PSI Terms, Abbreviations and Definitions

PSI-TAD

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Table of Contents

List of Figures

List of Tables

1 Document Meta Information

1.1 Document Signature Table

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Table 1.1: Signature Table.

1.1.1 Document Change Record

1.1.1.1 Changes

Date	Version	author	message
2022-07-07	MS1	Wolfgang Robben	Initial version
2022-07-14	MS1.1	Wolfgang Robben	Updated to resolve RID comments
2022-09-30	MS2	Christian Grubert	various updates.
2022-12-31	MS3	Dafinka Srezoska	Minor updates due to MS2 action items. Various additional updates
2023-04-19	MS4	Christian Grubert	Added change_orders, beam characteristics, user missions, overbooking and best-effort-options
2023-07-27	MS5	Norbert Czeranka	Added SLI, SLA, SLO, SLS, KPI and KPQ, OTM and UI and some rephrasing to overbooking.

Date	Version	author	message
2023-10-06	MS6	Hendrik Oppenberg	Clarified on overbooking, overselling and overprovisioning, adjusted TAD definitions, resolved MS5 action items
2024-01-25	MS7	Bela Lars Mueller	Elaborated on provider journey. Add examples of bundled offerings. Finalized overbooking concepts
2024-09-11	MS8 [1.2.0]	Thomas Schulz	Public release adjustments.
2024-12-09	MS9 [1.2.1]	Dominik Ogrodnik	SLA redefinition from UnifiedAPIs.
2025-02-03	MS10 [1.2.2]	Hendrik Oppenberg	Mission API: mission assets, products and mission management stubs.

Table 1.2: DCR Table.

1.1.1.2 Source Control

Changes to this document are tracked electronically. No signature is required by the authors. The following information can prove the integrity of the document and reveal any change.

Repo	Date	Author	Branch	Hash

Table 1.3: GIT Changelog Table.

Figure 1.1: DCR QR-Code.

1.2 Documents

1.2.1 Reference Documents

Acronym	Reference	Title	Version
PSI-DL	PSI-DL	PSI CGI Document List	current MS (doc version)
PSI-ICD	PSI-ICD	PSI Interface Control Document	see before
PSI-TAD	PSI-TAD	PSI Terms, Abbreviations and Definitions	see before

Table 1.4: Reference Documents.

2 Introduction

The Pooling & Sharing Interfaces Definitions (PSID) project is an ESA co-funded effort to define a common standard for the interfaces of Pooling & Sharing Systems (PSS) for Satellite Communication (SatCom) services. A PSS is a digital platform for matchmaking (Gov)SatCom users' demands (both commercial and institutional) with (Gov)SatCom providers' offers. Bringing together multiple (Gov)SatCom providers in one platform makes the market transparent, thus allowing users to get an overview of the market and to compare different offers efficiently. Additionally, a PSS assists users with little knowledge about the (Gov)SatCom domain defining their requirements on the (Gov)SatCom services. Those two aspects combined allow for fast access to the services and an efficient usage of the available capacities. To accomplish this, a PSS steps in between the usual processes of finding a provider/supplier, requesting an offer, and ordering the desired products or services, either as a service broker or by pooling products and services from different providers and offering them as an intermediary or distributor. Subsequently, the PSS can be used to monitor the services and manage multiple missions in a single application.

Eventually, a PSS can also be used as (or manage) a community hub, i.e., a number of end users or customers with similar interest that *share* their common resources and utilize a commonly obtained *pool* of (Gov)SatCom capacities. This strategy increases the efficient usage of scarce resources further.

There are already different approaches on PSSs, that might lead to an unnecessary fragmentation of the market. Therefore, a common standard for the interfaces of a PSS is required to allow the interaction between those different PSSs and reduce the effort of (Gov)SatCom providers to offer their product and services via multiple PSSs to maximize their reach.

Such a standard needs to take care of the different interfaces involved in the aforementioned processes, i.e.,

1. an interface between PSS and resource providers (satellite operators, service providers, or other PSSs),
2. an interface between the PSS and users, and
3. an interface between PSS and its own governance.

The goal of this project is to mainly define aspect 1 and to develop a software mock-up as needed to validate the various interfaces being developed.

The PSI standard derives from the existing industry-standard "Open Digital Framework" of **TM Forum** alliance[1]. The "Open Digital Framework" is a reference framework for delivering online Information, Communications and Entertainment services to the telecom world. It empowers market participants to compete and cooperate. One of PSI's goals is to make this existing standard fit for the world of satellite communication.

The consortium for this project consists of the service & technology providers SES Techcom and CGI, as well as of the (Gov)SatCom operators SES, Hellas Sat, Hispasat, Hisdesat, and LuxGovSat, and Inmarsat being both a service & technology provider and a (Gov)SatCom operator.

[1] See https://www.tmforum.org/resources/reference/gb991-tm-forums-core-concepts-and-principles-v22-0-0/

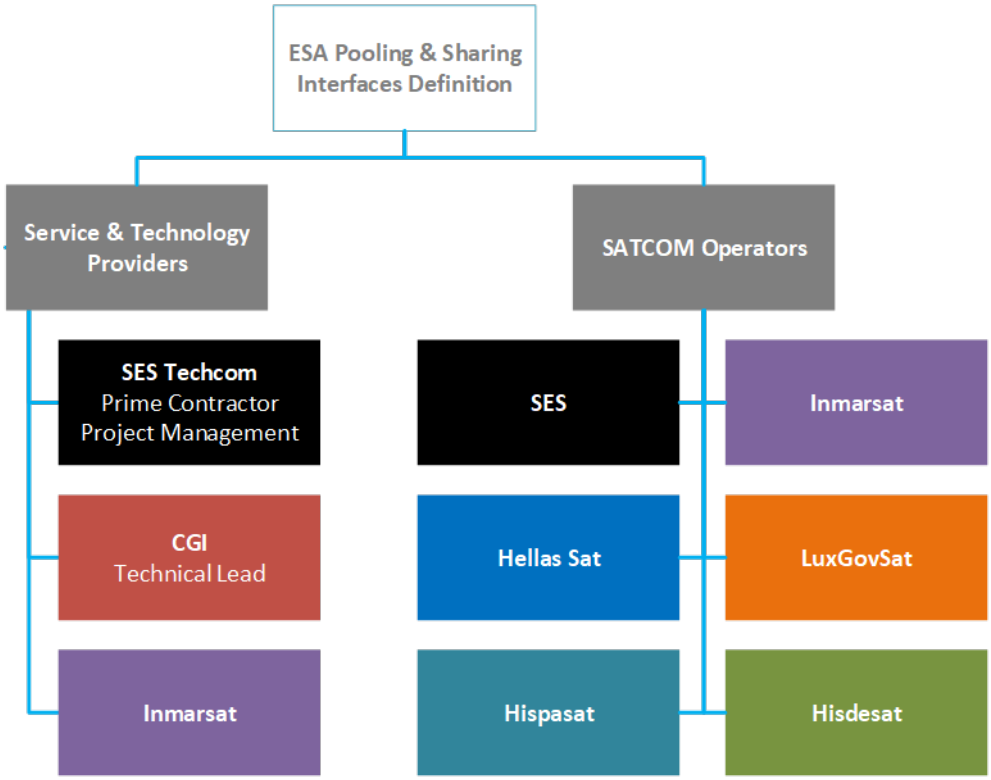

Figure 2.1: The PSI consortium.

2.1 Document Scope

This document contains all explanations of terminology, abbreviations and definitions used within the Pooling And Sharing Interfaces Standardisation Project (PSI).

2.1.1 Compiled Document

NOTE: THIS IS A COMPILED DOCUMENT [2]

This document has been compiled/generated from external sources and is not being written as-is. Therefore, any changes made within this compiled version of the document will be lost upon recompilation!

To make (permanent) changes, edit the respective sources directly or contact the PSID team.

2.1.2 Signature

Changes to this document are tracked electronically. No signature is required by the authors. The information in the “Source Control” chapter can prove the integrity of the document and reveal any change.

[2] Document compiled on 2025-02-12 11:46.

2.1.3 Development State

Current document version is `1.2.2`.
Next version is targeted for `2025-04-01`.

2.1.4 PSI Release Notes

2.1.4.1 Introduction

Welcome to the third release of the Pooling and Sharing Interface API! Below, you'll find details about the features, enhancements, and other important aspects of this release.

2.1.4.2 Key Highlights

The focus of this release lies on **mission management**, to facilitate a common understanding of user requirement towards communication. It aims to complement the Inquiry API by providing workflows and *understanding* to service requirements. This is mainly a user-oriented API, but it also enables exchange of mission data between PSS systems and therefore cross-platform-market places. This could become a future focal point. Such data exchange would include actual user requirements (expressed as missions), as well as templates for such missions. By the use of templates, user mission creation is streamlined and allows a governance to safeguard, streamline or ease the process of user requirement gathering.

Together with the APIs, we are working on a Plug&Play component for P&S systems (Hubs, Brokers, Marketplaces...), based on ODA. This will be a standalone Micro-Frontend open to be integrated into existing OSS/BSS/PSS systems. A first draft is included in this release.

It will come with different views:

- Time based (e.g. mission timeline, Gantt-Chart, to express that is needed *when*)
- Geography based (e.g. mission zones or network nodes on a map to express what is needed *where*)
- Logical View (e.g. communication interdependency graph to express *how* the requirements will look like)

Another area of improvement is the **performance management API**.

A new API has been added that allows to request performance reports to an ongoing mission from the provider. That is: the report itself is generated on provider's systems. The API handles the request and exchange of the report. The report has to be in line with the product's SLA and allows monitoring of compliance. It allows also to define alarm thresholds and receive a push of threshold violations by the provider, avoiding a constant pull.

We also added the technical considerations and resulting decisions to the document set. This allows easier future evolution and maintenance of the standard.

2.1.4.3 What's New

- [PSI-GID] now contains descriptions about the ODA component for mission management
- [PSI-ICD] now contains new and updated APIs - see below!
- [PSI-ADR] first release of our decision records

- [PSI-TAD] now contains descriptions of concepts for user missions, as well as performance and alarm management
- [PSI-TOD] now contains new tasks and operations for user missions, performance and alarm management

2.1.4.3.1 Newly added APIs

- PSID002 Mission Management
- This customer-facing API allows them to manage missions and assign products, services and resources to them.
- It can also serve as an entry point for the Customer Inquiry API to find matching products for their requirements.
- PSID143 Performance Monitoring
- Based on MEF143 - Performance Monitoring API (Version 2.0.0-RC).
- The performance monitoring allows a PSS or customer to request performance reports from a provider.
- PSID642 Alarm
- Based on TMF642 - Alarm API (Version 4.1.0).
- Allows the provider to notify a PSS or customer about detected problems with their products.

2.1.4.3.2 Updates APIs

- PSID001 Customer Inquiry
- Improved handling of places by adapting TMF Geography types.
- PSID620 Product Catalog
- Based on TMF620 - Product Catalog Management API (Version 4.1.0).
- Changed `SLARef` to `ServiceLevelSpecificationRef`
- Streamlined GeoJSON types
- PSID633 Service Catalog
- Based on TMF633 - Service Catalog Management API (Version 4.1.0).
- Changed `SLARef` to `ServiceLevelSpecificationRef`
- Streamlined GeoJSON types
- PSID634 Resource Catalog
- Based on TMF634 - Resource Catalog Management API (Version 4.1.0).
- Changed `SLARef` to `ServiceLevelSpecificationRef`
- Streamlined GeoJSON types
- PSID657 Service Quality Management
- Based on TMF657 - Service Quality Management API (Version 4.1.0).
- Add endpoints to manage KPIs that are supported by the PSS.

2.1.4.3.3 Added Requirements

- MISSION requirement category
- REQ-06-03 Key Indicator Management
- REQ-06-04 Performance Monitoring Job Management
- REQ-06-05 Performance Monitoring Report Management
- REQ-06-06 Alarm Management

2.1.4.4 Known Limitations

1. The Service Quality Management is rather basic. There is an ongoing effort to align this set of APIs with the results of a TM Forum Catalyst project. More information will follow in one of the next releases.
2. The Mission Management Service is at an early state. However, the available API implements basic mission management services, import and export. A full set of APIs to implement such a service are subject to an upcoming release. Refer also the [PSI-GID] to learn about the available API use cases.

2.1.5 Outlook

Currently, we are working on the next release with the following focal points:

- Finalize the mission management component
- Update the API baseline to TM Forum 5
- Converge with MEF schema for some selected APIs

2.1.6 Feedback and Contributions

We value your feedback! If you encounter any issues or have suggestions, please reach out. Additionally, we welcome contributions from the community.

3 Preamble

The Pooling and Sharing Interface Definition (PSID) project develops the specifications for the interfaces of a Pooling & Sharing system based on the Open Digital Framework of TM Forum. The Open Digital Framework defines processes and business entities that are commonly used by telecommunication providers to achieve the best possible compatibility between them. Although most of the work is built around terrestrial communication services, satellite providers are interested to adapt it, too. PSID follows the same domain structure, including but not necessarily restricted to:

- Common
- Customer
- Product
- Service
- Resource

The terms in these documents refer to the Aggregate Business Entities (ABEs) of the Information Framework (Shared Information/Data Model, SID), including some addendums. They are described again to show the actual scope (excluding what is not required for this project) and to add some more information on how they are applied to the satellite communication context.

The actual API specification is based on the Open APIs of TM Forum, which is certified to comply with the SID. PSID applies a set of patches to create tailored OpenApi files, which are then used to generate the code stubs of the prototypes.

Note that we distinguish between the definition (PSID) and its implementation, the Pooling & Sharing Interface (PSI).

4 Terminology & Concepts

This chapter describes some core concepts and terminology necessary for the correct understanding of PSID project's approach for a standardisation and, consequently, for its development project and any follow-up activities.

4.1 Understanding and different Scenarios of a Pooling & Sharing Systems (PSS)

A pooling & sharing system (PSS) for (Gov)SatCom services is a centralised platform that connects users' needs and providers' offers. A provider can offer their services and add their resources to a common pool managed by the PSS from which users can select the best fitting option for their needs. A PSS gives its users a dedicated interface to specify their needs in such a way that their input can be processed automatically to find suitable options or at least to identify providers that are capable of making a serious offer. In the commercial domain, this enables open competition between providers in the (Gov)SatCom market by striving to make better and more attractive offers for the users, that can promote innovation and growth. In the governmental domain, this allows to optimise the usage of governmental (Gov)SatCom resources, e.g., as part of a common space communication plan for EU member states. Users can share the ordered resources among each other, but this is internally handled by a PSS. For example, a PSS can support defining the hierarchical structure of an organization with its sub-organizations and community of users. Therefore, an organization as a user of a PSS might order an internet access service that will be used by its sub-organizations/users.

4.1.1 Types of Pooling & Sharing Systems

There are different types of pooling & sharing systems and various scenarios how the stakeholders can interact with each other.

4.1.1.1 Stand-Alone PSS for One Provider

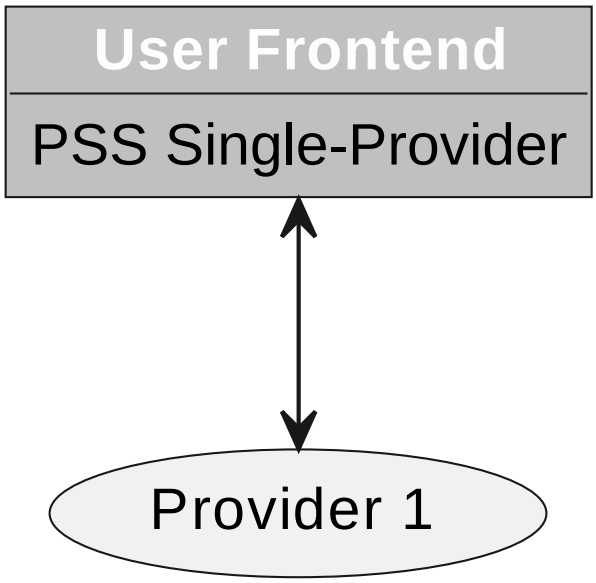

Figure 4.1: PSS set-up scenario 1.

A single provider can implement a PSS and use it basically as their sales frontend. In that case, it offers products and combines space assets/resources of a single operator. This is a scenario mainly applicable to commercial (Gov)SatCom providers but can be envisioned as a platform for non-commercial usage as well, e.g., as a tool to request secure (Gov)SatCom capacities as part of a governmental framework contract. With this setup of digitalised services, a commercial CSP can couple the PSS to their other systems seamlessly, e.g., to their Content Management or Enterprise Resource Planning systems.

It is even possible to have a direct connection with their teleport, i.e., the PSS offers a contingent of preconfigured services that are automatically configured on the teleport's hub systems. Then, a user can book or request services right away and minimal, if any, human interaction is required to set up a service through the digital (Gov)SatCom value chain created.

4.1.1.2 Stand-Alone PSS for Multiple Providers

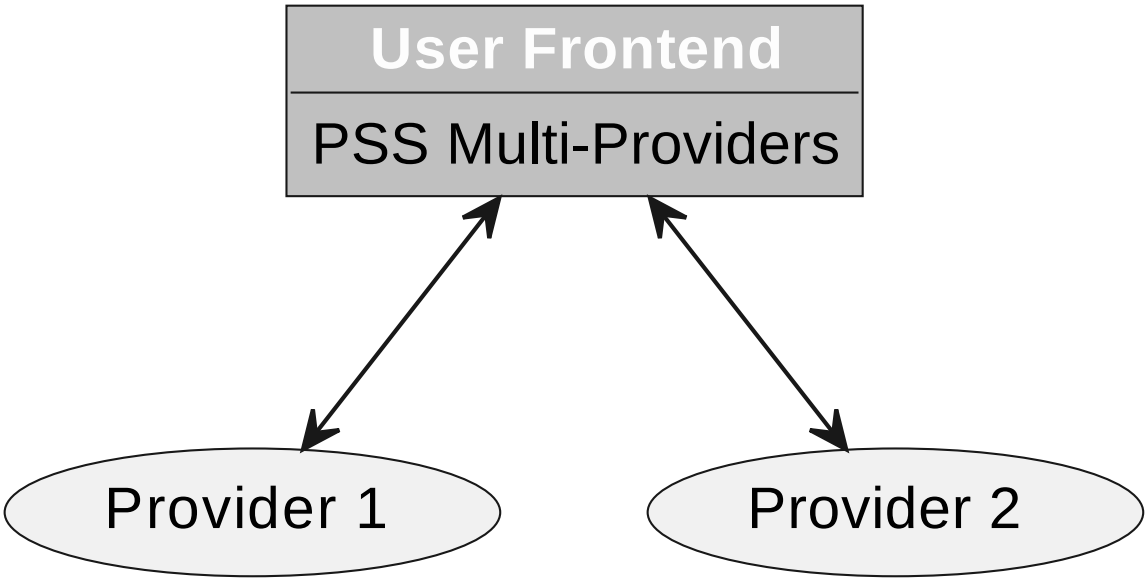

Figure 4.2: PSS set-up scenario 2.

This type of Pooling and Sharing System is similar to the one above but offers products from multiple providers. A PSS that hosts offers from different providers can work in two modes: A broker-mode and a provider-mode. As service broker, the PSS connects users and providers with each other. Therefore, the PSS supports the user to make a standardised request or browse and filter a catalogue of available products. This request is processed and a list of fitting products is presented to the user. If no option is found, the request can be forwarded to a list of providers as request for quote (RFQ) or published as an invitation to tender (ITT). The list can be filtered by the PSS to show only providers that the PSS is aware of offering similar services. In addition, a PSS can act as a provider on its own. For this, the PSS's governance can buy capacity from different providers and resell them to its users, which can be lucrative to providers. From the governance's perspective, the availability of remaining capacity that they can offer to users can be easily calculated, meaning they are less dependent on the individual providers for forecasting of demand and supply. Additionally, the governance can combine products from different providers to create high-redundancy packages for users with high-availability requirements. Such a PSS can be an open market platform for commercial services, or a hub PSS.

4.1.1.3 PSS to PSS

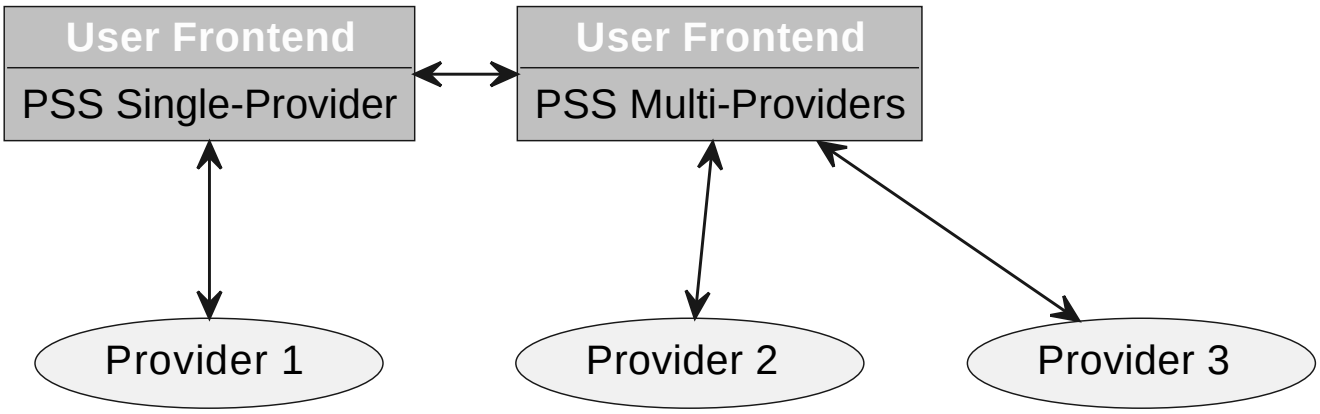

Figure 4.3: PSS set-up scenario 3.

Potentially, different PSSs can interact with each other to reach out to providers they do not have in their own portfolio. To establish new associations, it is irrelevant how many providers are onboarded on the PSS systems and how many external PSS systems are already connected. It only demands unified APIs to enable communication between the PSS instances.

4.1.1.4 Hub PSS

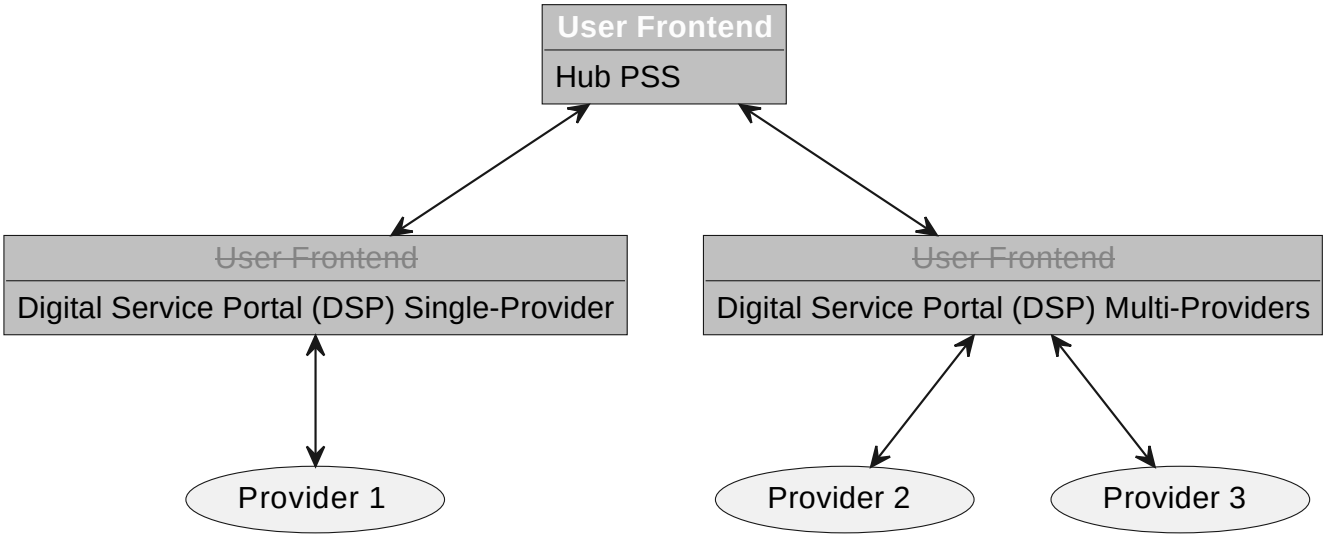

Figure 4.4: PSS set-up scenario 4.

The user frontend for those PSSs connected to the overall hub PSS is not needed and replaced with a uniform hub frontend. It is a “reference PSS” federating different PSSs including their respective provider combinations. All examples given above can potentially be combined to form a hub PSS. As depicted in the diagram, the hub PSS offers a centralised user frontend, hence the user frontends of the individual PSSs that are connected to the hub PSS are obsolete. There are plans for a European (Gov)SatCom hub to centralise the (Gov)SatCom demand & supply by European public authorities.

> The hub PSS setup is not addressed within PSI, but it is only elaborated for the completeness of the different PSS types.

4.1.1.5 Control over a PSS or hub PSS

The control over a PSS or a hub federating multiple PSSs can be *community* or *commercially* driven. For example, community stakeholders controlling a PSS or hub PSS could be a consortium of humanitarian aid organisations, aiming at centralising and pooling resources to reduce costs while optimising the usage of booked (Gov)SatCom capacities.

A commercially driven PSS or hub PSS would be controlled by commercial parties.

4.1.2 Interactions

Regardless of the type of the PSS, it might be able to interact with other PSSs. For example, the governance of a governmental hub PSS wants to buy capacities for its pool from a commercial PSS, thus addressing the providers listed within a commercial PSS. Changing the point of view, a provider might want to offer resources to multiple PSSs as well. Despite various target systems, the provider would be greatly helped if they only had to prepare and provide their portfolio once. This can be done by exporting the data of one PSS and importing it in another, or via direct transfer. It has to be ensured however that declared resources are made available if they are listed and offered within several PSSs. In the former case, a standardised PSS-provider interface is required, in the latter one a standardised PSS-PSS interface. This way, a standardised interface enables several automated interactions that currently require a lot of human intervention. Additionally, it facilitates connections that were not thought of initially.

4.2 Parties

Business interactions are executed between two or more parties, which are either natural persons (“individuals”) or organizations. A party can have different roles in different interactions. For example a service provider can also be the customer and business partner of another provider, who is then a supplier, too.

A PSS might also be used as a hub where different users share resources without cost, where access to them is merely requested and approved. For easier reading, these users are also referred as customers even though they don’t explicitly pay for the resources that they are using.

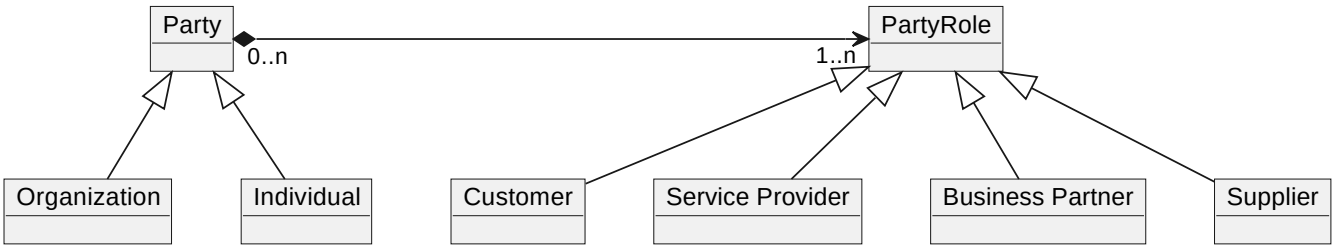

Figure 4.5: Parties and roles.

4.2.1 Party Relations

There are two aspects to describe the relations of parties:

1. All parties can be related to one another. This allows to model long-term partnerships between organizations, but is also used to describe the role of individuals inside of organizations (e.g. buyers and users).

2. Organizations can have an explicit hierarchy of parent-child relations.

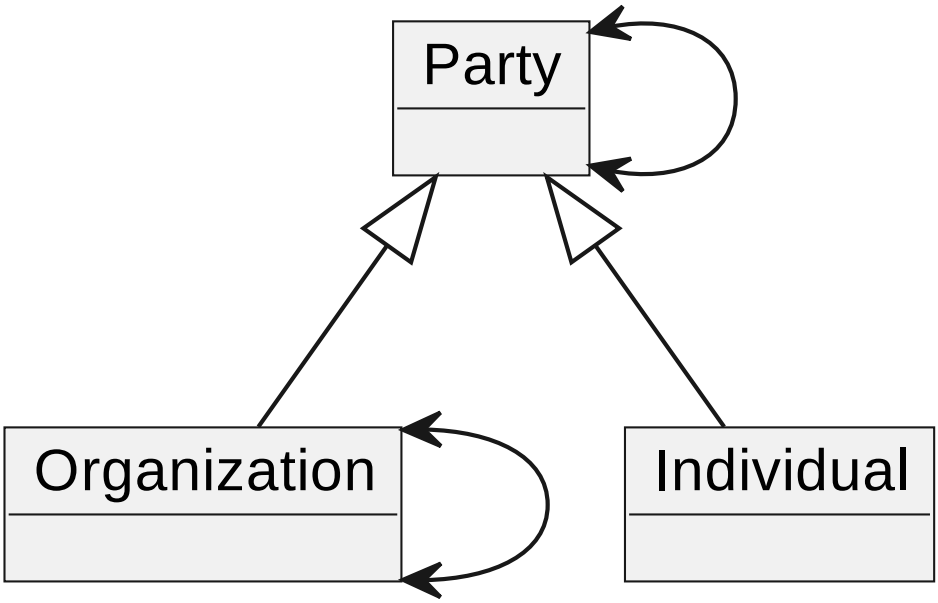

Figure 4.6: Party relations.

4.2.2 Party Roles

The following roles are used by the PSID in compliance with the SID[3]. As mentioned before, each party can have different roles in different contexts:

- General role inside a PSS (maybe used for role based access control):
- **(Service) Provider**: An organization or individual which offers products to others in exchange for payment in some form.
- **Customer**: A person or organization that buys products from the enterprise or receives free offers or products. Customers can also be other service providers who resell the enterprises products, other service providers that lease the enterprise's resources for utilization by the other service provider's products and services, and so forth.
- Order context:
- **Supplier**: A role played by a Party, who commits to provide a product to a Buyer by a formal agreement. Usually a provider.
- **Buyer**: A role played by a Party, who imposed a Supplier to provide a product by a formal agreement. Usually a customer.
- **(Product) User**: A Product User is corresponding to the role of using a product. Usually an individual or subunit of a customer organization.

[3]https://www.tmforum.org/Browsable_HTML_SID_R20.0/content/_3E3F0EC000E93E389BB6023C-content.html

- **Broker**: A role played by a party, who brokers products between buyer and supplier. Usually the PSS.

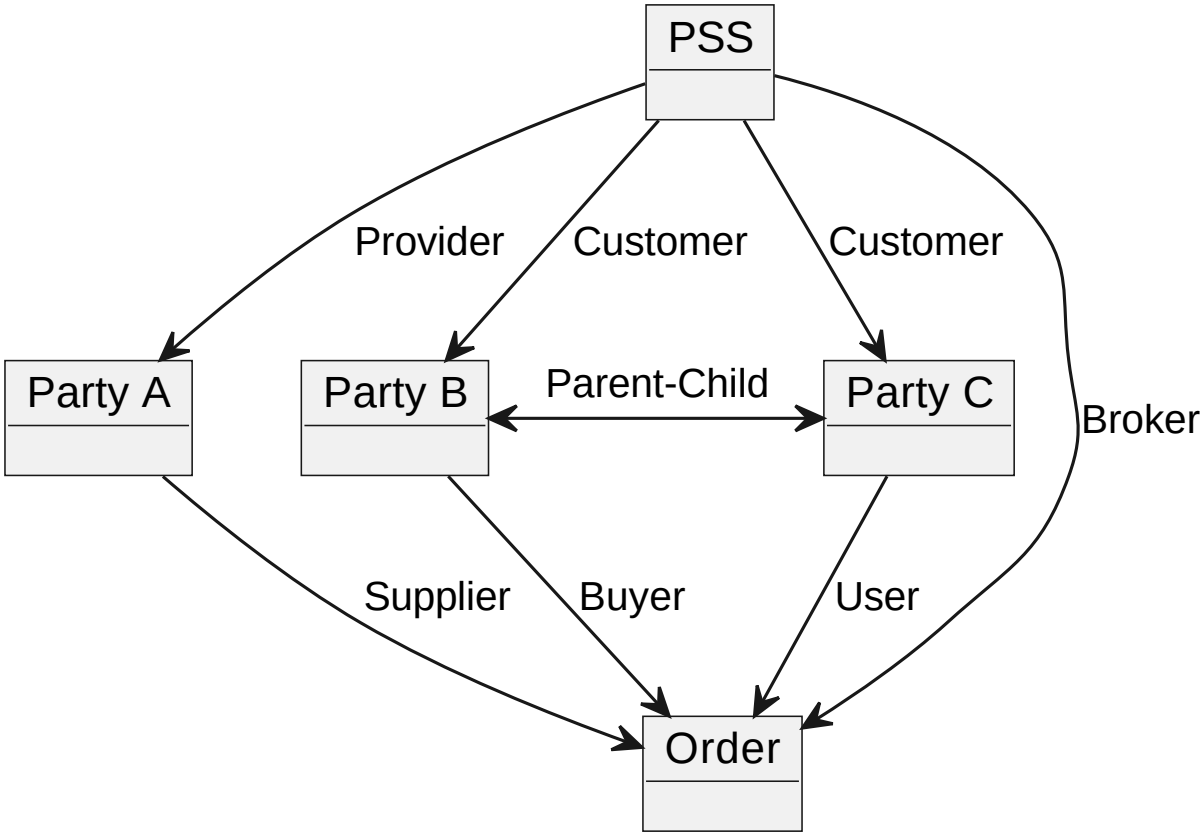

Figure 4.7: Party role example.

4.3 User Missions

Users conduct missions, which require certain assets to achieve a given goal; e.g. humanitarian aid or disaster recovery. Such a user mission entity is generally composed of some header information (name and description, time frame and other characteristics) and lists of places. Following TMF, the places are expressed as addresses (which may be incomplete, e.g. only a country) and/or a location object, which contains the actual coordinates (point, line or polygon). The `MissionAsset` assigns an InquiredProduct, ordered Product or User Resources to the mission. They can be in relationship with each other, e.g. a fire truck may require an internet connection to stream data.

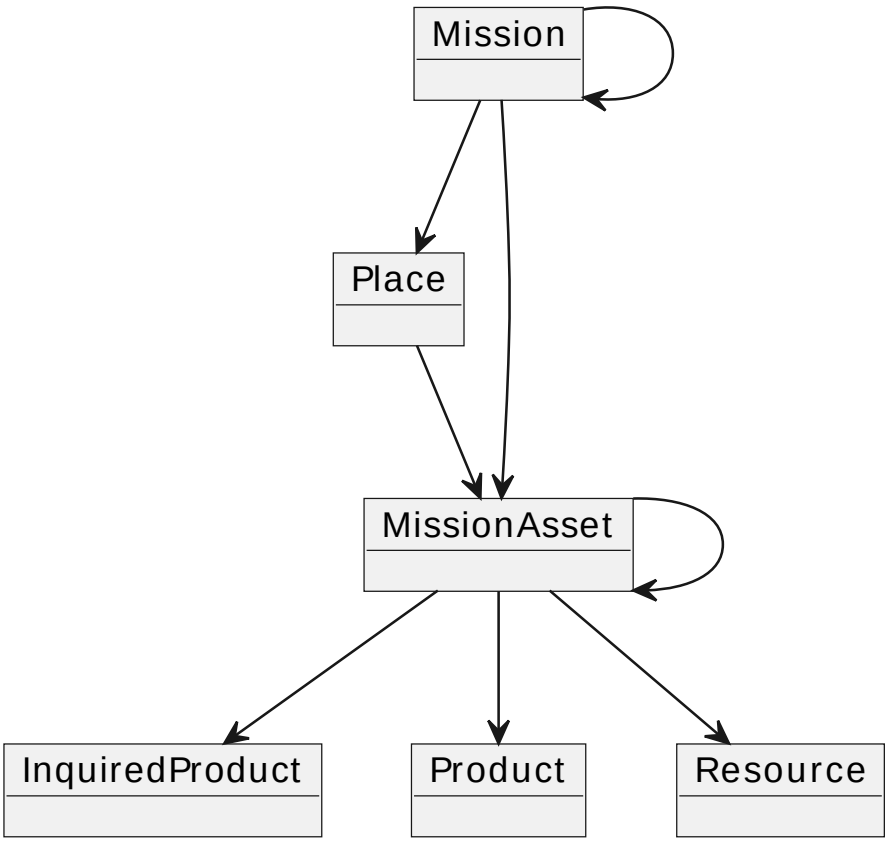

Figure 4.8: User Mission.

4.4 Resources, Services and Products

TM Forum introduces the concepts of resources, services, and products to allow for maximal flexibility in modelling a provider's portfolio. Resources are the different parts that are required for a service. They can either be customer-facing or hidden under a service. Then, a service is the *action*, usually performed on some set of resources. Finally, a product combines any number of customer-facing resources and/or services. A product is something a customer can actually order, e.g., if a customer wants a specific resource, this resource needs to be wrapped into a product.

Another aspect of this model is the difference between a specification and an instance of the specification. This will be discussed in Specifications, Catalogs and Offerings.

4.4.1 Resources

Resources are physical or logical components which are used to implement communication services. The physical ones are those you can see, touch, and hold. They are generally divided into the following groups:

- Physical resources (antennas, BUCs and other hardware, but also satellites)
- Logical resources (IP addresses, software, RF bandwidth)
- Compound resources of the above (e.g. a router consists of different cards/ports and runs software)

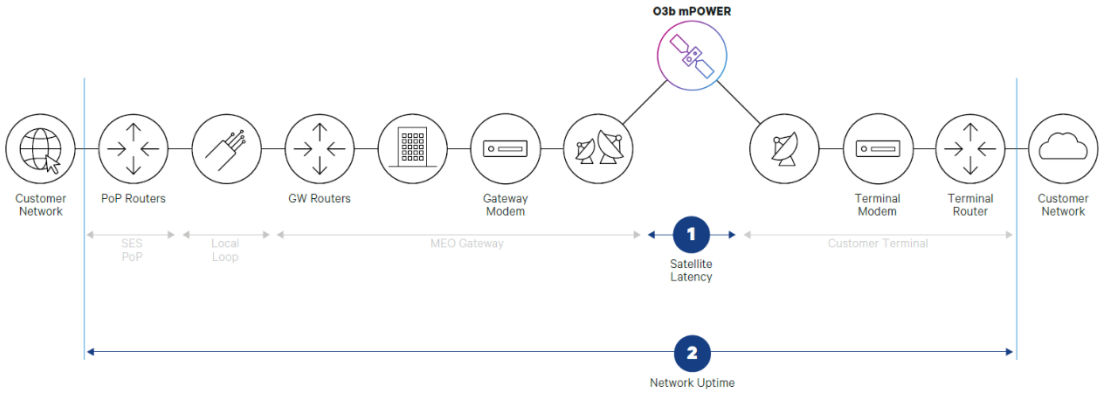

Figure 4.9: Resources and Service Demarcation Points.

Resources can be utilised either in the on-site user segment or the space segment and teleport (see figure 4.9). The ones used in the on-site user segment are a visible part of the product offered by the provider. For example, a terminal antenna could be bundled into a product and offered as part of it, or it could be offered separately to the user. If the user already owns a compatible antenna, they may want to use it to realise the offered product. On the other end, the space segment and the teleport equipment are not directly visible to the user but are required by the provider to implement the service.

The diagram below demonstrates the relationship between a resource, a service and a product. A product, or a service may require resources to be realised. Resources can be related to other resources, e.g. when a chunk of bandwidth of a provider (resource A) is leased (as resource B) to a customer (child of A). They are also related to parties which own, manage and/or use the resources.

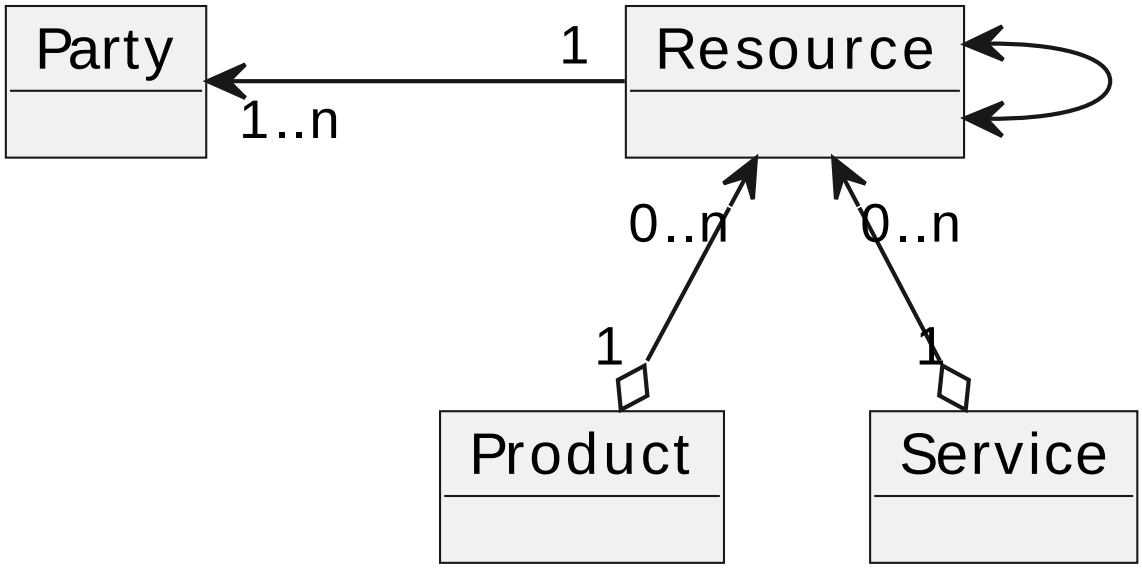

Figure 4.10: Relations of resources.

4.4.2 Services

Services are a predefined utilization of different resources in the teleport and the space segment, which providers offer to users, e.g. Internet Access, Telephony or Site-to-Site IP-Trunk. They may also provide value-added services, e.g. network management or field services, which do not employ resources. Services (and on-site resources) are then bundled to products, which are sold to a user.

Figure 4.11: Relations of services.

4.4.3 Products

A product is a wrapper entity for a services or on-site resources which is sold to a user within an order. Though it is possible to combine multiple services and resources in a single product, the nominal layer to combine them is a (bundled) offering.

The diagram below demonstrates the relationship between a product and its bundled resources and services. A product may require zero or many resources and/or services to be realised.

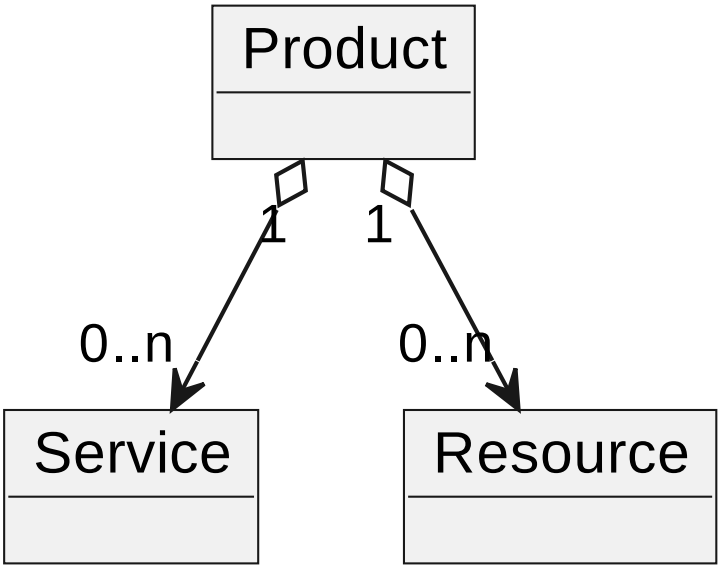

Figure 4.12: Relations of products.

4.5 Specifications, Catalogs and Offerings

The above-mentioned terms (resource, service and product) describe the operational business entities. They are managed in the “inventory” of the provider, customer or PSS. Before this, the user has to be made aware (e.g. by a PSS) of what a provider *could* sell them. To describe this, there are three terms defined by the SID:

- Specifications describe general characteristics a resource, service or a product can have. For example, a product specification is composed of service and resource specifications. If a product is offered and bought, those specifications need to be realised, e.g., the specification of a particular modem is realised by providing a physical instance of this modem. The total of all realizations of services and resources are then the actual product. Specifications often contain characteristics with variants. For example:
- "iDirect X3 DC on/off" is the specification of a physical resource. The resource itself is a specific modem with a serial-number and DC **either** on **or** off (the specification allows both variants).
- "[1; 2; ...; 100] MHz Ku-Band bandwidth" is the specification of a logical resource. The resource itself is a specific chunk of bandwidth with up to 100 MHz.
- "VSAT Internet Access Service" is the specification of a service. It allows defining the possible information rates with granularity e.g. 128, 256, 512, 1024 kbps, etc. The service itself is bound to a user and a site, or multiple users and sites (e.g. multicast/broadcast service).
- A product specification contains resource and/or service specifications as described above.
- Catalogs are used by a provider to make a list of offerable specifications visible to other parties. There is a catalog for each category of specification defined per provider, i.e., a product catalog for product specifications, a service catalog for service specifications, and a resource catalog for resource specifications.
- The term "portfolio" is used to also include outdated or future products, services and resources.
- A product offering is a concrete offer of a product specification to a user. This can be through a catalog or directly to a user (as the result of ITT or RFQ). It also contains other business-related information such as SLSs and pricing information.
- Bundled offerings combine multiple offerings (and therefore multiple products) into one bookable entity.

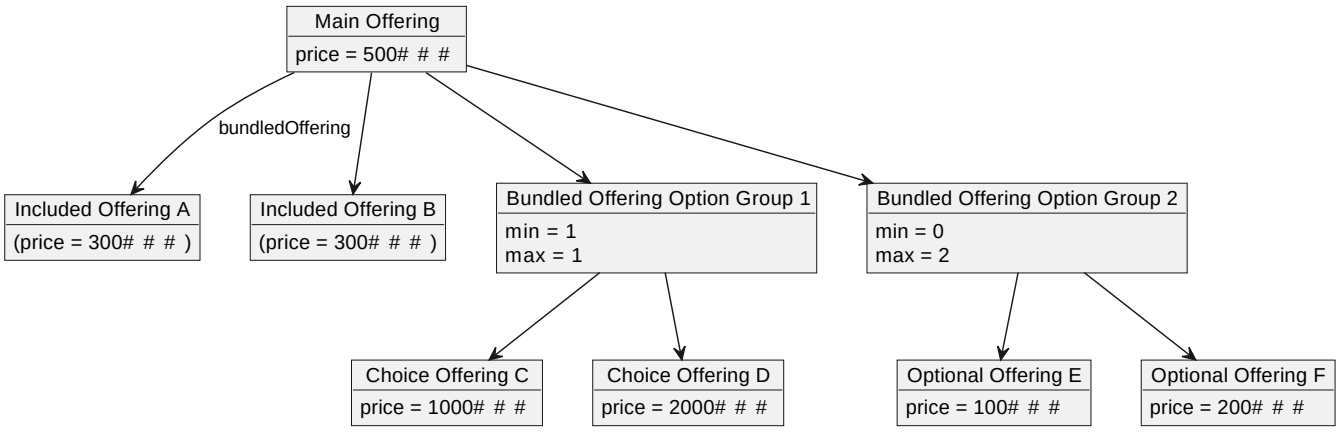

Figure 4.13: Bundled Offerings.

The example 4.13 shows an offering that bundles the two other offerings **A** and **B**, providing a discount that results in a lower package price. The included offerings may also be unpriced, which makes them sellable in said package only. Additionally, the customer must choose exactly one offering, either **C** or **D**, from option group 1. Depending on their selection, the price of the selected offering is added to the overall price. The second option group contains two optional offerings **E** and **F**, which are also added to the price when selected. The customer can select to have none of these added, add only one or two instances of **E**, add only one or two instances of **F**, or add one instance of both, **E** and **F**. Other permutations of these cases are possible, e.g., an offering for a single product with some additional options.

4.5.1 Types and Characteristics

The PSS defines a set of supported types for resources, services and products in consultation with the providers. It provides them in a JSON Schema file that is made available through the API itself or can be exchanged offline (cf. [PSI-ICD]). Each type then defines characteristics that describe its exact nature. For example, a resource of type “Bandwidth” contains the start and end frequencies as characteristics, while an “Internet Access” service is defined by the information rates. These definitions are then used by the providers to create specifications with concrete values in the catalogs, which can be accessed by the matchmaking to find an implementation for the needs of the customer. After a successful order, the instances that are created in the inventory are also based on the same schema.

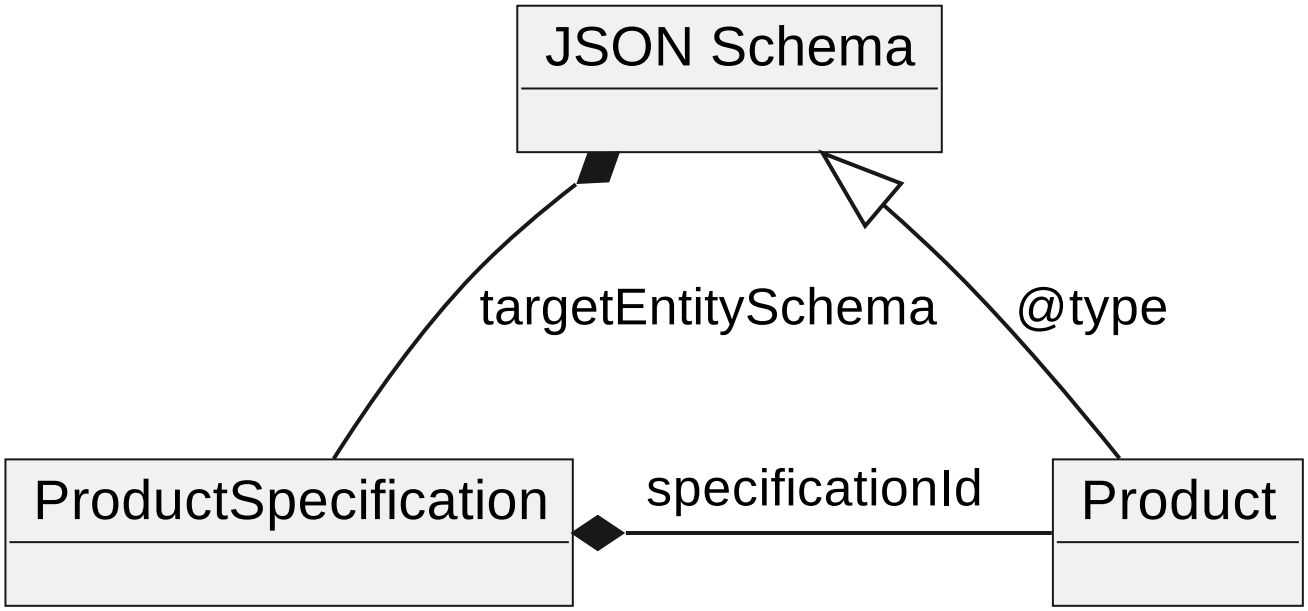

Figure 4.14: Relation between schema ("type"), specification and instance

A special characteristic is the definition of beam footprints and service areas. There are three cases considered:

- **Fixed Beams:** For most commercial providers, the beams are fixed above a well known area. They are able to define the footprints with any desired detail of EIRP values. This allows for an automated matchmaking by the PSS and preconfigured offerings that can be directly ordered by the customer.
- **Dynamic Beams:** Sometimes the provider can not define the beams in detail, because they change over time. It may also be that the exact footprint shall not be disclosed. In this case, it is possible to define only a single “potential beam area”, which still allows the matchmaking to find the resource/service but will by definition lead to an RFQ.
- **Services:** If a service is only available in a specific area, this can also be expressed via geometries. Each area can be augmented with additional properties that can be referenced in offerings, e.g. a minimum required dish size.

4.6 Service Quality

4.6.1 Service Level Specification

A service level specification represents a predefined or negotiated set of service level objectives (SLO). The SLO, in turn, defines for a key performance/quality indicator a threshold which is to be adhered to. In case the targets are not met, the consequences define the expected outcome which in most cases would be generating an alarm.

A service specification may refer to a list of service level specifications (SLS) that must be capable of being met by corresponding service instances.

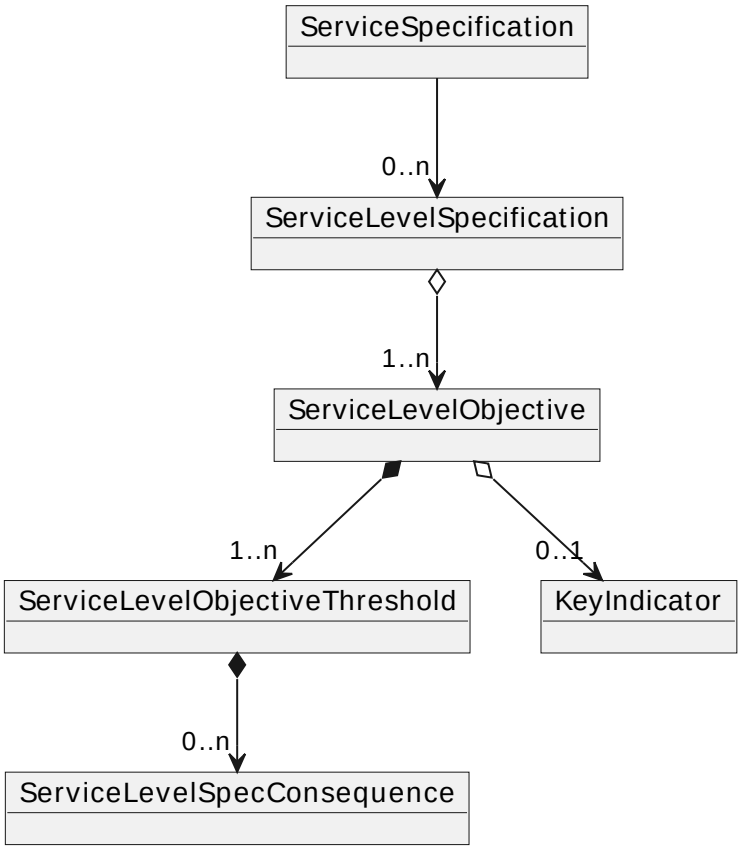

Figure 4.15: Service Level Specifications.

The service level specifications could then be used to establish a service level agreement between the customer and the provider.

4.6.2 Performance Monitoring

In case of services with attached service level specification, a service provider will enable performance monitoring for a provisioned service to measure the applicable KPIs/KQIs of the service as defined by the service level objectives. Examples of performance objectives encompass various metrics such as frame/packet delay, frame/packet loss ratio, inter-frame/packet delay variation, and more. These objectives serve as measurable criteria for assessing the performance characteristics of a service. In this scenario, a service provider is responsible for provisioning the appropriate measurement points and performance objectives, together with measurement intervals and schedules, as well as gathering data. Measured values are available for retrieval by the PSS by generating a performance monitoring report for the requested key indicators.

For an ad-hoc performance measurement (not related to an SLS but e.g. for supporting troubleshooting during service assurance) that is initiated for a limited time (typically a single run or non-continuous run) the on-demand

performance monitoring job is provisioned to carry out the measurement of key indicators. The on-demand performance job is indicated by a performance monitoring job type. The execution of the performance monitoring job results in the generation of performance measurement reports, which deliver comprehensive performance collections.

The PSS API does not define performance indicators' specifications but can be used in combination with any specifications. This is delivered by the ServiceSpecificPayload attribute of the performance monitoring job entity which serves as an extension point for configuring service-specific performance indicators. Reports delivered by the performance job contain ResultPayload attribute which similarly acts as an extension point for capturing and representing the outcome of performance monitoring.

4.6.3 Alarm

An Alarm is a specific type of notification related to detected faults or abnormal conditions. Alarms are generated by a service provider in case thresholds specified in a service level specification are violated. Alarm generation results in the creation of an event that is received by an interested party.

Alarms support both resources and services and are not restricted to any particular technology or vendor. Important entities and relationships are depicted in the following diagram.

- alarmedObject is a reference to an object (typically a resource) which is affected by the Alarm. An example of *alarmedObject* is a malfunctioning terminal.
- affectedService is a reference to services that are affected by the Alarm. Services that are known to be degraded because of the *alarmedObject* will be listed here.
- crossedThresholdInformation identifies details of the crossed threshold.

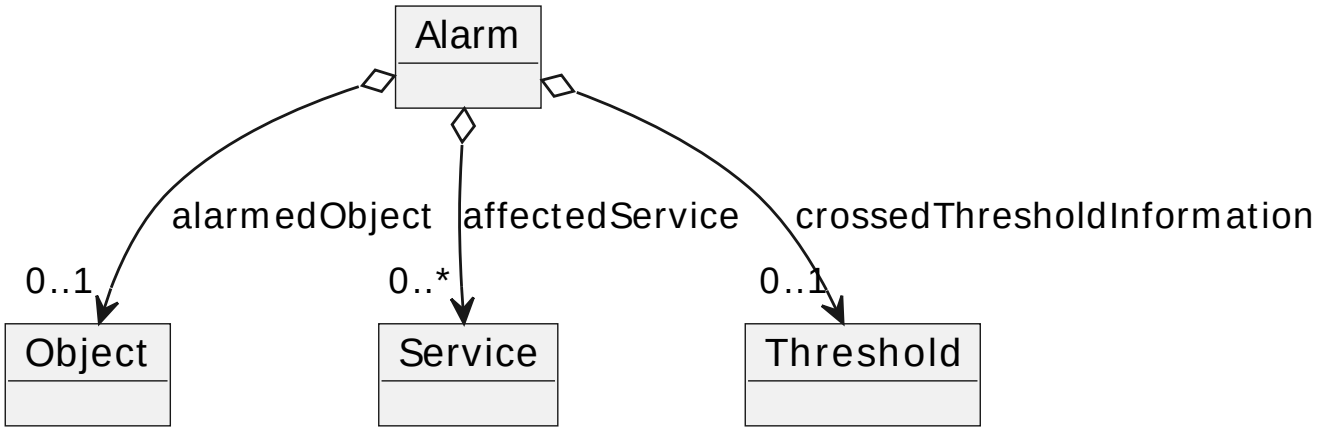

Figure 4.16: Alarm.

4.7 Service Demarcation Points

ESA and the associated so-called PACIS groups introduced the following classification scheme for services based on their demarcation points:

Class	Layer	Covered OSI-Layer	Example
L0	Physical Communication Medium	1 & 2	Leasing 10 MHz bandwidth in Ka-Band
L1	Network Access / Data Transport incl. teleport	2 & 3	IP trunk between two sites, internet access or PSTN access
L2	Network Access / Data Transport incl. remote site	2 & 3	IP trunk between two sites, internet access or PSTN access
L3	Application / Value-added Services	>3	VoIP via L1/L2 link or L1/L2 link + (leased) terminal(s)

Table 4.1: PACIS/SSPS Service classification based on demarcation points, ISO/OSI, examples.

The demarcation points of a service define relevant parameters for the SLS of an offering, e.g., the measured latency of their connection. A basic L0 service grants a user access to a space segment (a GEO satellite, a MEO constellation, etc.) via a defined frequency bandwidth or channel. The corresponding service demarcation points are marked as **B** and **C** (Teleport as the sender) or **B'** and **C'** (Remote Terminal as the sender) in 4.17, i.e., the user is responsible for connecting to the satellite. Both sides can act either as a sender or as the receiver. The service starts when the satellite's transponder receives the signal, and ends when the signal can be received at the defined remote site. Note that neither the teleport or site sending the signal nor the remote site antenna receiving the signal are included in the service. Therefore, only the availability of the space segment and the round-trip latency from point **B** to point **C** or **B'** to **C'** can be part of an SLS.

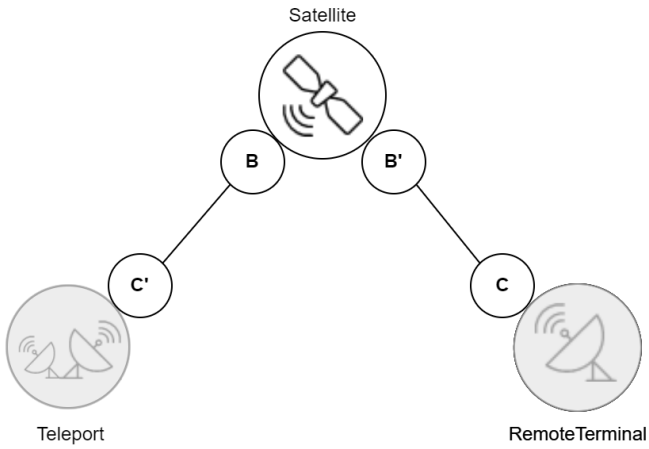

Figure 4.17: Service Demarcation Points L0.

As soon as a provider's teleport is included, the demarcation point shifts from point **B** (or **C'**) to point **A** in 4.18, which corresponds to an L1 service. This allows a provider to actively manage the connection and provide a data bandwidth with access to the internet and/or a user's private network. Thus, the provider has access to half of the connection's endpoints and is able to make statements on the network availability on their side.

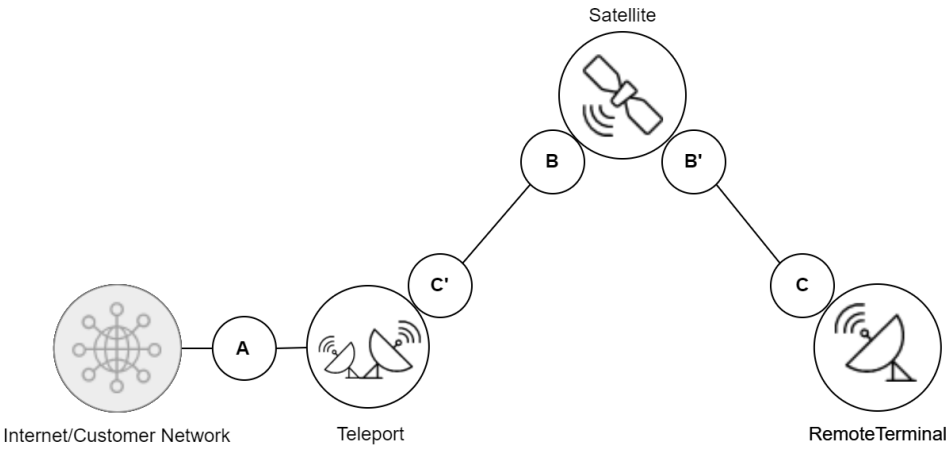

Figure 4.18: Service Demarcation Points L1.

The next step is to include the user's remote site, which corresponds to an L2 service. If a provider has to manage this one as well, the demarcation point shifts from **C** to **D**, as seen in 4.19. In this scenario, the provider has full control over the link and is able to make sophisticated statements on the network uptime and availability, as well as the network latency.

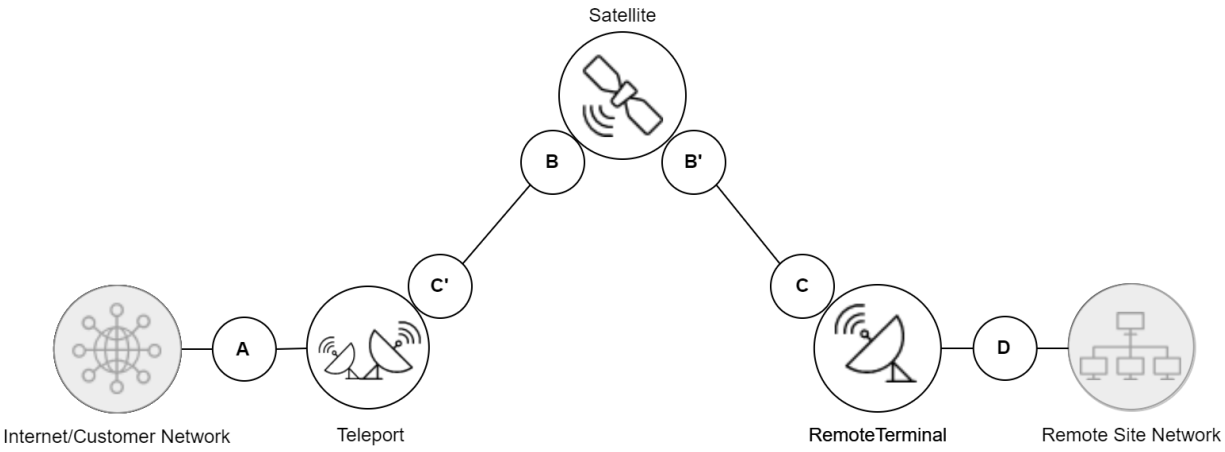

Figure 4.19: Service Demarcation Points L2.

Finally, adding value-added services to the package, e.g., 24/7 remote site support or remote site network management might shift the demarcation point even further from **D** to **E**, see 4.20. Other value-added services, such as provision of colocation space, VoIP, etc., can be located next to the Teleport. There is a cornucopia of value-added services, some depending on the details of the implemented connection. Therefore, they are collectively listed as L3 services and might involve other parts of the service not considered here.

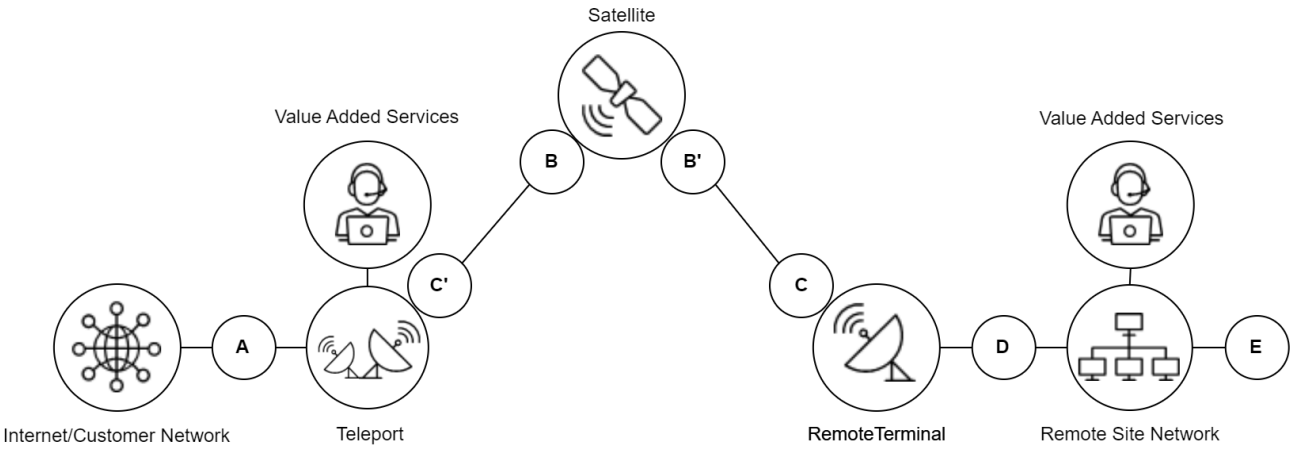

Figure 4.20: Service Demarcation Points L3.

Not categorized but inherently included in the corresponding services of each layer are the resources in the space segment (satellites, constellations, transponders), which are owned or leased by providers. Note that this model needs to be adjusted slightly if a service does not need a teleport, e.g., with point-to-point (P2P) connections. It does not include any details on the systems behind the demarcation points, e.g., if the service is deployed on a maritime vessel or if it is a connection between governmental sites.

The Information Framework (SID) of TM Forum (and by extension PSID) defines services not in relation to the underlying resources and the service demarcation points, see chapter Resources, Services and Products, although this model can be applied within this model as well. Therefore, the service demarcation points are used to define the key performance indicators (KPIs) that are part of an offering. This way, the resources and services are still kept separated, while their interdependency is still valid. Then, L3 includes all sorts of value-added services (VAS), e.g., remote site survey, sparse part management, etc., but also turn-key solutions. A VAS can be mapped to a separated product that can be bundled in an offer without interfering with the L0-L2 services.

4.8 Resource Pool

Pools can be used by the PSS governance to make resources available to different groups of customers. For example, they can create a separate pool for high priority users that is not accessible by others. The number and kind of pools can vary, so the following figure assume two pools to explain the concept. Entities that are not assigned to any visible pool can be interpreted to be in a “private pool” of the provider or customer, although the governance may decide to make private pools explicit.

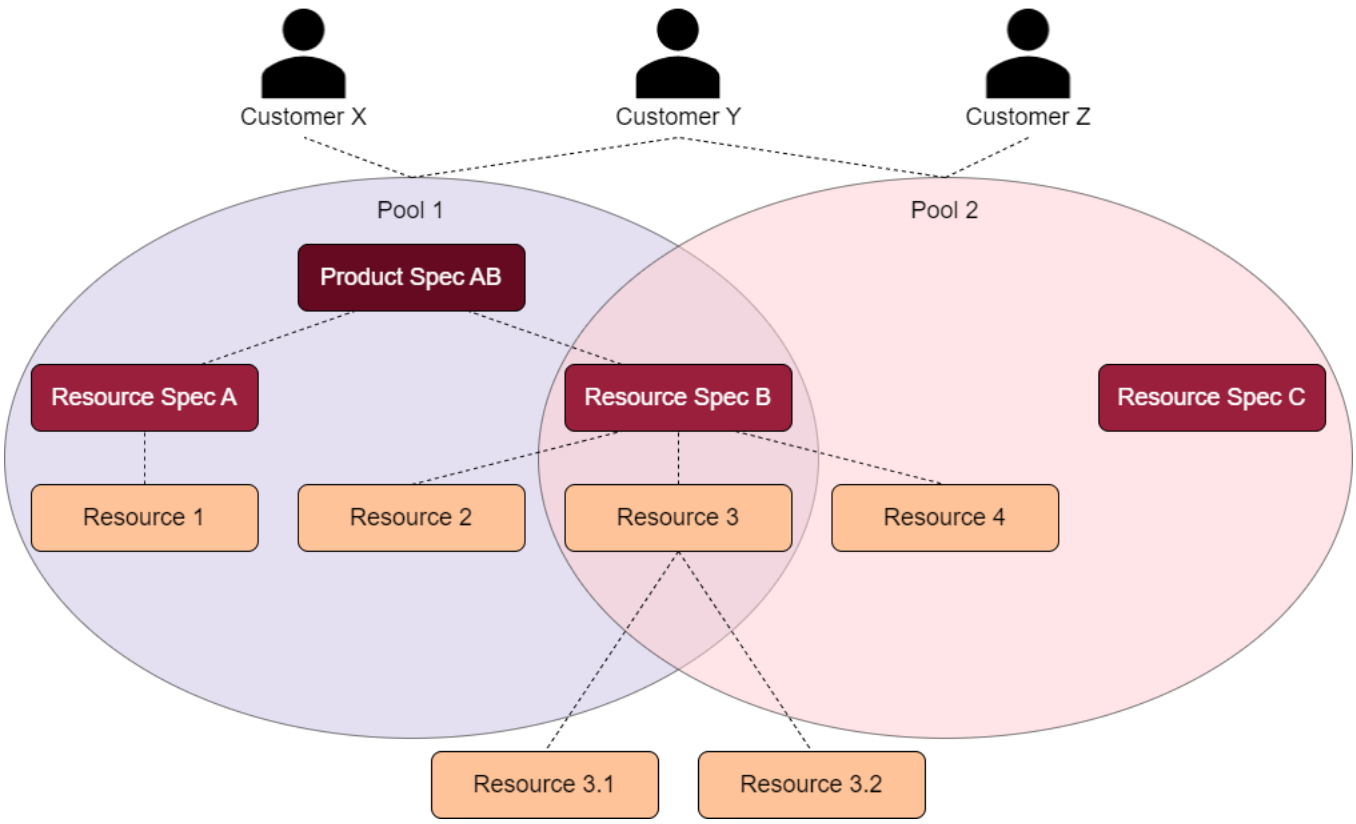

Figure 4.21: Illustration of Pools.

The assignment starts with the resource specification. It must be assigned to at least one pool, but can also be assigned to multiple ones. This makes the specification visible to all users that can access at least one of the pools. All other entities based on it (service/product specifications, offerings and committed resource instances) can be assigned to the same pools or a subset. They shall never be assigned to a pool that does not contain the underlying specification. If a product specification or offering combines multiple resource or service specification, they can only be assigned to the intersection of the pools of the latter.

Applied to the example in figure 4.21, this means that “Customer X” will find the product specification AB in a matchmaking and can access the resources 1-3 to implement it. In case resources 2 and 3 are already booked (and can not be pre-empted), the customer is **not** able to access resource 4. Customer Y in contrast could do so, as they can access both pools. Customer Z on the other hand can see the specifications B and C and even the available resources 3-4, but will have to request a quote since there is no visible product (and therefore no offering) for them. Resource 3 is booked two times and therefore has sub-resources in private pools of unlisted customers for the respective timespan of their bookings.

4.9 Inquiry

A user issues an inquiry to obtain product offerings from the providers. There are four types to distinguish for better comprehension:

- Matchmaking: The user utilises the HMI of the PSS to get an automatically generated list of matching products. This is expected to be the default, since it is the main purpose of a PSS. The matchmaking process can be done by a single PSS, but may also be distributed between multiple PSS and/or provider systems (see Figure

4.22), which makes this a use case for the PSID. It may also be combined: the PSS could perform a coarse matchmaking first and then contact a subset of potential providers to do a fine matchmaking.

- Request-for-Quote (RFQ): The matchmaking can indicate that a provider can offer the requested services and/or resources, but not have an offering. In this case, the user may send a RFQ to said provider, so they can respond with a tailored offering.
- Invitation-to-Tender (ITT): The user can either skip the matchmaking completely or have the PSS do a coarse matchmaking to identify potential providers for their request and then send an ITT to selected providers. This will result in a subset of providers responding with one or more offerings. Note that this is also an option for users if the PSS finds no matching offerings after an initial matchmaking.
- Change Request: When the customer wants to change an active product, they might need to check the feasibility and potentially new price with the provider. In this case, the PSS might already show concrete boundaries such as which characteristics of the product offer can be changed e.g. the maximum information rate.

The general data format required to exchange inquiries is expected to be the same for all cases, but the PSS will have to implement different processes for each use case.

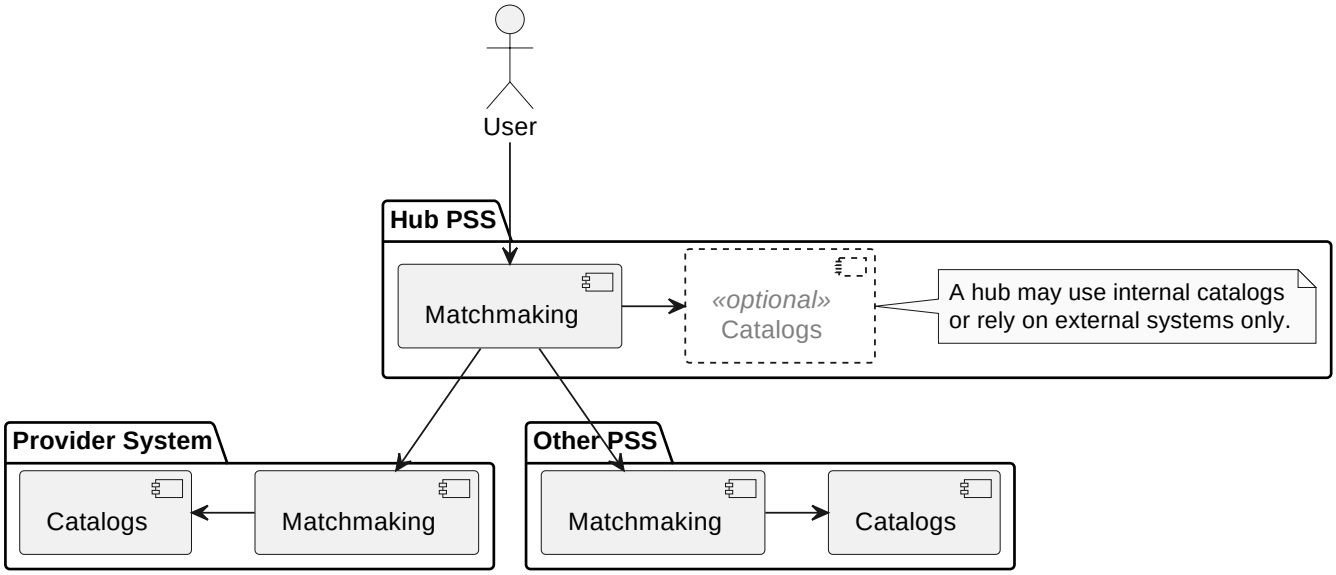

Figure 4.22: Distributed Matchmaking

As part of the inquiry request, the customer can define inquired product types and characteristics (e.g. internet access with 50 Mbps download rate). But the more restrictive the characteristics, the higher the probability that no suitable options will be found. To alleviate this situation, the customer (or the PSS) can define their absolute minimum or maximum values (e.g. 40 Mbps download rate instead of 50 Mbps). Product offerings that do not fully meet the inquired characteristics are referred to as *partial matches* and shall contain human-readable *notes* describing the rationale for deviations. This is possible for any type of customer inquiry (matchmaking, ITT, RFQ or change request).

To prevent long delays, the response time of the providers to an RFQ or ITT should be limited. When forwarding the inquiry to the providers, the PSS is responsible to pass the information for the maximum response time until the PSS is expecting the product offerings. In case the provider exceeds the given deadline, its product offerings may not be considered for the issued inquiry.

4.10 Order

An order lists the product offerings that the customer finally wants to book from the providers. The order also references all the parties that are related to that order. For example, it contains the customer who ordered it, the broker PSS and the service provider. The parties involved get access to the details of the order items, including e.g. quantities, selected variants, agreed prices, contractual data and further negotiation results. When necessary, this list can be extended to additional related parties such as technical contact persons. The order starts as a product order by the user and is decomposed to service and resource orders on the provider side.

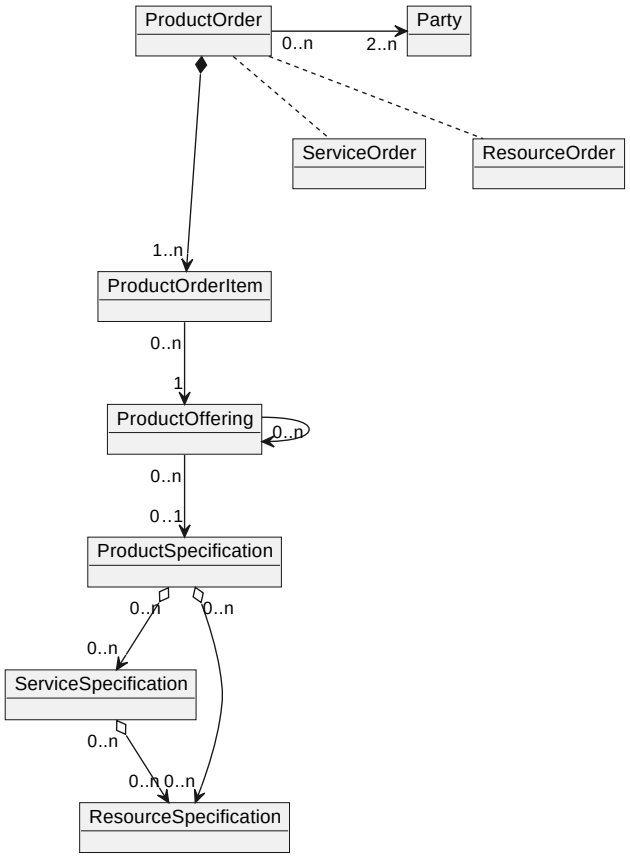

Figure 4.23: Relations of orders.

Orders can also be used to change characteristics of an active service. The PSS can show the possible options of the previously ordered product and let the user select the new values. As with the initial order, an offering for that value combination must exist or be requested via an inquiry. Then the old order is marked as `completed` and a new order is created, which defines that the old service is replaced with a new one. This way, the provider can ensure a smooth transition of operations.

4.11 Overbooking, Contention, and Pre-emption

Overbooking describes the scenario of instances of items (i.e. resources, services, and products) being offered by a provider exceeding their availability. It can be perceived as a boolean characteristic of such an item, e.g., a parameter stating that a resource is overbooked within a PSS. While overbooking is not an issue *per se*, it becomes a major one when the instances in question are finally about to be used. Then a contention situation arises. In consequence, this leads to reduced service quality of low priority customers, which may or may not be within the boundaries of their SLAs.

Overbooking and contention can be mitigated by either cancelling the order of the item or by offering a replacement. Ideally, this is done by the PSS in the overbooking-phase, before the actual contention occurs. Cancellation might result in penalties being imposed as well as bad reputation for a provider.

Additionally, priority schemes for customers can be implemented that allow for pre-emption of already booked items. Such a priority schemes might include different levels, e.g., first based on the type of customer (emergency response before private customers) followed by the product type (private customers paying for higher priority). These strategies are enabled in the API as the corresponding parameter, e.g., in the party profile.

The PSS is in charge of handling the overbooking process for committed resources and, vice versa, the providers for on-demand resources. The PSS might already be able to implement optimization of costs and accommodate a high-priority request, i.e., downgrading another request within given SLA limits. Therefore, the PSS can implement a priority scheme, that allows, e.g., for pre-emption. The PSS can submit the priority with the request/inquiry to the provider (e.g. in form of a priority list of customers or via the party profile with an agreed mechanism for handling priorities) for some resource or service request, allowing the provider to mitigate potential overbooking issues of non-committed items. However, if the PSS has (potentially) no control over the resource, therefore, this might be just a mere suggestion. Such an algorithm needs to be part of the PSS, fed by information provided by the provider and sent via the PSI API.

Every order will create a sub-entity in the PSS (optionally also in the provider system) that is assigned to the customer for the given timespan. Each child contains the actual configuration of the item for that specific customer and allows a discrete state tracking (e.g. planned, shipped, installed, returned). Depending on the implementation, the resource can be further subdivided, e.g., if it is shared with another user or is resold by a service provider. The API allows transferring the information on a resource state.

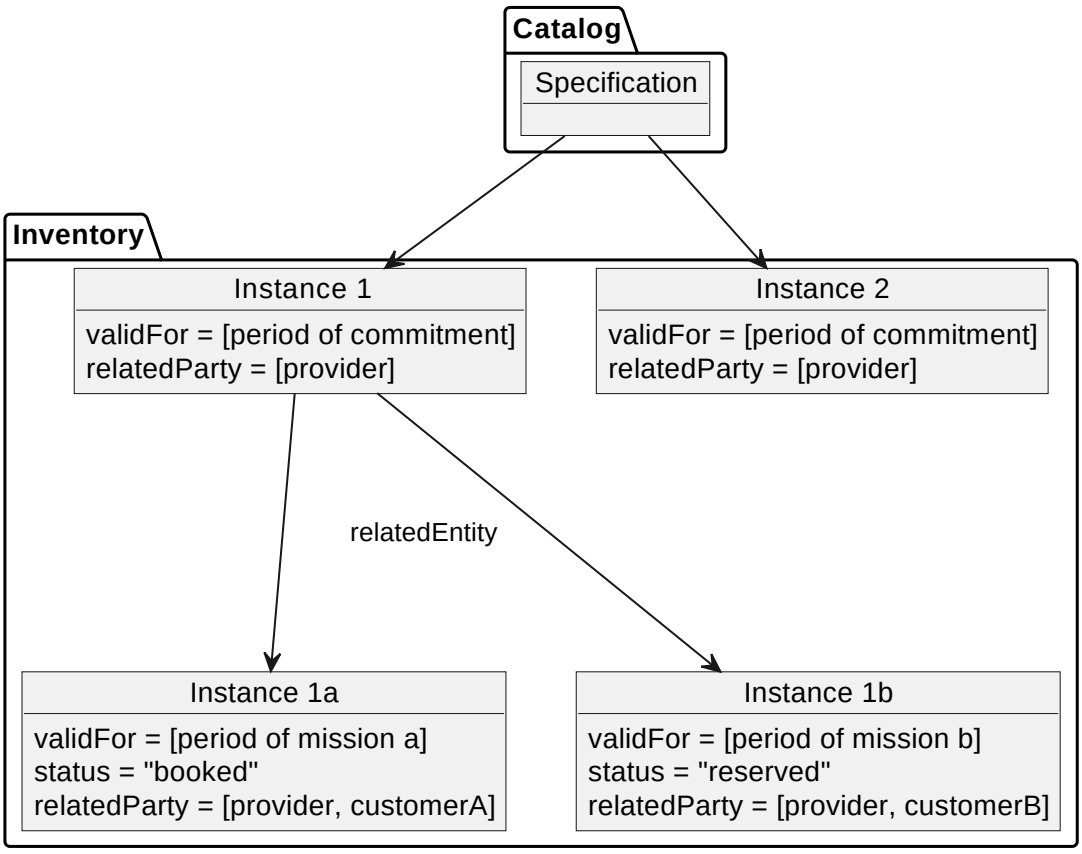

Figure 4.24: Tree of resources.

For committed resources, the PSS can calculate the booking capability as part of the matchmaking: Physical re-

sources (e.g. terminals) are bookable when there is no sub-entity in the inquired timespan. For logical resources (e.g. bandwidth) the implementation has to sum up the assigned amount (MHz or Mbit), subtract it from the available amount and compare it with the inquired value. If the resource is booked as part of *Product A*, it is not available for *Product B* any more (excluding pre-emption etc.). As for on-demand resources, the PSS may still send a check-stock-request to the provider to ask for additional resources.

Another aspect to overbooking is *reserving* a specific resource, e.g., reserving a raw bandwidth for a dedicated period of time without actually booking it. For example, a customer may anticipate a mission starting in two months but doesn't actually know if it will really take place. Some providers offer an option to reserve the bandwidth for a certain time. This allows the customer to set up the mission, knowing, that the required resources will be available. A reservation might be cheaper (although not cost-neutral) than actually booking a resource ahead of time. Again, the decision on such a possibility is to be implemented within a PSS or even on provider side, if they allow reservations on their resources. Thus, the API itself allows to transfer a state to the resource without actively deciding if reservation is possible.

Lastly, a PSS can distribute resources into multiple regional pools in order to perform demand/supply forecast. It could be assumed then that the actual resources are not required at same time and in same pool. However, if this does not hold true, workflows shall be in place to mitigate resource conflicts. The actual overbooking subsequently has an impact on the supply to demand ratio of multiple regional pools. Overbooking is handled according to the type of product. For physical and logical resources (e.g. raw bandwidth) no overbooking is envisioned. However, leasing raw bandwidth for very short time frames is already supported by the API. In contrast, managed services already distinguish between *committed* and *peak* information rates. As result, the CIR is booked and cannot be overbooked; the PIR however can be shared.

Since the processes elaborated here are internal to the PSS, they are not covered in more detail here. Rather, overbooking in all aspects as described within this chapter is a process that will be handled by the PSS. PSI shall allow overbooking, i.e., send the information to the PSS that is then enabled to handle overbooking situations accordingly, but not impose any mechanisms based on overbooking situations.

5 Abbreviations

5.1 General Abbreviations

The table 5.1 below lists all abbreviations used in the context of PSID, i.e. in communication, design/documents and implementation.

Abbreviation	Expansion
ABE	Aggregated Business Entity
ACL	Access Control List
ADR	Architecture Decision Records
AITF	Automated Integration Test Framework
AOO	Area of Operation
AOP	Aspect-Oriented Programming
API	Application Programming Interface
ASF	Apache Software Foundation
BSS	Broadcasting Satellite Service
BUC	Block Up Converter
CD	Continuous Delivery
CI	Configuration Item
CIA	Confidentiality, Integrity, Availability
CIR	Committed Information Rate
COTS	Commercial Off-The-Shelf
CRM	Customer Relationship Management
CRUD	Create, Read, Update, and Delete
CSP	Communication Service Provider
DI	Dependency Injection
DL	Document List
EIRP	Effective Isotropic Radiated Power
ESA	European Space Agency
eTOM	TM Forum Business Process Framework, formerly known as Enhanced Telecom Map
EU	European Union
GDPR	General Data Protection Regulation
GEO	Geostationary Earth Orbit
HMI	Human-Machine-Interface

Abbreviation	Expansion
ISMS	Integrated Security Management System
ITT	Invitation To Tender
JMS	Java Messaging Service
JWE	JSON Web Encryption
JWT	JSON Web Token
KPI	Key Performance Indicator
KQI	Key Quality Indicator
LNB	Low-Noise Block Downconverter
MEO	Medium Earth Orbit
MIR	Maximum Information Rate
N/A	Not applicable
NMS	Network Management System
OS	Operating System
OSS	Operations Support System
OTM	On-the-move
P&S	Pooling & Sharing
PACIS	Pacific Asia Conference on Information Systems
PIR	Peak Information Rate
PKI	Public Key Infrastructure
PMDB	Project Management Database
P2P	Point-to-point
PM	Performance Monitoring
PSI	Pooling And Sharing Interfaces Definition Project, implementation
PSID	Pooling And Sharing Interfaces Definition Project, definition
PSS	Pooling & Sharing System
PSTN	Public Switched Telephone Network
RBAC	Role based access control
RC	Recurring Charge
REST	Representational State Transfer
RF	Radio frequency
RFQ	Request for Quote
RTM	Requirements Traceability Matrix
SCPC	Single Channel per Carrier

Abbreviation	Expansion
SID	Information Framework
SLA	Service Level Agreement
SLI	Service Level Indicator
SLO	Service Level Objective
SLS	Service Level Specification
SSPS	Secure (Gov)SatCom Pooling And Sharing System
TAD	Terms, Abbreviations, and Definitions
TBD	To Be Defined
TLS	Transport Layer Security
TMF	TM Forum, TeleManagement Forum
TOD	Tasks and Operations Dictionary
TS	Technical Specification
Telco	Telecommunications Company
UCSM	Unified Communication Service Manager, COTS PSS Software by CGI
UI	User Interface
URI	Uniform Resource Identifier
VAS	Value-Added Services

Table 5.1: General abbreviations used in the scope of PSID.

6 Definitions

The table below lists all definitions that are being used in the context of PSID, i.e. in communication, design/documents and implementation.

Term	Definition	Explanation / Understanding
Alarm	An *Alarm* is a specific type of notification concerning detected faults or abnormal conditions.	Alarms are generated by a Service provider in case thresholds specified in a service level specifications are violated.
API Gateway	The *API Gateway* is the only access point for all clients and hides the backend from the caller.	Modern applications distribute the work and responsibility among a collection of backend services. This complexity of the backend is of no relevance for the caller and is hidden behind the *API Gateway*. In addition, the *API Gateway* takes care of common tasks like authentication, load balancing, security measures, rate limiting, etc.
Area Of Operation	*Areas Of Operation* (AOOs) are predefined geographical areas in and for which a PSS is willing to provide services to its customers.	An AOO is defined by the system governance who should keep track of AOOs where no service is available. Note that this is very different from a mission zone, which is defined by a customer and can cover areas where the PSS cannot offer any service.
Attachment	An *attachment* represents an actual binary content along with the mime type, size, or url to a file storage where the actual attachment can be accessed.	An *attachment* belongs to a document.
Catalog	A subset of the portfolio containing only currently offered entities. The *catalog* thus contains product specifications, service specifications, and resource specifications, as well as product offerings.	Required for on-demand and offered resources.
Contention	A *contention* situation arises, if the sum of the capacity (e.g., the CIRs) allocated for all services sharing the capacity of the same underlying resources actually exceeds the total available capacity, i.e., when the overbooking actually manifests itself.	*Contention* always needs to be mitigated, e.g., by processes implemented by the PSS based on priority and/or pre-emption.
Customer	A customer utilizes a PSS to model/specify, find and acquire services and resources, usually becoming customers of providers.	A role of a business party.

Term	Definition	Explanation / Understanding
Dedicated Service	A *dedicated service* is a special kind of service that can either have no PIR assigned or have the PIR equal to the CIR. If a resource is used to implement multiple instances of a service or different services, each customer has a dedicated chunk of the underlying resource that is never shared with another customer.	
Document	A *document* describes the metadata for associated attachment(s). It contains characteristics such as name, related parties, version, lifecycle status, etc.	A *document* contains a list of one or more attachments.
Inventory	A set of concrete products, services, and resources.	Required to commit items, but may also be dynamically managed as part of the order process to enable monitoring.
Item	Sometimes used collectively for resource, service, and product.	
Key Performance Indicator	*Key Performance Indicators* (KPI) are technical and organizational parameters and requirements on services. KPIs are features/criteria guaranteed (incl. e.g. boundary conditions) by the provider to a customer.	They can also exist at PSS level, e.g., coverage of different areas, frequency bands available, delay between request and offer, ratio of successful request served etc.
Mission	A *mission* is a set of customer-defined products within the same operational context and scope.	
Mission Zone	A *mission zone* is a geographical area that a mission takes place in.	A mission has one or more mission zones. Services terminate in one or more mission zones.
Operation	An *operation* is a low-level activity towards concluding a certain task. It is the third level of hierarchy of the TOD.	
Order	An *order* is created when a customer requests to book a product.	
Order Process	The *order process* describes the full lifecycle of an order, beginning with an order request by the customer and the termination of the order by deletion through the customer or provider or by the end of the booked period.	

Term	Definition	Explanation / Understanding
Overbooking	*Overbooking* refers to the scenario of more instances of an item being offered by a provider than are actually in stock.	For example, If the sum of the CIRs of all services sharing the capacity of the same underlying resources will exceed the total available capacity at some point in the future, the services are subject to overbooking.
Oversubscription	Shared services are subject to oversubscription if the sum of the PIRs of all services sharing the capacity of the same underlying resources exceeds the total available capacity, but the sum of the CIRs does not.	
Partial Match	An inquiry initiated by a customer leads to the identified product offerings. An offering is called a partial match if it does not fully satisfy the inquired product characteristics.	For example, the customer inquires about a 50 Mbps download rate for internet access, but the provider can only offer a maximum of 40 Mbps. A PSS can enable the customer to specify the allowed deviation for each product characteristic in the customer inquiry.
Business Party	An organisation or individual taking part of a business interaction, e.g., as a customer or provider.	A party can have different roles in different interactions.
Performance Monitoring Job	*Performance monitoring jobs* contain the configuration of performance objectives, the related subject (service or other type of entity), measurement intervals and schedules to enable performance monitoring. Examples of performance objectives encompass various metrics such as frame/packet delay, frame/packet loss ratio, inter-frame/packet delay variation, and more. These objectives serve as measurable criteria for assessing the performance characteristics of a service.	The PSS implementation supports a single type of jobs. On-demand performance monitoring jobs are initiated for a limited time, typically a single run or non-continuous run, to carry out the performance measurement tests and support troubleshooting during service assurance.
Performance Monitoring Report	*Performance monitoring reports* are output of the performance monitoring job processing or generated on request. They contain performance data produced as a result of the provisioning of a service with an attached SLS. *Performance monitoring reports* deliver comprehensive performance collections to the requesting party.	
Personal Data	*Personal Data* as defined by the EU GDPR; a PSS needs to be EU GDPR-compliant.	

Term	Definition	Explanation / Understanding
Pool	A pool is an arbitrary set of resources that can be used to organize, analyse, and manage them.	
Portfolio	A set of product, service and resource specifications that where, are, or will be offered to the customer.	May be used by the PSS to look up “system familiar” resources.
Product	A *product* bundles one or more service or resource to be offered to customers.	
Product Offering	A *product offering* is a concrete offer of a product specification to a customer. This can be through a catalog or directly to a user (as the result of ITT or RFQ). It also contains other business-related information such as SLSs and pricing information.	
Product Specification	A *product specification* describes general characteristics a product can have based on its resource type.	The *product specification* allows a provider to specify the parameters they can offer.
Provider	*Providers* offer their products to customers of a PSS.	A role of a business party.
PSS	An expert system and service broker for SatCom-centric service.	The solution aggregates both the supply and demand of (Gov)SatCom services, and provides business processes facilitating the management of the services and resources.
Resource	A communication(-associated) resource like RF bandwidth, terminal hardware etc. A resource implements an underlying resource specification with a specific resource type.	Resources are inputs to a PSS and are brought into by providers. A PSS constructs/markets/brokers products from resources.
Resource Precedence	The hierarchy / precedence of resource that a PSS might offer/use.	Customers’ private resources > committed resources > offered resources > non-offered resources (fitting resource known, but no offers) => query providers > non-existent resources (no fitting resource known => query providers)
Resource Specification	A *resource specification* describe general characteristics a resource can have based on its resource type.	The *resource specification* allows a provider to specify the parameters they can offer.
Resource Type	A *resource type* is an abstraction of a resource based on type (e.g. “terminal”, “router”, “constellation”, ...), which describes all necessary parameters for resource specifications and resources of that type.	The *resource type* is defined by a JSON schema and is referenced by the `@type` parameter.

Term	Definition	Explanation / Understanding
Service	A communication service that is specified by and brokered/given to customers of a PSS. A service implements an underlying service specification with a specific service type.	*Services* are inputs to a PSS and are brought into by providers. A PSS constructs/markets/brokers products from services.
Service Specification	A *resource specification* describe general characteristics a resource can have based on its service type.	The *service specification* allows a provider to specify the parameters they can offer.
Service Termination Type	A service's *termination type* specifies for each mission zone in which manner it shall be terminated (e.g. fixed, on-the-move, aviation, maritime).	
Service Type	A *service type* is an abstraction of communication services based on type (e.g. "internet access", "telephony", ...), which describes all necessary parameters for services of that type.	
Shared Service	A *shared service* has different values for CIR and PIR. The total capacity can be shared by multiple customers.	
System Actor	System actors are entities (organisations, people, systems) who interact with a PSS.	Examples of system actors are system operators, customers, and providers.
System Governance	The *system governance* is the governing body of a PSS.	A PSS's governance is tasked with e.g. the management of service and the adjustment of workflows and configuration parameters to tailor a PSS to the operational rules, needs and realities.
Task	A *task* represents a business process which consists of a group of low-level operations that need to be performed to conclude it. It is the second level of hierarchy of the TOD.	An example task is *Party Management*. It involves low-level operations such as *Create Party Profile* or *Delete Party Profile*.
Task Category	A *category* provides logical grouping of tasks that belong to a same high-level business process. It is the first level of hierarchy of the TOD.	An example category is 'Product Publishing'.
Topic	*Topic* is the target container for events in the *Event Management* task. The benefit of storing different events into different topics is to separate them into domains.	Example topics for events in a PSS are *inquiry* and *order*.
User	Please refer to customer.	

Table 6.1: Definitions used in the scope of PSI.

6.1 Documentation Tags

Abbreviation	Expansion
[ToBeDesigned]	Chapters or sections with this tag require further content which will be designed and developed within the PSID project.
[ToBeInvestigated]	Chapters or subsections with this tag still require further analysis, which will be explored or taken forward in the PSID project.

Table 6.2: Documentation tags used in the scope of PSID-documents.

Last Page of Document