.
ServiceAccessPoint (SAP)	This class is derived from the DMT CIM. It is an abstract class only used for inheritance. CIM ServiceAccessPoint represents the ability to utilize or invoke a service. SAP:s represent that a service is made available to other entities for use.

Table 5 - Classes defined in the ConS-RP Package

6.4. Interface Specifications

See section 5.4 for detailed specifications of interfaces defined in ConC-RP.

6.4.1. Connectivity Service Interface

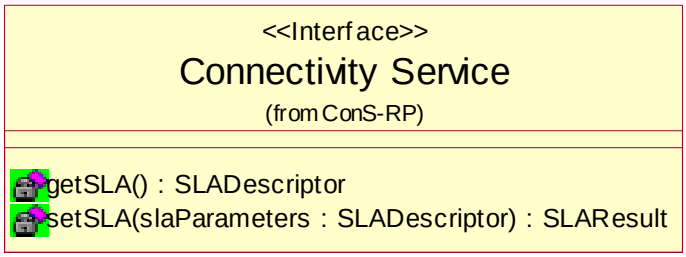

Figure 23 – Connectivity Service Interface

Operations inherited from AbstractConnectivityService class:

getNFList () : NFList

getNAGList () : NAGList

getNF (nfID : String) : NFInterfaceRef

getNAG (nagID : String) : NAGInterfaceRef

createNF (nfInfo : NFTemplateRef) : NFInterfaceRef

deleteNF (nfID : String) : Result

createNAG (nagInfo : NAGTemplateRef) : NAGInterfaceRef

deleteNAG () : Result

Private Connectivity Service Operations:

getSLA () : SLADescriptor

setSLA (slaParameters : SLADescriptor) : SLAResult

6.4.2. Connectivity Service Access Interface

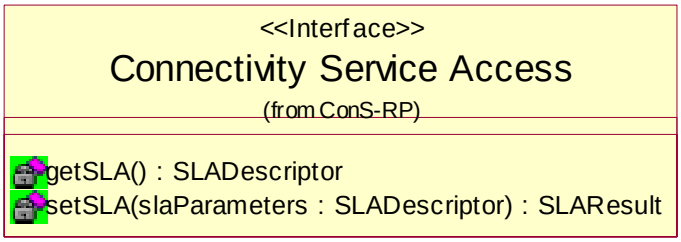

Figure 24 – Connectivity Service Access Interface

Operations inherited from AbstractConnectivityServiceAccess class:

getNAList () : NAList

getNA (naID : String) : NAInterfaceRef

createNA (naParameters : NATemplateRef) : NAInterfaceRef

deleteNA (naID : String) : Result

Private Connectivity Service Access operations:

getSLA () : SLADescriptor

setSLA (slaParameters : SLADescriptor) : SLAResult

7. FCon-RP Detailed Description

7.1. Overview Description

The FCon-RP is the reference point between stakeholders acting as Connectivity Providers. Services delivered over FCon-RP are provided by the Connectivity Provider business role as Federated Connectivity Services (FCS). The customer client Connectivity Provider business roles undertakes the user and subscriber role and the other “service providing” Connectivity Provider business role undertakes the provider role.

FCS defines the type of services that may be provisioned over FCon-RP. Federated Connectivity Service Access (CSA) defines the ability to reach a CS from specific termination points (represented on ConC-RP level by Network Accesses).

7.2. Use Case View

7.2.1. Business Case Descriptions

FCon-RP VPN Provisioning Facet: To be specified in the final version.

FCon-RP Link Provisioning Facet: To be specified in the final version.

7.3. Information View

Figure 25 describes the FCon-RP related delivery objects and important relations to those.

A user/subscriber authorised as a Connectivity Service Provider is allowed to access FCon-RP interfaces, which are Federated Connectivity Service (FCS) and Federated Connectivity Service Access (FCSA) class interfaces.

The FCS class consists of one or more connectivity layer network bindings (CLNB). This grouping form the connectivity service provided to the user/subscriber client.

The FCSA class consists of one or more network accesses. This grouping form the connectivity service accesses provided to the user/subscriber client.

See Table 6 for class definitions.

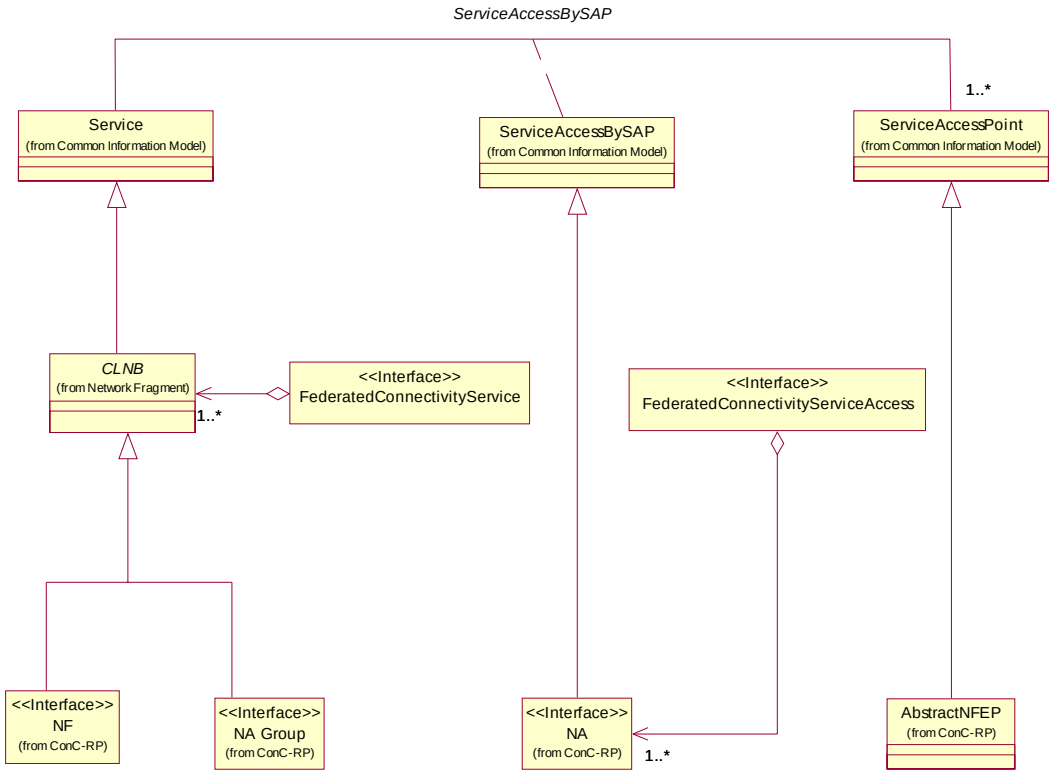

Figure 25 – FCon-RP Information Model

Class	Description
FederatedConnectivityService	The unit of reference between the stakeholders of FCon-RP that defines the type of federated service offered.
FederatedConnectivityServiceAccess	The unit of reference between the stakeholders of FCon-RP that defines the ability to reach a FCS from specific termination points.
ServiceAccessPoint (SAP)	This class is derived from the DMT CIM. It is an abstract class only used for inheritance. CIM ServiceAccessPoint represents the ability to utilize or invoke a service. SAP:s represent that a service is made available to other entities for use.

Table 6 - Classes defined in the FCon-RP Package

7.4. Interface Specifications

See section 5.4 for detailed specifications of interfaces defined in ConC-RP.

7.4.1. Federated Connectivity Service Interface

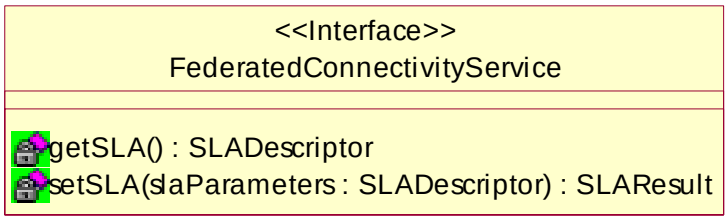

Figure 26 – Federated Connectivity Service Interface

Operations inherited from AbstractConnectivityService class:

getNFList () : NFList

getNAGList () : NAGList

getNF (nfID : String) : NFInterfaceRef

getNAG (nagID : String) : NAGInterfaceRef

createNF (nfInfo : NFTemplateRef) : NFInterfaceRef

deleteNF (nfID : String) : Result

createNAG (nagInfo : NAGTemplateRef) : NAGInterfaceRef

deleteNAG () : Result

Private Federated Connectivity Service operations:

getSLA () : SLADescriptor

setSLA (slaParameters : SLADescriptor) : SLAResult

7.4.2. Federated Connectivity Service Access Interface

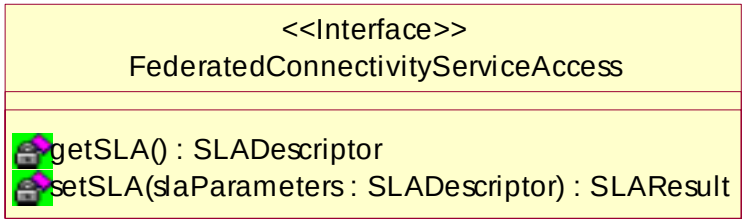

Figure 27 - Federated Connectivity Service Access Interface

Operations inherited from AbstractConnectivityServiceAccess class:

getNAList () : NAList

getNA (naID : String) : NAInterfaceRef

createNA (naParameters : NATemplateRef) : NAInterfaceRef

deleteNA (naID : String) : Result

Private Federated Connectivity Service Access operations:

getSLA () : SLADescriptor

setSLA (slaParameters : SLADescriptor) : SLAResult

8. Glossary

AAA	Authentication, Authorization and Accounting
CAT	Compliance and Testing
CIM	Core Information Model
CLN	Connectivity Layer Network
ConC-RP	Connectivity Component Reference Point
ConS-RP	Connectivity Service Reference Point
CORBA	Common Object Request Broker Architecture
CoS	Class of Service
CP	Connectivity Provider
CPE	Customer Premises Equipment
CSLN-RP	Client Server Layer Network Reference Point
CU	Connectivity User
DMTF	Distributed Management Task Force
FCon-RP	Federated Connectivity Service Reference Point
GNM	Generic Network Manager
IDL	Interface Definition Language
IETF	Internet Engineering Task Force
IIOP	Internet Inter-Orb Protocol
IP	Internet Protocol
IPCM WG	IP Control and Management Work Group
ITU-T	International Telecommunication Union
JAVA	Objectoriented Programming language
LND	Layer Network Domain
LND	Layer Network Domain
LNFed-RP	Layer Network Federation RP
MIB	Management Information Base
MSC	Message Sequence Chart (ITU-T Recommendation Z.120)
NA	Network Access
NAG	Network Access Group
NE	Network Element
NF	Network Flow
NFEP	Network Flow Endpoint
NFEP Pool	Network Flow Endpoint Pool
NM	Network Manager
ODL	Object Definition Language
OMA	Object Management Architecture
OMG	Object Management Group
OMT	Object Modelling Technique
ORB	Object Request Broker

PCIM	Policy Core Information Model
QoS	Quality of Service
Ret-RP	Retailer Reference Point
RfP	Request for Proposal
RfR/S	Request for Refinements and Solutions
RP	Reference Point
RP-Facet	Reference Point Facet
RSVP	Resource Reservation Protocol
SAG	Service Access Group
SLA	Service Level Agreement
SNMP	Simple Network Management Protocol
SP	Service Provider
TCA	Traffic Condition Agreement
Tcon-RP	Terminal Connection RP
TINA	Telecommunication Information Network Architecture
TINA NCM	TINA Network Component Specification
TINA NRA	TINA Network Resource Architecture
TINA NRIM	TINA Network Resource Information Model
TINA ODL	TINA Object Definition Language
TSAS	Telecom Service Access and Subscription

9. References

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