



**Service Operations**

**Guidelines**

**MEF 50**

**Carrier Ethernet Service Lifecycle Process Model**

**December 2014**

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## 1. List of Contributing Member Companies

The following Member companies of the MEF participated in the development of this document and have requested to be included in this list.

Member Company
Allstream
Ericsson
EXFO
Fujitsu
Oracle Communications
PCCW Global

Table 1 Contributing Member Companies

## 2. Abstract

This document documents a process model for the generic Carrier Ethernet service lifecycle, including Service Operations Lifecycle management and Product Lifecycle management. It establishes a foundation for specifications developed by the MEF Service Operations Committee. Such documents should reference the foundational material in this document.

The process model is composed of a series of Process Flows woven together to form the Carrier Ethernet service lifecycle. Each Process Flow is composed using Process Elements that define processes performed within a Service Provider's organization. At the core, a single Process describes functional activities or tasks required to deliver results or outputs. The Process Flows are graphically defined using Business Process Model and Notation (BPMN) and represent the Process Elements in an end-to-end or through Process view across the Service Provider's business as well as between different organizations such as the Service Provider and Wholesale partner or end Subscriber. Therefore, each Process Flow examines some specific scenario in which the Processes achieve an overall business purpose for the Service Provider (e.g., ordering handling of Carrier Ethernet services). The TeleManagement Forum's Business Process Framework, also referred to as the enhanced Telecom Operations Map (eTOM) [1], has an extensive definition of Process Elements and decomposition of these Process Elements applicable to a Service Provider's business. As such, this document leverages these Process Element definitions as the building blocks to creating the Carrier Ethernet Process Flows. In a few instances, Process Elements required for Carrier Ethernet did not exist in the eTOM framework and have been defined in this document.

## 3. Terminology and Acronyms

This section defines the terms used in this document. In many cases, the normative definitions to terms are found in other documents. In these cases, the third column is used to provide the reference that is controlling, in other MEF or external documents.



Term	Definition	Reference
Access Provider	A CEN Operator that offers the Ethernet Access Service type.	MEF 33 [5]
BPMN	Business Process Model and Notation or Business Process Modeling Notation	BPMN 2 [9]
Business Process Model and Notation	Business Process Model and Notation (BPMN), also known as Business Process Modeling Notation, is a graphical representation for specifying business processes and process flows in a business process model. BPMN is a standard for business process modeling that provides a graphical notation for specifying business processes and process flows in a business process diagram.	BPMN 2 [9]
Carrier Ethernet Network	A network from a Service Provider or network operator supporting the MEF service and architecture models.	MEF 12.1 [3]
CEN	Carrier Ethernet Network	MEF 12.1 [3]
eTOM	enhanced Telecom Operations Map (a.k.a. Business Process Framework)	TMF GB921P [8]
Process	A Process describes a systematic, sequenced set of functional activities that deliver a specified result. In other words, a Process is a sequence of related activities or tasks required to deliver results or outputs.	TMF GB921CP [7]
Process Element	Process Elements can be considered as the building blocks or components, which are used to 'assemble' end-to-end business Processes. A BPMN Process Element defines a process performed in an organization.	TMF GB921CP [7]
Process Flow	A Process Flow graphically represents the behavior of Process Elements in an "end-to-end" or "through" Process view across the business (i.e., Enterprise). Such Process Flows are not constrained to bridge across the entire Enterprise, they can have any scope that is meaningful and helpful to analyze (e.g., Service Activation Testing). Thus, Process Flows examine some specific scenario in which the processes achieve an overall business purpose. The MEF is using the BPMN2 notation for documenting Process Flows.	TMF GB921P [8]

Term	Definition	Reference
Product Lifecycle	<p>The Product Lifecycle encompasses definition, planning, design and implementation of new products for customers, as well as new features and enhancements for existing products and services. Communications Product lifecycles depend upon the nested lifecycles of services, resources and infrastructure. The term "Product Lifecycle" is usually used to broadly describe the lifecycle of a Product definition (as a general term, not necessarily restricted to an instance of a Product Offering) possibly interacting with a large number of processes defined within the Strategy, Infrastructure and Product area of TMF's Business Process Framework (eTOM), particularly the L2 processes defined within the Product Lifecycle Management vertical:</p> <ul style="list-style-type: none"> <li>• Marketing and Offer Management</li> <li>• Service Development and Management</li> <li>• Resource Development and Management</li> <li>• Supply Chain Development and Management</li> </ul> <p>The lifecycle on individual Product, Service and Resource instances are normally not the focus of the Product Lifecycle, but are considered within the Operations area of TMF's Business Process Framework (eTOM).</p>	This document
SAT	Service Activation Testing	MEF 48 [6]
Service Activation Testing	The process of executing a collection of test procedures to be applied to a given traffic entity (e.g., EVC, OVC, etc.) in order to collect behavioral information about the traffic and compare this with predefined expectations	MEF 48 [6]
Service Operations Lifecycle	The Service Operations Lifecycle encompasses selling, order handling, service configuration, resource provisioning, activation, testing, customer interactions, service management, resource management and supplier/partner interactions relevant to a service instance. In general, the Service Operations Lifecycle interacts with the business processes that affect operational aspects of a service instance within the Fulfillment and Assurance verticals of the TMF's Business Process Framework (eTOM)	This document
Service Provider	The organization providing UNI to UNI Ethernet Service(s).	MEF 33 [5]
Subscriber	The organization purchasing and/or using Ethernet Services.	MEF 33 [5]
TMF	TeleManagement Forum	TMF GB921P [8]

Table 2 Terminology and Acronyms

## 4. Scope

This document defines a process model for the service lifecycle of MEF defined services. The process model includes identification of Process Elements and organization of Process Elements into Process Flows to define dynamic behavior within a CEN Operator's organization (intra-operator) and between multiple CEN Operators (inter-operator). This behavior also models interactions with the Subscriber. MEF defined services include EVC-based services defined in MEF 6.2 [2] as well as OVC-based services defined in MEF 26.1 [4] and MEF 33 [5].

Service Lifecycle Management encompasses Product Lifecycle management and Service Operations Lifecycle management. Primarily, this document defines high-level business Process Elements and Process Flows for Carrier Ethernet Service Operations Lifecycle management (from "Marketing Fulfillment Response" to "Terminate Customer Relationship"). This includes both inter-operator and intra-operator scenarios. However, the emphasis is placed on inter-operator interactions. Secondly, this document defines high-level business Process Elements and Process Flows for Carrier Ethernet Product Lifecycle management (from "Market Analysis & Product Strategy" to "Launch products"). This includes both inter-operator and intra-operator scenarios. Again, the emphasis is placed on inter-operator interactions.

This document leverages the TeleManagement Forum's Business Process Framework, also referred to as the enhanced Telecom Operations Map (eTOM). Where needed, this document identifies extensions to the eTOM model for Carrier Ethernet Service Lifecycle Management. The emphasis is for Level 0 to Level 3 Process Elements.

This document takes the approach to define MEF service type agnostic process models for Carrier Ethernet Service Lifecycle Management. If required, specializations of this agnostic model are created as needed for the specific EVC-based MEF 6.2 and OVC-based MEF 33 service types.

## 5. Compliance Levels

The document does not specify normative requirements. This document provides a consistent reference model intended to represent a well-structured Service Provider's business operations environment for Carrier Ethernet.

## 6. Introduction

Service Lifecycle Management is focused on identifying and modeling the lifecycle stages of MEF defined services, including EVC-based per MEF 6.2, and OVC-based per MEF 26.1 and MEF 33. Service Lifecycle Management includes Product Lifecycle management and Service Operations Lifecycle management.

This document leverages the enhanced Telecom Operations Map (eTOM) for the Process Element definitions. Although TMF provides the Process Element definitions, it does not

provide the comprehensive Process Flows for service definitions. Therefore, this document defines Process Flows in the context of Carrier Ethernet service definitions and where necessary identifies extensions to the eTOM model for Process Element definitions.

Product Lifecycle management encompasses definition, planning, design and implementation of new products for customers, as well as new features and enhancements for existing products and services. Communications Product lifecycles depend upon the nested lifecycles of services, resources and infrastructure. The term "Product Lifecycle" is usually used to broadly describe the lifecycle of a Product definition (as a general term, not necessarily restricted to an instance of a Product Offering) possibly interacting with a large number of processes defined within the Strategy, Infrastructure and Product area of TMF's Business Process Framework (eTOM), particularly the L2 processes defined within the Product Lifecycle Management vertical:

- Marketing and Offer Management
- Service Development and Management
- Resource Development and Management
- Supply Chain Development and Management

The lifecycle on individual Product, Service and Resource instances are normally not the focus of the Product Lifecycle, but are considered within the Operations area of TMF's Business Process Framework (eTOM).

Product Lifecycle management for Carrier Ethernet includes, but is not limited to, the following stages.

1. Market Analysis and Product Strategy
  - Establishes what types of products are offered to the market and how they will be sold
2. Product Design
  - Develops specific products and products offerings and establishes requirements for services, resources and partners to support them.
3. Service and Resource Design
  - Develop the Technical Designs that support the required products using design process steps at the Service and Resource level.
4. Launch products

- Makes products available to the market and ensures that orders for the products can be successfully fulfilled.

The Service Operations Lifecycle encompasses selling, order handling, service configuration, resource provisioning, activation, testing, customer interactions, service management, resource management and supplier/partner interactions relevant to a service instance. In general, the Service Operations Lifecycle interacts with the business processes that affect operational aspects of a service instance within the Fulfillment and Assurance verticals of the TMF's Business Process Framework (eTOM).

Service Operations Lifecycle management for Carrier Ethernet includes, but is not limited to, the following stages.

1. Marketing Fulfillment Response
  - Includes processes to market products and enable initial customer inquiry of product offering and price.
2. Sale Proposal and Feasibility
  - Includes processes to check customer eligibility and product availability and feasibility. Also includes processes for partner requisition feasibility.
3. Capture Customer Order
  - Includes processes for customer order for new product offer, modification of an existing product, or deletion of an existing product.
4. Service Configuration & Activation
  - Includes processes for creation and activation of the service.
5. End-to-End Service Testing
  - Includes processes for testing and hand off of the service to the customer.
6. Service Problem Management
  - Includes processes for Service Operations, Administration and Maintenance (SOAM) activities including Fault Management and in-service test and troubleshooting.
7. Service Quality Management
  - Includes processes for SOAM activities including Performance Monitoring.
8. Billing and Revenue Management

- Includes processes for usage monitoring, charging, billing and managing customer payments

## 9. Terminate Customer Relationship

- Includes processes for ending the relationship with the customer.

The following sections will describe each stage of the Product and Service Operations Lifecycle management. Figure 1 illustrates the Product and Service Operations Lifecycle stages for a CEN Operator.



Figure 1 – Product and Service Operations Lifecycle Stages

## 7. Product Lifecycle Management

This section defines the process models for the stages of Product Lifecycle management.

### 7.1 Market Analysis and Product Strategy

This section defines the Process Elements and Process Flow for the Market Analysis and Product Strategy stage of the Product Lifecycle.

The inspiration, rationale and requirements for new (or changed) Products arise from many sources:

- Evolving market expectations

- Decisions to address specific market segments
- Standards work within MEF that formalizes and standardizes products and service variants tuned for specific market segments such as Carrier Backhaul or Cloud Access
- The standardization of popular variants of "custom solutions" to improve the operational efficiency of delivering and maintaining them
- New technology, new vendor equipment and new paradigms in the network that provide new capabilities in the network to be monetized
- Leveraging existing infrastructure and technologies to extract value by exposing these existing capabilities as eternal product offerings
- Addressing competitive threats - responding to the products offered by competitors. This encompasses pricing, bundling, technology, geographic footprint
- The success (or failure) of existing products

The overall strategy may be constrained by several factors including:

- Existing infrastructure
- Available suppliers/partners

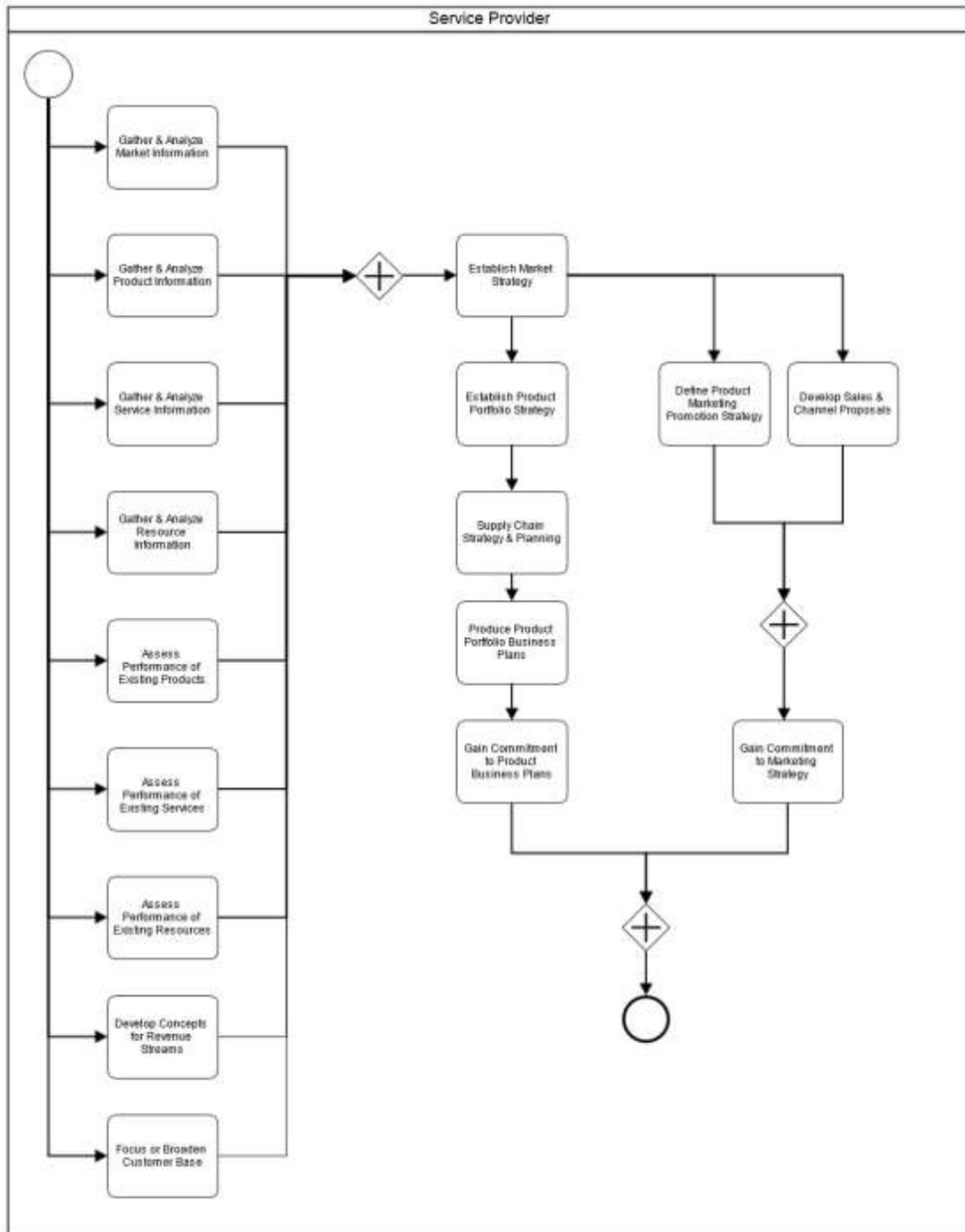


Figure 2 – Market Analysis and Product Strategy Process Flow

The Process Flow in Figure 2 illustrates the activities applicable to performing Market Analysis and establishing Product Strategies that enable the development of specific Products and Product Offerings.

There are a wide variety of inputs that contribute to establishing an overall market strategy. These inputs are obtained through specific activities focused on gathering and analyzing appropriate input and insights. The types of inputs include market information, new product ideas, new service ideas and new resource ideas, as well as the assessment of how existing implementations of products, services and resources are performing. In addition, analysis of potential revenue streams and the customer base may reveal additional opportunities.

Once a market strategy is established, this will provide essential input into Product Portfolio strategy, which in turn will affect a Supply Chain Strategy with respect to “Make or Buy” decisions. Once these overall strategies are defined, Product Portfolio Business Plans may be established and commitments made to move forward.

In parallel to these activities are the developments of Marketing Promotion strategies and Sales proposals. These are important components of an overall Market Strategy.

When organizational commitment is made for both the Product Business Plans and the Market Strategy, work may begin on the development of specific Product Definitions.

Table 3 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Gather & Analyze Market Information	1.2.1.1.1	No	Research market information and develop market forecasts.
Establish Market Strategy	1.2.1.1.2	No	Develop and document the enterprise market strategy.
Gain Commitment to Marketing Strategy	1.2.1.1.5	No	Gain enterprise commitment to the market strategy and segmentation.
Gather & Analyze Product Information	1.2.1.2.1	No	Research information relating to product ideas and opportunities and identify product opportunities.
Establish Product Portfolio Strategy	1.2.1.2.2	No	Define and agree the product and offer portfolio structure to be used within the enterprise.
Produce Product Portfolio Business Plans	1.2.1.2.3	No	Develop annual and multi-year product and product portfolio business plans to guide product development within the enterprise.
Gain Commitment to Product Business Plans	1.2.1.2.4	No	Gain enterprise commitment to the product portfolio strategy and individual product plans.
Assess Performance of Existing Products	1.2.1.5.2	No	Analyze the performance of existing products to identify inadequacies and required improvements.
Develop Sales & Channel Proposals	1.2.1.6.2	No	Create and document proposals for sales processes and sales channels, and gain approval for them.
Define Product Marketing Promotion Strategy	1.2.1.7.1	No	Defines the specific communications and promotions strategy to be used for positioning the product in the marketplace.
Gather & Analyze Service Information	1.2.2.1.1	No	Research and analyze customer, technology, competitor and marketing information to identify new service directions and industry best practice, and potential enhancements to existing services.
Assess Performance of Existing Services	1.2.2.3.2	No	Analyze the performance of existing services to identify inadequacies and required improvements.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Gather & Analyze Resource Information	1.2.3.1.1	No	Research and analyze customer, technology, competitor and marketing information to identify new resource requirements and industry resource capabilities and availability.
Assess Performance of Existing Resources	1.2.3.3.2	No	Analyze the performance of existing resources to identify inadequacies and required improvements.
Supply Chain Strategy & Planning	1.2.4.1	No	Develop the Supply Chain strategies and policies of the enterprise.
Develop Concepts for Revenue Streams	1.3.1.2.1	No	Develop concepts for new revenue streams, and diversification of revenue streams.
Focus or Broaden Customer Base	1.3.1.2.2	No	Focus or broaden the customer base via investigating new markets, as well as different products and services for the enterprise.

**Table 3 Market Analysis and Product Strategy Process Elements**

## 7.2 Product Design

This section defines the Process Elements and Process Flow for the Product Design stage of the Product Lifecycle.

Based on incoming requirements and overall product strategy, Products are designed taking into account multiple considerations:

- How the product will "look": its commercial and brand aspects as well as its functionality/capability
- How customers will interface with the Service Provider to order, use, pay for and raise and solve problems with the product
- Which suppliers and partners will be involved or impacted by the ordering, delivery, billing or assurance of the product
- Justification and authorization for decisions in the above activities

The flow for product design includes:

- The management of the delivery and build of new or changed Product & Offer and delivery capabilities within the enterprise.

- "Product Capability" delivery has been included in scope and has been interpreted to include many activities representing "readiness" activities defined in the "Operations" side of eTOM.

It is important to note that the flows described below are defined from the perspective of the Service Provider. While the Service Provider is establishing/modifying their Product, Service and Resource definitions, the Access Provider is merely providing existing "product offerings" that are being incorporated into the Service Provider's Product or Service definitions. Defining the Access Provider's Products, Services and Resources will be achieved by the Access Provider acting in the role of Service Provider in these flows.

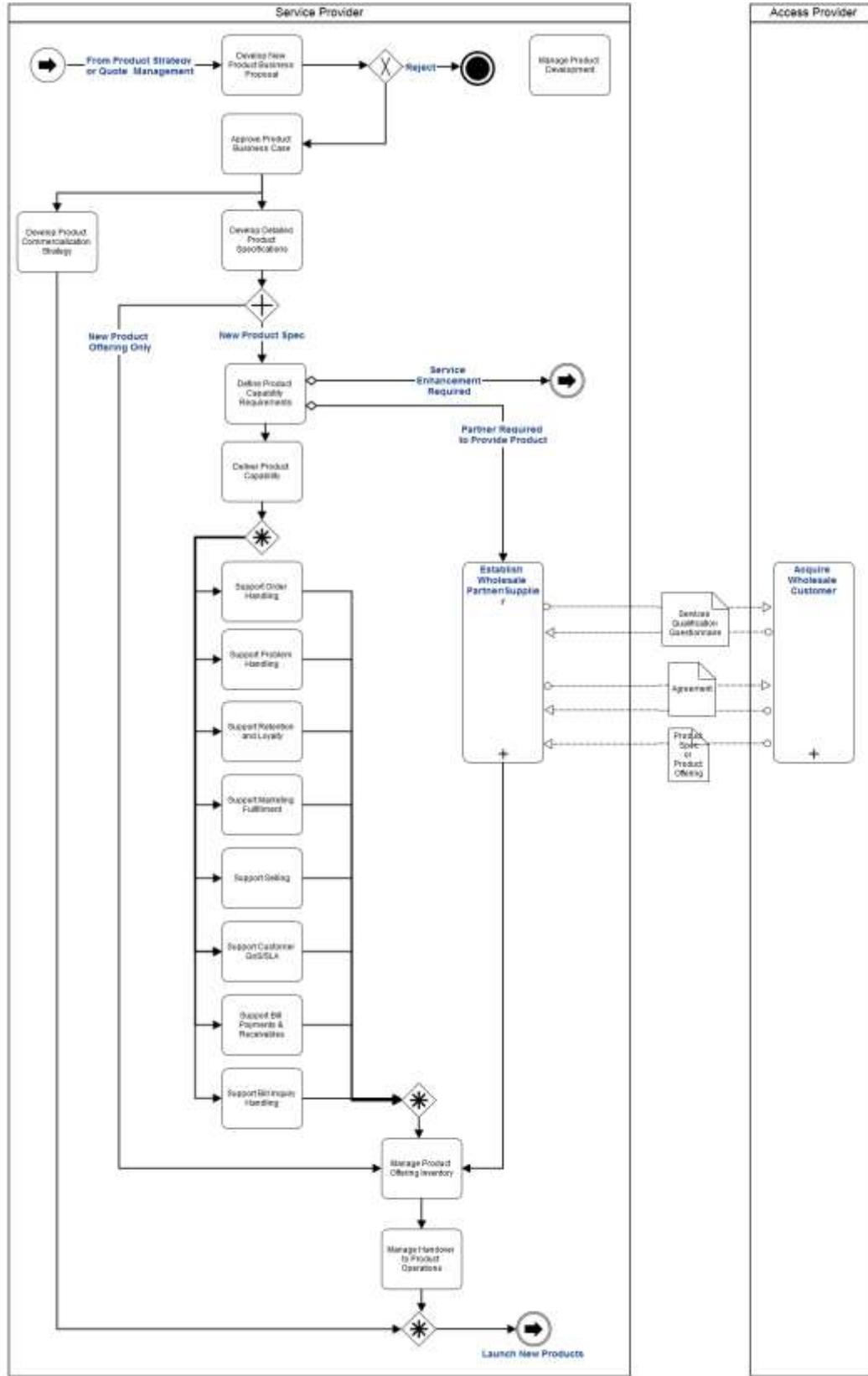


Figure 3 – Product Design Process Flow

The Process Flow in Figure 3 illustrates the development of new products and product offerings. The input to this process flow is a product concept that may originate from analysis of business/technical opportunities and requirements that drive an overall Product Strategy for Carrier Ethernet Products, or the input may arise from a normal course of business in responding to business opportunities through the Sales Proposal & Feasibility Process. In this second case, the Service Provider may be motivated to standardize a custom offer, or introduce a re-usable product or product offering based on market demand.

In either case the proposal is formalized as a Business Proposal that is evaluated and must be approved before a significant investment is made in Product Development.

It is important to note that Product Offerings represent the customer-facing, commercial aspects of services being sold. Therefore a large variety of Product Offering changes require no technical change to the underlying services, but are achieved through selective exposure of product options, bundling of products and product offerings targeted at specific market segments, promotions, and pricing.

Once the Business Case for the new product development has been approved; the commercialization strategy can commence in parallel to (although not necessarily in isolation from) the development of the product/product offering. Based on the requirements associated with the product concept, new product specifications are developed that detail the proposal. At this point, it should be clear whether the new concept is supported by existing product specs, or whether new/revised product specifications are required to support the intended offering.

If new product definitions are required, the infrastructure impact of the new product must be assessed and described in terms of "Product Capability Requirements". If additional functionality is required from the services exposed to the product layer, Service Enhancements will be required. Similarly, if it is determined that the Service Provider cannot support the Product Capability requirements directly, a wholesale partner may be sought. This is frequently the case where the geographic reach of service offerings is extended outside the footprint of the Service Providers own access network. It is important to note that the use of a wholesale partner does not necessarily need to be directly exposed at the commercial layer. In some cases this transparency allows the customer to explicitly choose between Access Providers and have full knowledge of who is providing the last-mile access. However, this wholesale relationship may also be maintained at only the technical level and not explicitly exposed as products in the commercial layer. This is shown in the process flow for Service & Resource Design.

The interactions for establishing a supplier/partner relationship between Service Provider and Access Providers is detailed later in this document in Figure 5 – Establish Relationship between Service Provider and Access Provider.

Within the scope of this process flow, the Delivery of Product Capabilities and general aspects of "readiness" are shown. The areas relevant to a new product that would be coordinated by "Deliver Product Capabilities" would include potential changes to Order Handling, Problem Handling, Retention and Loyalty, Marketing, Sales, Customer SLAs, Billing Payments and Receivables as well as Billing Inquiries. The final activity prior to

handover to operations is the exposure of the product as appropriate new or updated product offerings in the Product Catalog (i.e. Product Offering Inventory).

After appropriate sets of Product Offerings have been exposed, the project can be handed over to Operations. This hand-over may involve trials and POCs to ensure that the product is operating as expected from both technical and commercial perspectives.

When handover is successfully completed the new product will be launched following the process flow for "Launch Products".

Table 4 documents the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Support Marketing Fulfillment	1.1.1.20.6	No	Ensure that there is capability to support the expected demand for the Marketing Fulfillment Response processes so that they can operate effectively.
Support Selling	1.1.1.20.7	No	Administer and manage the operation of the various sales channels and to ensure that there is capability (for example, information, materials, systems and resources) to support the Selling processes.
Support Customer QoS/SLA	1.1.1.21.8	No	Support Customer QoS/SLA Management processes by proactively monitoring and assessing the performance of purchased product offerings as a group against agreed QoS/SLA parameters, and monitoring, managing and reporting on the capability of the Customer QoS/SLA Management processes.
Manage Product Offering Inventory	1.1.1.21.11	No	Establish, manage and administer the enterprise's product offering inventory, as embodied in the Product Offering Inventory Database, and monitor and report on the usage and access to the product offering inventory, and the quality of the data maintained in it.
Support Order Handling	1.1.1.22.2	No	Ensure that new and/or modified Order Handling related infrastructure is deployed effectively, and to ensure that Order Handling processes can operate effectively.
Support Problem Handling	1.1.1.22.3	No	Assist Problem Handling processes by proactively undertaking statistically driven preventative and scheduled purchased product offering maintenance activities and monitoring, managing and reporting on the capability of the Problem Handling processes.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Support Retention & Loyalty	1.1.1.22.5	No	Ensure that all information, materials, systems and resources are available so that the retention & Loyalty processes can be completed without delay, when a request is received from a customer.
Support Bill Payments & Receivables Management	1.1.1.22.14	No	Ensure that all information and systems are available so that the Bill Payments & Receivables Management processes can be completed without delay.
Support Bill Inquiry Handling	1.1.1.22.15	No	Ensure that all information, systems and resources are available so that the Bill Inquiry Handling processes can be completed without delay.
Define Product Capability Requirements	1.2.1.3.1	No	Define and obtain agreement to the detailed infrastructure requirements to support the product portfolio and individual product plans.
Approve Product Business Case	1.2.1.3.3	No	Develop and gain approval for a business case to develop and deliver the required capabilities, including identification of potential suppliers/partners.
Deliver Product Capability	1.2.1.3.4	No	Manage the coordinated delivery in line with the approved business case of all required product infrastructure capabilities for that business case across the enterprise.
Manage Handover to Product Operations	1.2.1.3.5	No	Manage the processes involved in handover of deployed product infrastructure to operational control.
Develop New Product Business Proposal	1.2.1.5.3	No	Develop and document business proposals for the identified new product concept.
Develop Product Commercialization Strategy	1.2.1.5.4	No	Ensure that product specific pricing, sales channel support and regulatory approvals are identified and agreed.
Develop Detailed Product Specifications	1.2.1.5.5	No	Develop and document the detailed product-related technical, performance and operational specifications, and customer manuals.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Manage Product Development	1.2.1.5.6	No	Ensure the co-coordinated delivery in line with the approved business case of all required product capabilities for that business case across the enterprise.

**Table 4 Product Design Process Elements**

The messages used in this Process Flow are documented within the scope of Figure 5 – Establish Relationship between Service Provider and Access Provider and are documented in Table 7 Establish Relationship between Service Provider and Access Provider Messages.

### 7.3 Service and Resource Design

This section defines the Process Elements and Process Flow applicable to Service and Resource Design within the context of the Product Lifecycle. Service and Resource Design establishes the entity definitions and business logic that will be invoked by Fulfillment and Assurance processes in a Service Operations context. For fulfillment, Service and Resource Design represent the technical implementation of functionality exposed to the product layer through Customer Facing Service abstractions.

The design of Customer Facing Service definitions, Resource Facing Service definitions, Resource definitions, their relationships and associated business logic is intertwined; therefore this process has been presented within a single flow. Despite the fact that Service and Resource Design is frequently iterative in nature, the process flow does not attempt to show the possible process flows that may result.

For Fulfillment, Customer Facing Service definitions represent a stable re-usable abstraction of the functionality that Service Providers provide to their Subscribers. This abstraction is expected to expose only the Service details directly relevant to Subscribers ordering Products based upon the Service. This shields the internal implementation details, which may vary based upon available technology choices within the Service Provider network infrastructure, but which have no impact discernible by the Subscriber. The definition of new Customer Facing Service Definitions or the modification of existing ones is triggered by the need to expose new functionality to Subscribers.

For Carrier Ethernet, Customer Facing Services are closely aligned with MEF's information model, which provides a firm abstraction. This implies that Service and Resource Design will be primarily concerned with the details of the technical implementation, the first time introduction of Carrier Ethernet services, and the refinement of parameters exposed to the Product layer.

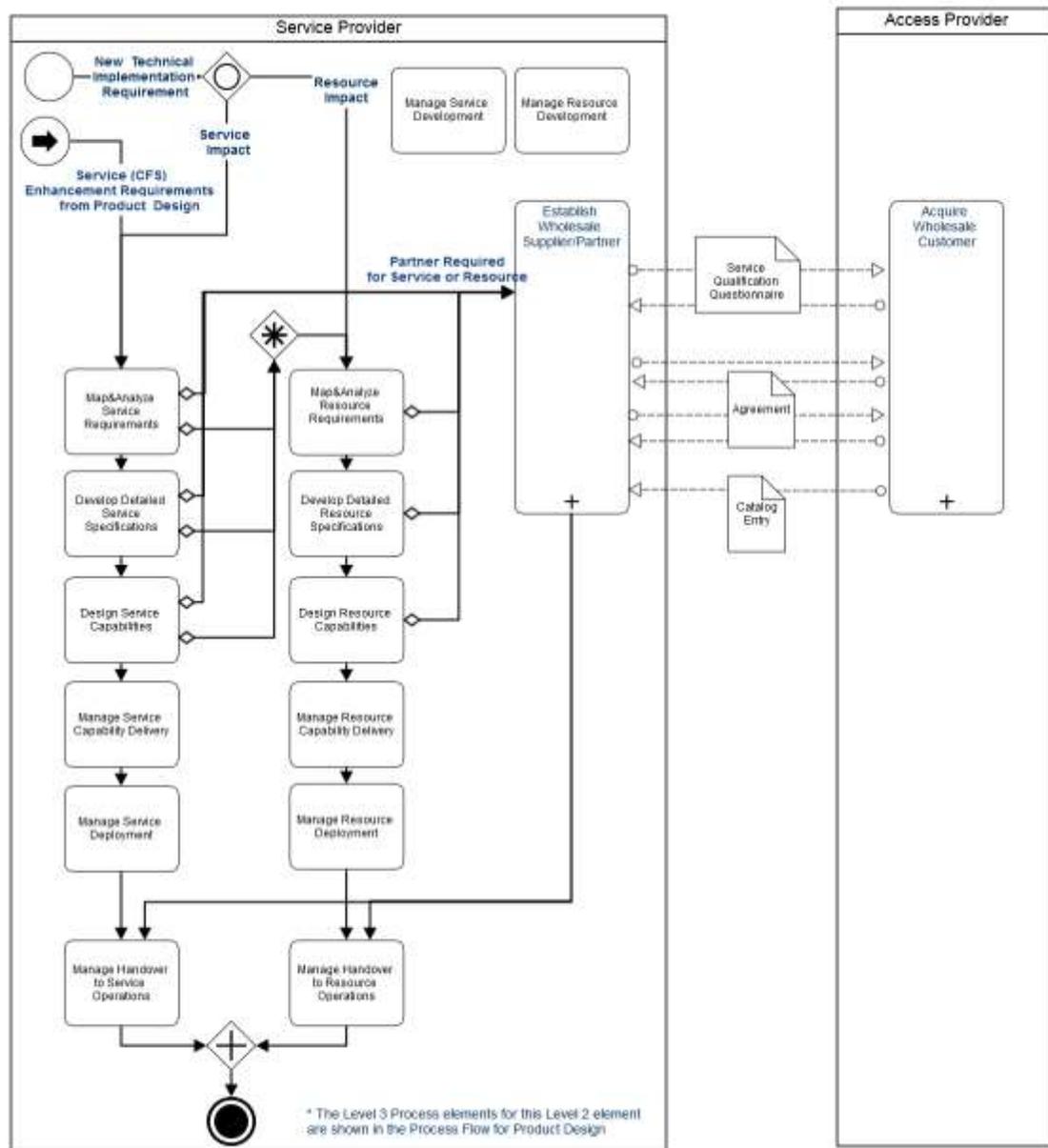


Figure 4 – Service and Resource Design Process Flow

The process flow in Figure 4 illustrates the development of Customer Facing Service definitions, Resource Facing Service definitions, Resource definitions, their relationships and associated business logic.

The input to this process flow may be requirements for a new technical implementation of an existing Customer Facing Service or new technical capabilities within the network that will be exposed as a new Customer Facing Service. In these cases the requirements may apply to service definitions, resource definitions, or both. Alternatively the input requirement may be for a Customer Facing Service concept that originates from analysis of Product requirement activities.

The overall development of Service definitions is coordinated by “Manage Service Development”, which interacts appropriately with “Manage Product Development” and “Manage Resource Development” to ensure the necessary synchronization of their respective deliverables.

The development of Service definitions must first assess incoming requirements to determine whether new Service definitions must be created, whether existing Service definitions must be modified, or both. Following this analysis step, the specification document for the Service definition is developed or refined. The specification may include high-level design logic and business or technical rules for selecting and configuring appropriate Resource Facing Services and/or Resources; process decision, approval and measurement points; and dependencies on other Service capabilities from within the Service Provider’s infrastructure. The Service capabilities may have further dependences on capabilities represented by Resource Facing Services or Resources.

During any of these activities, incremental Resource requirements may be identified, which are dealt with through a sequence of activities that deal with Resource definitions. The inputs to this sequence are the requirements originating from analysis of service requirements or direct requirements for a new technical implementation. The overall development of Resource and Resource Facing Service Definitions is coordinated by “Manage Resource Development”, which interacts appropriately with “Manage Service Development” and “Manage Product Development” to ensure the necessary synchronization of their respective deliverables.

The development of Resource definitions starts with the assessment of the requirements to determine whether new Resource definitions must be created, or whether existing ones must be modified, or both. Following this analysis step, the specification document for the Resource definition is created or updated. The specification may include overall design logic implementing business and technical rules on Resource selection and configuration, and dependencies on Resource capabilities from within the Service Provider’s infrastructure.

Although not explicitly shown in the process flow, it is possible that analysis, specification and design activities for resources may also identify additional service requirements.

As a result of analyzing Service or Resource requirements, developing specifications or design, it may be determined that a new capability from a wholesale partner is required. In this case it may be necessary to select an appropriate wholesale supplier and onboard a product offering from them. In the Service Provider’s environment, the wholesale product offering may be exposed as a service or a resource.

The interactions for establishing a supplier/partner relationship between Service Provider and Access Providers is detailed later in this document in Figure 5 – Establish Relationship between Service Provider and Access Provider.

Once Resource capabilities have been specified and designed, they are tested and delivered according to the Service Provider’s standard development processes. Following this,

the delivered capabilities are deployed and accepted into the Service Provider's production environments, including where necessary, the network. This acceptance may involve trials and Proofs of Concept to ensure that the Resource is operating as expected from both technical and commercial perspectives. The final step in this process is the Handover to Resource Operations that enables the Resource definition to be used for Service Fulfillment and Service Assurance.

Similarly, the service is tested and delivered according to the Service Provider's standard development processes, then deployed and accepted into the Service Provider's production environments. The final step in this process is the Handover to Service Operations while enables the Service Definition to be used for Service Fulfillment.

Table 5 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Map & Analyze Service Requirements	1.2.2.2.1	No	Define the detailed service infrastructure requirements to support the product capabilities required by the enterprise.
Design Service Capabilities	1.2.2.2.4	No	Manage the design of the service infrastructure to meet the requirements in any approved investment proposals.
Manage Service Capability Delivery	1.2.2.2.6	No	Manage the provision, implementation and rollout of the new or enhanced service capability, and associated operational support processes.
Manage Handover to Service Operations	1.2.2.2.7	No	Manage the processes involved in handover of deployed service infrastructure to operational control.
Develop Detailed Service Specifications	1.2.2.3.4	No	Develop and document the detailed service-related technical and operational specifications, and customer manuals.
Manage Service Development	1.2.2.3.5	No	Ensure the co-coordinated development in line with the approved business case of all required new or enhanced service classes/components for that business case across the enterprise.
Manage Service Deployment	1.2.2.3.6	No	Ensure the co-coordinated deployment in line with the approved business case of all required service classes/components for that business case across the enterprise.
Map & Analyze Resource Requirements	1.2.3.2.1	No	Define the detailed resource infrastructure requirements to support the service capabilities required by the enterprise.
Design Resource Capabilities	1.2.3.2.4	No	Manage the design of the resource infrastructure to meet the requirements in any approved investment proposals.
Manage Resource Capability Delivery	1.2.3.2.6	No	Manage the provision, implementation, commissioning and rollout of the new or enhanced resource capability, and associated operational support processes.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Manage Handover to Resource Operations	1.2.3.2.7	No	Manage the processes involved in handover of deployed resource infrastructure to operational control.
Develop Detailed Resource Specifications	1.2.3.3.4	No	Develop and document the detailed resource-related technical, performance and operational specifications, and manuals.
Manage Resource Development	1.2.3.3.5	No	Ensure the co-coordinated delivery in line with the approved business case of all required resource classes/components capabilities for that business case across the enterprise.
Manage Resource Deployment	1.2.3.3.6	No	Ensure the co-coordinated deployment in line with the approved business proposal of all required resource classes/components for that business proposal across the enterprise.

**Table 5 Service and Resource Design Process Elements**

The messages used in this Process Flow are documented within the scope of Figure 5 – Establish Relationship between Service Provider and Access Provider and are documented in Table 7 Establish Relationship between Service Provider and Access Provider Messages.

#### 7.4 Establish Relationship between Service Provider and Access Provider

This section details the process by which a Service Provider establishes a relationship with a wholesale Service Provider and onboards one or more of their product offerings. Within a Carrier Ethernet environment, this could include establishing the ENNIs at which the Service Provider will connect to the wholesale provider's service.

The wholesale product offering could be exposed by the Service Provider as a Product offering, Resource or a Resource Facing Service, depending on the intended commercial presentation.

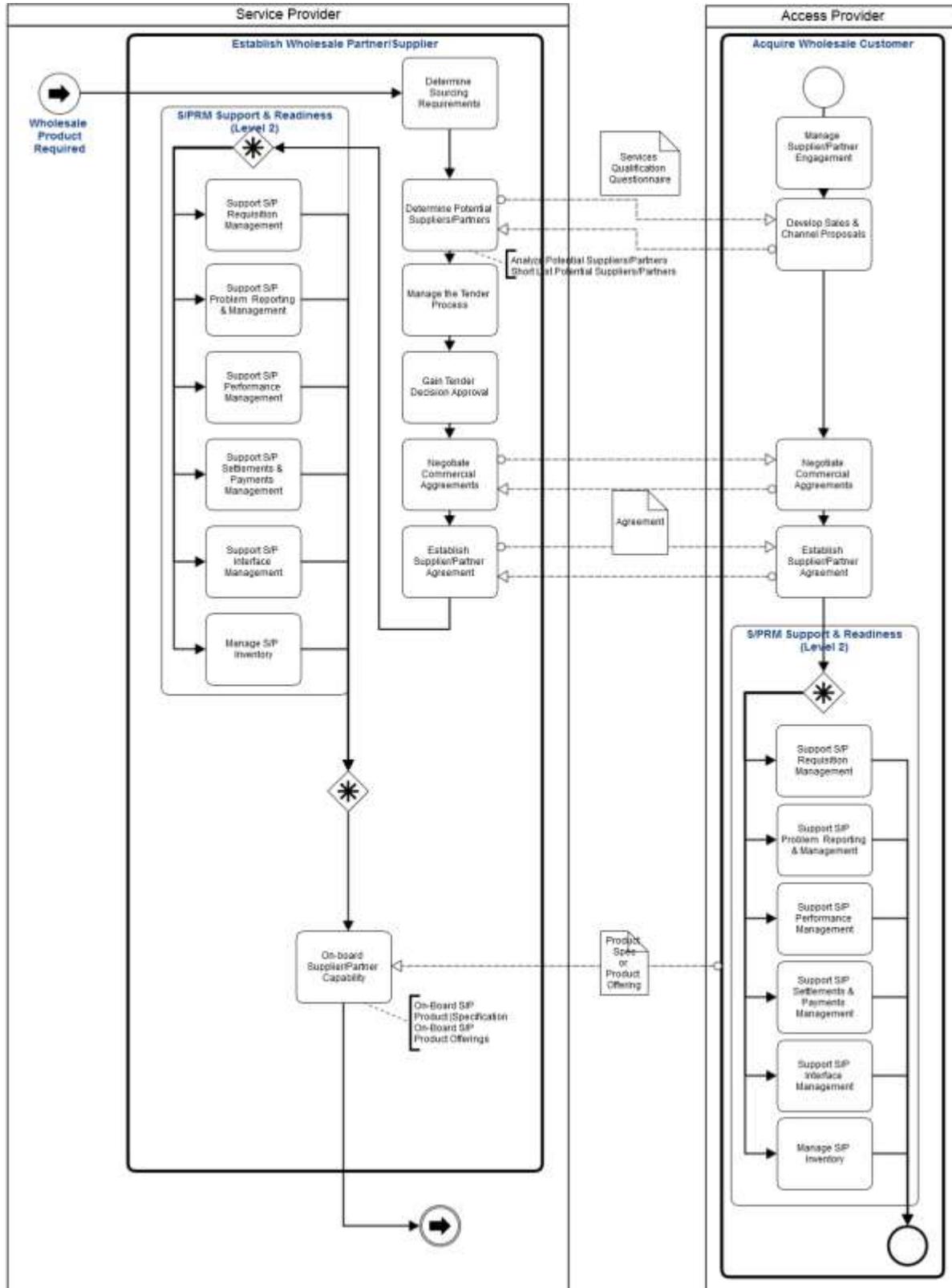


Figure 5 – Establish Relationship between Service Provider and Access Provider

The process flow in Figure 5 introduces the activities involved in establishing a new supplier/partner relationship and making the wholesale partner's product offering available for use in the Service Provider's environment.

Note that the reference processes are drawn from the Supplier/Partner Domain of TMF's Business Process Framework processes and not the more recently introduced Engaged Party Domain.

As a result of analyzing Product, Service or Resource requirements, developing specifications or design, it may be determined that a wholesale partner is required. In this case the Sourcing requirements would be established and a set of potential suppliers established by analyzing their responses to MEF's Service Qualification Questionnaire.

Once a short list of potential suppliers is established a formal tender procedure may be followed resulting in the selection of one or more suppliers with commercial/technical agreements in place. For a new supplier/partner, such agreements must establish the interworking in areas such as Requisition management (i.e. order handling), Problem Reporting, Performance Management, Payment management, overall procedures for interacting with the supplier, and appropriate visibility of the supplier's Product inventory.

Once such interworking is in place, the wholesale product offering can be onboarded to the Service Provider's environment.

Table 6 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
S/PRM Support & Readiness	1.1.4.1	No	S/PRM Support & Readiness processes are responsible for ensuring that all necessary facilities related to the interaction with suppliers and partners are ready and functioning. Moreover, these processes are responsible for the resolution of problems related to these facilities.
Support S/P Requisition Management	1.1.4.1.1	No	Manage engagement with suppliers/partners who own and manage outsourced infrastructure, and to ensure that the S/P Requisition Management processes are operating effectively.
Support S/P Problem Reporting & Management	1.1.4.1.2	No	Manage problem resolution activity with suppliers/partners who own and manage outsourced infrastructure, and to ensure that the S/P Problem Reporting & Management processes can operate effectively.
Support S/P Performance Management	1.1.4.1.3	No	Manage performance restoration activity with suppliers/partners who own and manage outsourced infrastructure, and to ensure that the S/P Performance Management processes can operate effectively.
Support S/P Settlements & Payments Management	1.1.4.1.4	No	Ensure that there is capability (for example, information, materials, systems and resources) so that S/P Settlements & Payments Management processes can operate effectively.
Support S/P Interface Management	1.1.4.1.5	No	Ensure that there is capability so that the S/P Interface Management processes can operate effectively.
Manage Supplier/Partner Inventory	1.1.4.1.6	No	Manage the administration of the enterprise's supplier/partner inventory.
Develop Sales & Channel Proposals	1.2.1.6.2	No	Create and document proposals for sales processes and sales channels, and gain approval for them.
Determine the Sourcing Requirements-S/P	1.2.4.2.1	No	Manage the collection and finalization of the specific requirements to be achieved from the sourcing process.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Determine Potential Suppliers/Partners	1.2.4.2.2	No	Determine the appropriate short list of suppliers to meet the specific enterprise requirements.
Manage the Tender Process-S/P	1.2.4.2.3	No	Manage and administer the mechanics of the tender process.
Gain Tender Decision Approval-S/P	1.2.4.2.4	No	Capture all activities required to develop and gain necessary approval for investment proposals to develop and deliver the required resource capabilities.
Negotiate Commercial Arrangements-S/P	1.2.4.2.5	No	Manage the commercial negotiations between the enterprise negotiation team and the selected supplier/partner, or with competitors in a regulated market.
Manage Supplier/Partner Engagement	1.2.4.3.1	No	Establish and manage the on-going processes to support the commercial, strategic, delivery and operational interactions between the enterprise and supplier/partner.
Establish Supplier/Partner Agreement	1.2.4.3.4	No	Establish an Agreement between the Enterprise and the Supplier/Partner for a particular Product for which the Enterprise and the S/P get into an out-sourcing agreement. The S/P makes the outsourced resources available to the enterprise as products in the S/P catalog. This Process Element defines the commercial terms and conditions and requirements for the Product to comply with the technical / operational specifications defined in the S/P catalog.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
On-board Supplier/ Partner	1.2.4.4.1	No	This Process Element supports the process for on-boarding a capability. This capability may e.g. be associated with a product offering (capability to order a product offering) or a product specification (capability to fulfill a product specification). By using the on-boarded specifications, this Process allows the enterprise to create new product offerings that leverage its own products as well as the acquired product.

**Table 6 Establish Relationship between Service Provider and Access Provider Process Elements**

Table 7 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Service Qualification Questionnaire	Service Provider	Access Provider	Request to identify and characterize the wholesale product offerings that are being offered.
Service Qualification Questionnaire Response	Access Provider	Service Provider	Standard description and characterization of product offerings that the Access Provider will offer to the Service Provider
Supplier/Partner Agreement Draft	Service Provider	Access Provider	Initial draft of Supplier/Partner agreement governing access to the Access Providers offerings.
Supplier/Partner Agreement Revision	Access Provider	Service Provider	Revised draft of Supplier/Partner agreement governing access to the Access Providers offerings.
Finalized Supplier/Partner Agreement	Service Provider	Access Provider	Finalized Supplier/Partner Agreement endorsed by Service Provider.
Finalized Supplier/Partner Agreement	Access Provider	Service Provider	Finalized Supplier/Partner Agreement endorsed by Access Provider.
Catalog Entry	Access Provider	Service Provider	The Catalog definitions of Access Provider Product Offering onboarded by the Service Provider.

**Table 7 Establish Relationship between Service Provider and Access Provider Messages**

## 7.5 Launch Products

This section defines the Process Elements and Process Flow for the Launch Products stage of the Product Lifecycle.

The Launch Products stage includes:

- Manage the initial introduction of new and enhanced products into the market and handover to operations for ongoing rollout
- Develop and manage communications to the market, prospective and existing customers

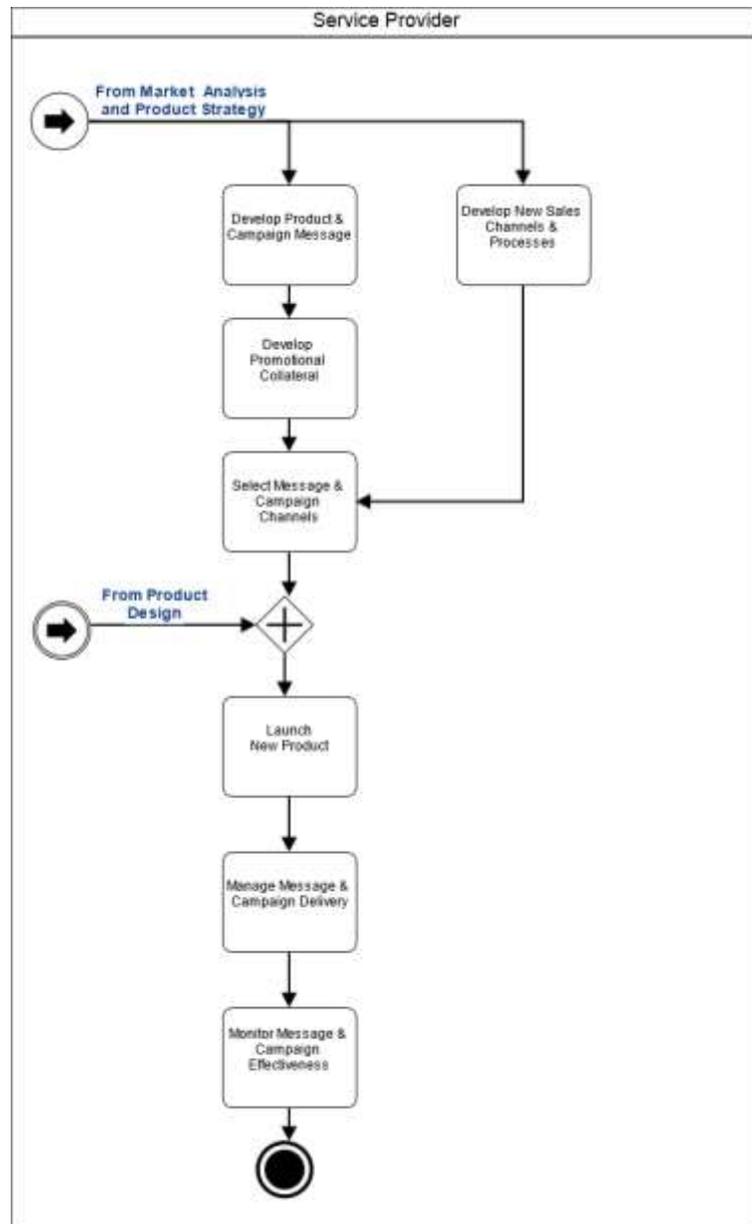


Figure 6 – Launch Products Process Flow

The Process Flow in Figure 6 illustrates the activities applicable to launching new commercial product offerings.

Once commitment is obtained for the Product Business Plans and Marketing strategy within the Market Analysis and Product Strategy Flow, specific Marketing and Sales activities may start in preparation for Product Launch. These activities include developing product and marketing campaign messaging and developing promotional material, and deciding on channels that will be used by the marketing campaign.

In addition, new sales channels and sales processes may be required to support the new product offerings.

When the marketing and sale preparation is complete along with the deployment of the necessary service and resource capabilities to support fulfillment of orders, the new product offerings will be launched to the market.

As part of the Product Launch, the Marketing campaign and messaging will be delivered to the market, and on an ongoing basis monitored for effectiveness.

Table 8 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in *italic font*.

<b>Process Element</b>	<b>TMF eTOM Identifier</b>	<b>Carrier Ethernet Extension?</b>	<b>High Level Description</b>
Launch New Products	1.2.1.5.7	No	Manage the initial introduction of new and enhanced products into the market and handover to operations for ongoing rollout.
Develop New Sales Channels & Processes	1.2.1.6.2	No	Develop New Sales Channels & Processes.
Develop Product & Campaign Message	1.2.1.7.2	No	Manage all activities and stakeholder engagement to develop and agree the specific campaign or promotion message.
Select Message & Campaign Channels	1.2.1.7.3	No	Manage the selection of the appropriate channel or channels to support the message delivery and/or campaign.
Develop Promotional Collateral	1.2.1.7.4	No	Ensure that all associated collateral is produced to support the market message and /or campaign.
Manage Message & Campaign Delivery	1.2.1.7.5	No	Manage and co-ordinate the delivery of the messages and campaigns into the selected channels.
Monitor Message & Campaign Effectiveness	1.2.1.7.6	No	Establish metrics and monitoring and reporting processes to gauge the effectiveness of market messages and product promotional campaigns.

**Table 8 Launch Products Process Elements**

## 8. Service Operations Lifecycle Management

This section defines the process models for the stages of Service Operations Lifecycle management. For each Process Flow there are at least three entities (e.g., stakeholders or actors) involved in the flow: 1) Subscriber, 2) Service Provider, and 3) Access Provider

(one or more). Each entity is represented by a BPMN “Pool”. The Process Elements and interactions of these elements (Process Flows) are focused on the Service Provider where “Messages” are sent towards the Subscriber and Access Provider. It is important to recognize that the Access Provider Pool represents another Service Provider acting in the role of providing a wholesale service. Therefore the Processes within the Access Provider Pool are also directly applicable to Service Providers, and vice versa. On the other hand, the Subscriber Pool is presented as a black box since only the interfaces between the Service Provider and Subscriber are of interest in this case.

Furthermore it should be noted that an Access Provider itself may also rely on wholesale services provided by other Access Providers. This multi-tier relationship has not been explicitly shown, but can be viewed as the Access Provider interacting with another Access Provider from the perspective of the Service Provider Pool.

### 8.1 Marketing Fulfillment Response

This section defines the Process Elements and Process Flow for the Marketing Fulfillment Response stage of the Service Operations Lifecycle.

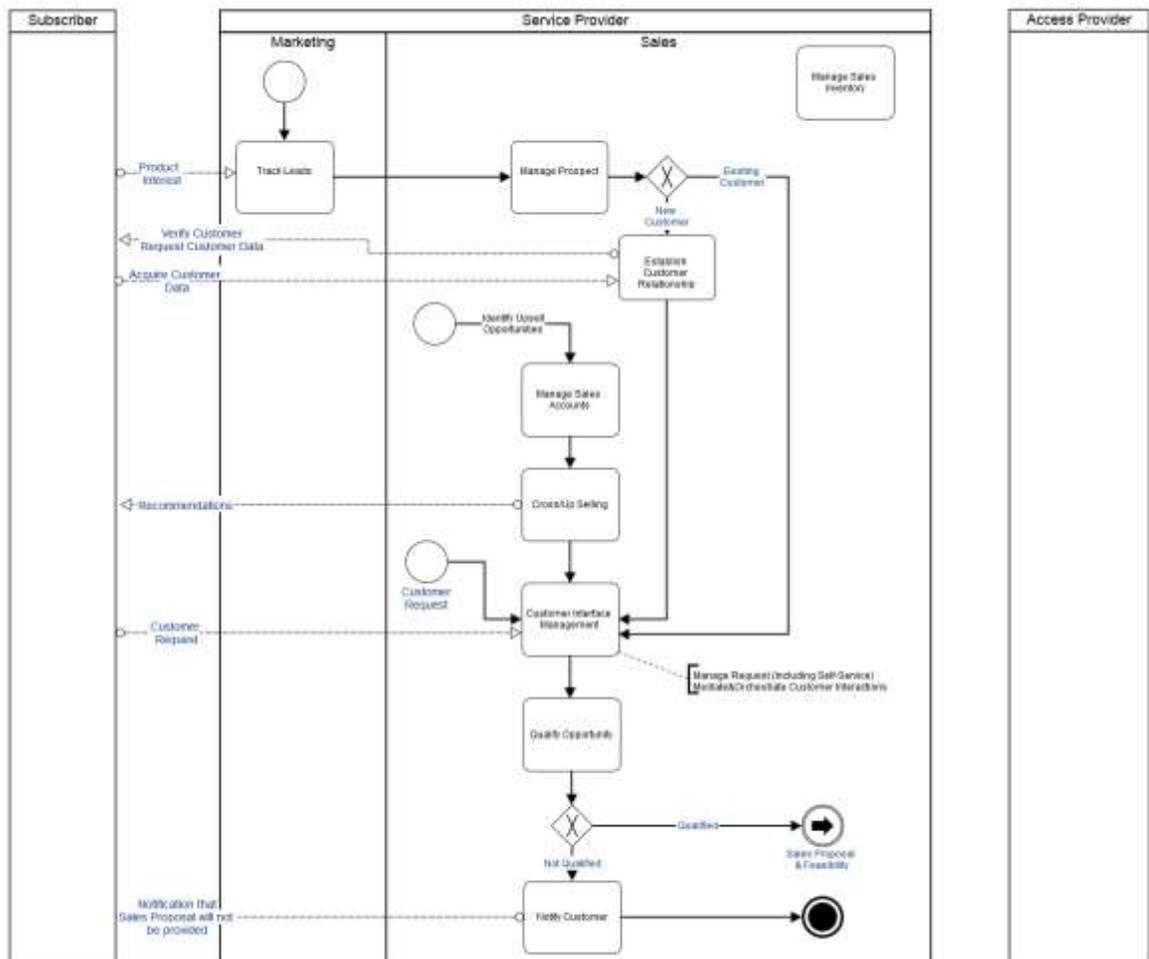


Figure 7 – Marketing Fulfillment Response Process Flow

The Process Flow in Figure 7 illustrates the activities applicable to managing sales opportunities arising through marketing Carrier Ethernet based products to new and existing Subscribers, up-selling existing Subscribers and direct Subscriber requests.

As a result of a marketing campaign for Carrier Ethernet based product offers, potential Subscribers may express interest in products being offered by the Service Provider. This may be expressed informally or through a formal Request for Proposal (RFP). These leads are collected and passed onto sales activities. Within the “Manage Prospects” activity these incoming leads are incorporated into the sales “pipeline”, applicable products are identified and the prospects are assigned to an appropriate sales channel.

If the prospect is not an existing Subscriber, the “Establish Customer Relationship” Process Element is applicable. In this Process Element the Subscriber details are validated, it is verified that this Subscriber is not already known to the Service Provider’s systems, a unique identifier is assigned, account credentials established and additional relevant Subscriber information is collected. It should be noted that further information may be gathered from the Subscriber in later activities within this or other flows.

The incoming request originating from the marketing lead, from a direct Subscriber request, or from an up-sell is managed within “Customer Interface Management”, which then passes the request on to the “Qualify Opportunity” Process Element. Up-sell opportunities arise from ongoing interactions with the Subscriber described within the “Manage Sales Account” Process Element. As a result of understanding the Subscriber specific requirements, recommendations for appropriate offerings may be made to the Subscriber that results in new incoming requests.

The “Qualify Opportunity” Process Element ensures that a decision to proceed with the opportunity is based on an appropriate assessment of risk, effort, ability to meet Subscriber expectations, strategic importance and profit potential. If the opportunity is qualified, the opportunity is passed on to the Quote management process flow shown in Figure 8, otherwise the Subscriber is notified that the Service Provider will not be providing a response to their request.

All sales prospects, sales, channel management and commissions are managed within a sale inventory. “Manage Sales Inventory” is not shown directly within the process flow itself, but sales inventory may be updated as a result of any of the activities within the flow illustrated here.

Table 9 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Track Leads	1.1.1.3.2	No	Track leads generated through marketing, or that arise in the course of business
Manage Prospect	1.1.1.4.1	No	Match assigned leads with the most appropriate products and ensure that these prospects are handled appropriately
Qualify Opportunity	1.1.1.4.2	No	Ensure that the opportunity is qualified in terms of any associated risk and the amount of effort required to achieve a sale
Cross/Up Selling	1.1.1.4.5	No	Ensure that the value of the relationship between the customer and Service Provider is maximized by selling additional, or more of the existing, products.
Manage Sales Accounts	1.1.1.4.7	No	Manage the sales accounts assigned to the sales channel on a day-day basis
Establish Customer Relationship	1.1.1.16.2	No	Verify the customer identity and manage the customer identity across the Enterprise.
Notify Customer	1.1.1.18.5	No	Notify the customer when interesting events happen.
Customer Interface Management	1.1.1.18.9	No	Managing all interfaces between the enterprise and potential and existing customers.
Manage Sales Inventory	1.1.1.20.12	No	Establish, manage and administer the enterprise's inventory of sales prospects, actual sales, channel management and sales commissions, as embodied in the Sales Inventory Database, and monitor and report on the usage and access to the sales inventory, and the quality of the data maintained in it.

**Table 9 Marketing Fulfillment Response Process Elements**

Table 10 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Product Interest	Subscriber	Service Provider	Subscriber indicates product interest to Service Provider through a formal request such as an RFP, or an informal request.
Verify Customer-Request Customer Data	Service Provider	Subscriber	Service Provider requests customer details from Subscriber
Acquire Customer Data	Subscriber	Service Provider	Subscriber provides information identifying themselves to the Service Provider.
Recommendations	Service Provider	Subscriber	Service Provider suggests a set of Product Offerings to the Subscriber
Customer Request	Subscriber	Service Provider	Customer requests product offerings from the Service Provider
Customer Notification that Quote will not be provided	Service Provider	Subscriber	Service Provider provides notification that sales proposal will not be provided to Subscriber.

Table 10 Marketing Fulfillment Response Messages

## 8.2 Sales Proposal and Feasibility

This section defines the Process Elements and Process Flow for the Sales Proposal and Feasibility stage of the Service Operations Lifecycle.

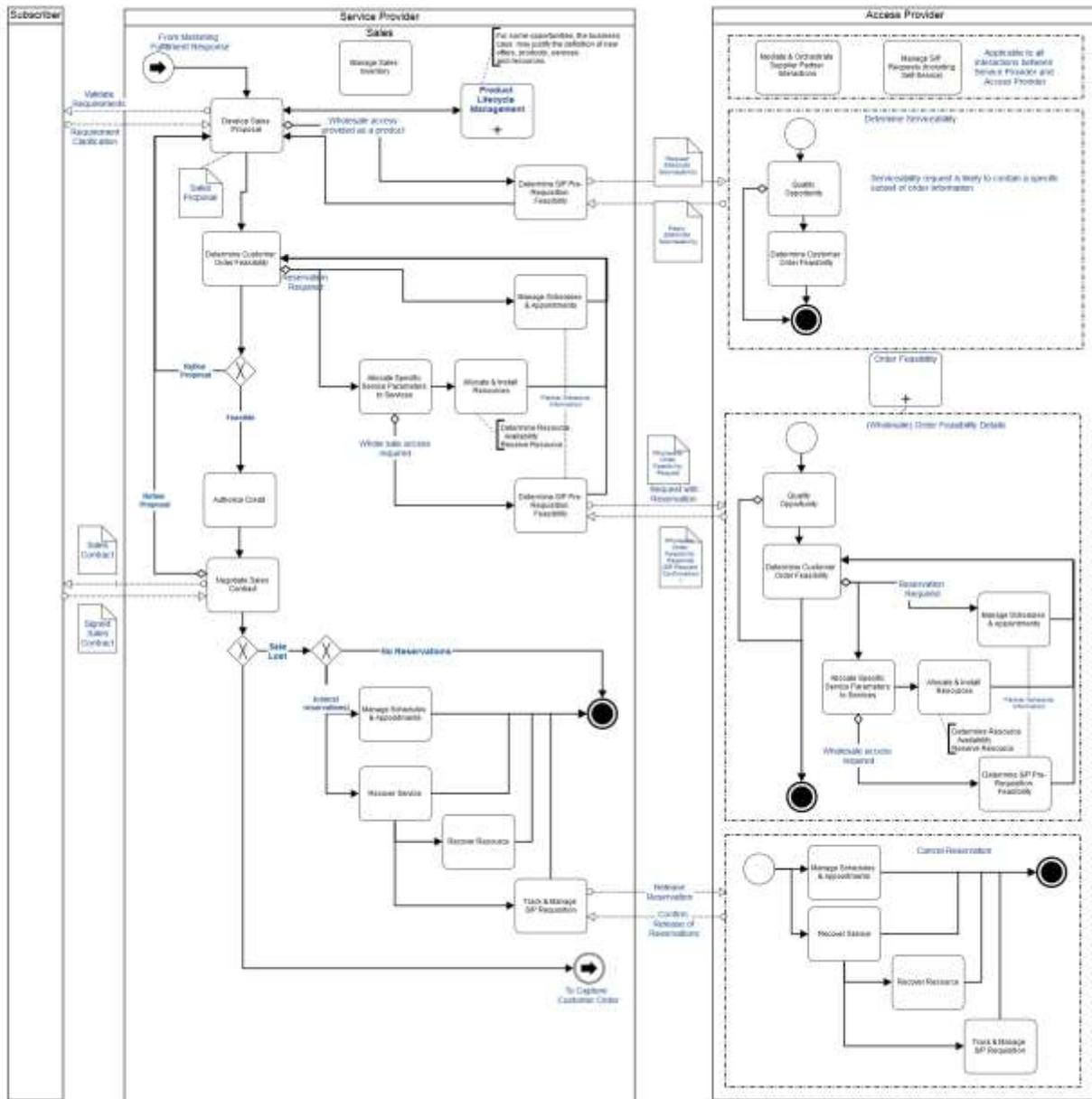


Figure 8 – Sales Proposal & Feasibility Process Flow

The Process Flow in Figure 8 illustrates the activities applicable to developing sales proposals (quotes) in response to qualified sales opportunities.

As an initial operation within the development of a sales proposal, the Service Provider may interact with the Subscriber to validate their requirements. As a result of feedback and questions from the Service Provider, a refined set of requirements may be provided by the (potential) Subscriber.

As part of the “Development Sales Proposal” Process Element, the Service Provider may recognize that it does not have suitable product offerings, products or services to support

the request. If the opportunity is sufficient, this may result in the development (or onboarding) of new product offerings, products and services. These activities, which may vary greatly in complexity, effort and timeframe, are not detailed in this process flow, but would occur in the context of general Product Lifecycle flows.

A sales proposal may include product offerings based on E-Access Services products sourced from external suppliers in addition to the Carrier Ethernet-based products offered directly by the Service Provider. In such cases, the availability of such product offers for a specific location or with specific parameters may be verified by issuing a Serviceability Request to the Access Provider. The Access Provider evaluates this request by performing some subset of determining the feasibility of an order with the specified location and parameters. These activities are represented by the “Qualify Opportunity” Process Element in which the Access Provider assesses risk and effort, as well as by the “Determine Customer Order Feasibility” Process Element in which the Access Provider determines whether the request can be met from a technical perspective. The result of this Serviceability assessment is returned to the Service Provider.

For Products supported directly by the Service Provider, “Customer Order Feasibility” will be determined. This check may take many forms and involve CRM logic, internal serviceability data and possibly service design. In some cases, a Subscriber commitment may require resources to be reserved to ensure that the customer order will be fulfilled with a high degree of certainty. In such cases, installation appointments may be scheduled, service identifiers allocated, resources allocated and products offered by Access Providers reserved using a wholesale order feasibility request with reservations.

Such a request incoming to the Access Provider requires that the Access provider reserve resources as a result of “Determining Customer Order Feasibility”. This sequence is the same as that identified in the Service Provider process, and may result in a request cascading to yet another wholesale provider (although this is not explicitly shown in the diagram).

When the reservations are complete, the Access Provider responds to the Service Provider with a Wholesale Order Feasibility response which includes confirmation that the reservation has been made. In an ATIS Access Service Request context, the response would take the form of the “Firm Order Confirmation”.

Within the Service Provider flow, if the Sales proposal is determined not to be feasible, the sales proposal may be refined until a feasible proposal is achieved. At this point, a credit check of the Subscriber is performed prior to negotiation of the Sale Contract.

The “Negotiate Sales Contract” Process Element might require further refinement of the Sale Proposal. Once an acceptable Sales Contract is established the Subscriber will sign the contract and the overall flow will progress to the stage of capturing the customer order.

If a Sales contract cannot be successfully negotiated, and if reservations have been made, these reservations are cancelled. This includes cancelling work force management ap-

pointments, recovering service and resource instances and requesting that the Access Provider release any reserved resources. The Access Provider follows a similar process for releasing reservations and responds to the Service Provider when this is complete.

Table 11 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Qualify Opportunity	1.1.1.4.2	No	Ensure that the opportunity is qualified in terms of any associated risk and the amount of effort required to achieve a sale
Negotiate Sales/Contract	1.1.1.4.3	No	Close the sale with terms that are understood by the customer, and are mutually agreeable to both the customer and the Service Provider.
Develop Sales Proposal	1.1.1.4.6	No	Develop a sales proposal to respond to the customer's requirements
Determine Customer Order Feasibility	1.1.1.5.1	Yes	Check the availability and/or the feasibility of providing and supporting standard and customized product offerings where specified to a customer.
Authorize Credit	1.1.1.5.2	No	Assess a customer's credit worthiness in support of managing customer risk and company exposure to bad debt
Manage Sales Inventory	1.1.1.20.12	No	Establish, manage and administer the enterprise's inventory of sales prospects, actual sales, channel management and sales commissions, as embodied in the Sales Inventory Database, and monitor and report on the usage and access to the sales inventory, and the quality of the data maintained in it.
Allocate Specific Service Parameters to Services	1.1.2.2.2	No	Issue service identifiers for new services.
Recover Service	1.1.2.2.10	No	Recover specific services that are no longer required by customers.
Allocate & Install Resources	1.1.3.2.1	No	Allocate specific resources required to support a specific service
Recover Resource	1.1.3.2.9	No	Recover specific resources that are no longer required.
Manage Schedules & Appointments	1.1.3.7.1	No	Manages the appointment schedule of assignable staff.
Determine S/P Pre-Requisition Feasibility	1.1.4.2.2	No	Determine the ability of suppliers/partners to deliver the specific resources, services or products, within the specified requirements

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Track & Manage S/P Requisition	1.1.4.2.3	No	Ensure S/P requisition orders are being processed and delivered efficiently and effectively
Manage S/P Requests (Including Self Service)	1.1.4.6.1	No	Accept requests and enable the supplier / partner to obtain the desired information from the enterprise, or identify and activate the appropriate process area to accomplish the request
Mediate & Orchestrate Supplier/Partner Interactions	1.1.4.6.3	No	Conversion of externally received messages into the required internal enterprise formats.

**Table 11 Sales Proposal and Feasibility Process Elements**

Currently a symmetric process definition from eTOM has not been identified by which an Access Provider would respond to “Determine S/P Pre-Requisition Feasibility”. In the diagrams above, “Determine Customer Order Feasibility” serves this purpose, even though a Serviceability Request is not necessarily order based.

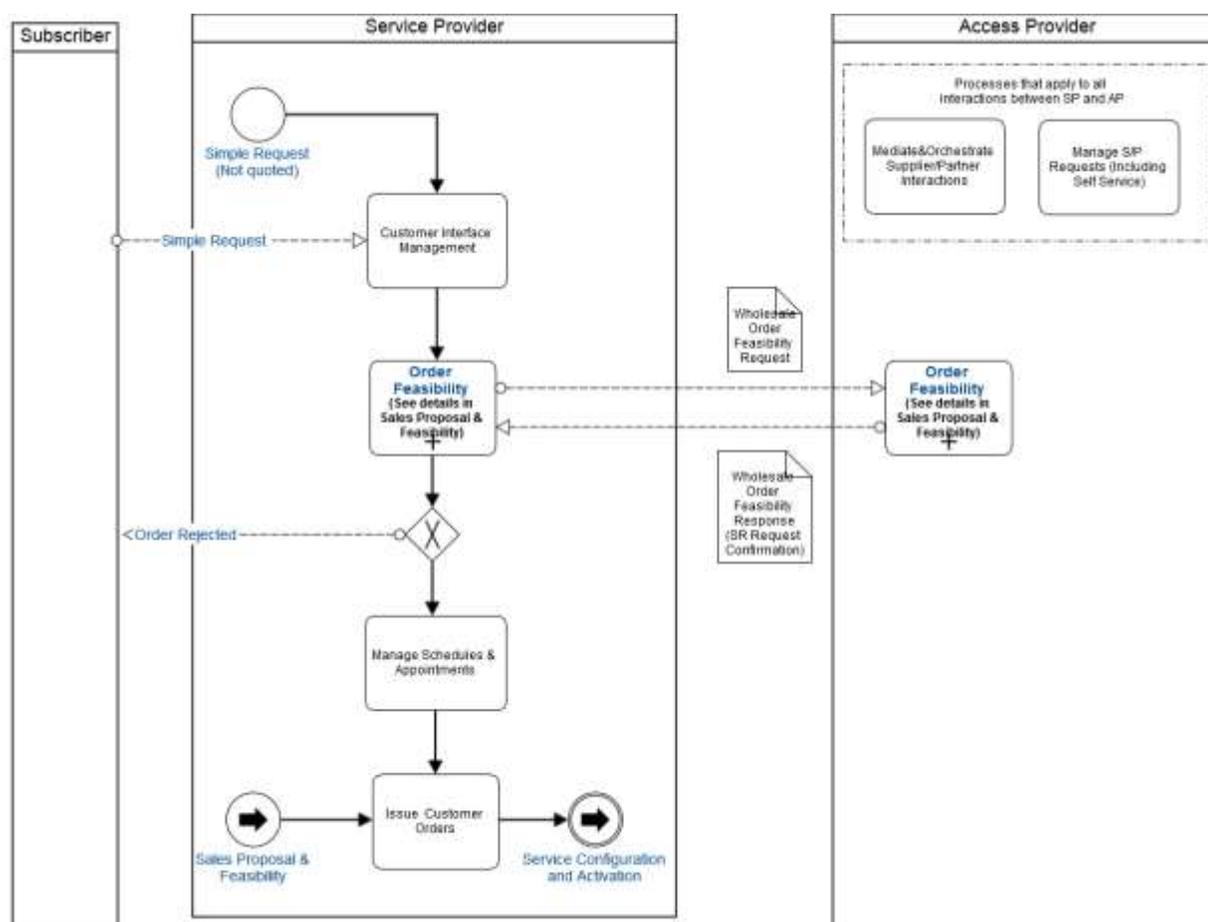
Table 12 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Validate Requirements	Service Provider	Subscriber	Service Provider communicates its understanding of requirements to Subscriber
Requirement Clarification	Subscriber	Service Provider	Subscriber provides refined set of requirements to Service Provider
Sales Contract	Service Provider	Subscriber	Service Provider proposes Sales Contract to Subscriber
Sales Contract Response	Subscriber	Service Provider	Subscriber accepts terms of Sales Contract from Service Provider
Request ENNI/UNI Serviceability	Service Provider	Access Provider	Service Provider requests whether a service can be provided at a location by Access Provider
Reply ENNI/UNI Serviceability	Access Provider	Service Provider	Access Provider indicates whether a service can be provided at a location by Service Provider
Wholesale Order Feasibility Request	Service Provider	Access Provider	Service Provider requests whether whole sale product can be provided (and resources reserved) by Access Provider
Wholesale Order Feasibility Response (SR Request Confirmation)	Access Provider	Service Provider	Access Provider indicates whether whole sale product can be provided for Service Provider
Release Reservation	Service Provider	Access Provider	Service Provider indicates that resources reserved for an S/P Request should be released by Access Provider
Reservation Release Confirmation	Access Provider	Service Provider	Access Provider confirms release of reserved resources associated with a S/P request Service Provider

Table 12 Sales Proposal and Feasibility Messages

### 8.3 Capture Customer Order

This section defines the Process Elements and Process Flow for the Capture Customer Order stage of the Service Operations Lifecycle that may represent orders for a new product offer, modification of an existing product, or deletion of an existing product



**Figure 9 – Capture Customer Order Process Flow**  
The Process Flow in

Figure 9 illustrates the activities applicable to capturing customer orders either from direct Subscriber requests or from sales contracts that have been generated through the Quote process. This flow reflects the interactions that occur with the Subscriber and Access Providers.

A Subscriber may directly initiate contact with the Service Provider to purchase new product offers or change their existing product offers. The “Customer Interface Management” Process Element is responsible for managing all incoming requests from the Subscriber. The request is expressed in terms of product offerings for which the feasibility of delivering can be determined by using the same process sub-flow identified within the Quote process. This may involve interactions with the Access Provider if wholesale E-Access based services are required.

If the order is determined to be feasible, scheduling of the order is performed (usually within CRM) and a customer order is issued. If the order is not feasible it is rejected and the Subscriber notified.

Once the customer order is issued the overall process advances to Order Fulfillment.

If it is determined that the Order is not feasible, the customer is notified and the process is complete.

Table 13 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Issue Customer Orders	1.1.1.5.6	No	Issue correct and complete customer orders
Customer Interface Management	1.1.1.18.9	No	Managing all interfaces between the enterprise and potential and existing customers.
Manage Appointment Schedule	1.1.3.7.1	No	Manages the appointment schedule of assignable staff.
Manage S/P Requests (Including Self Service)	1.1.4.6.1	No	Accept requests and enable the supplier / partner to obtain the desired information from the enterprise, or identify and activate the appropriate process area to accomplish the request
Mediate & Orchestrate Supplier/Partner Interactions	1.1.4.6.3	No	Ensure that transaction message structure and interactions conform to agreed, externally defined standards used by the enterprise and its suppliers/partners

**Table 13 Capture Customer Order Process Elements**

Table 14 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Simple Request	Subscriber	Service Provider	Subscriber requests Product Offerings or changes to product from Service Provider.
Order Rejected	Service Provider	Subscriber	Service Provider notifies Subscriber that Order cannot be accepted.
Wholesale Order Feasibility Request	Service Provider	Access Provider	Service Provider requests whether wholesale product can be provided (and resources reserved) by Access Provider
Wholesale Order Feasibility Response (SR Request Confirmation)	Access Provider	Service Provider	Access Provider indicates whether wholesale product can be provided for Service Provider

**Table 14 Capture Customer Order Messages**

## 8.4 Service Configuration and Activation

This section defines the Process Elements and Process Flow for the Service Configuration and Activation stage of the Service Operations Lifecycle.

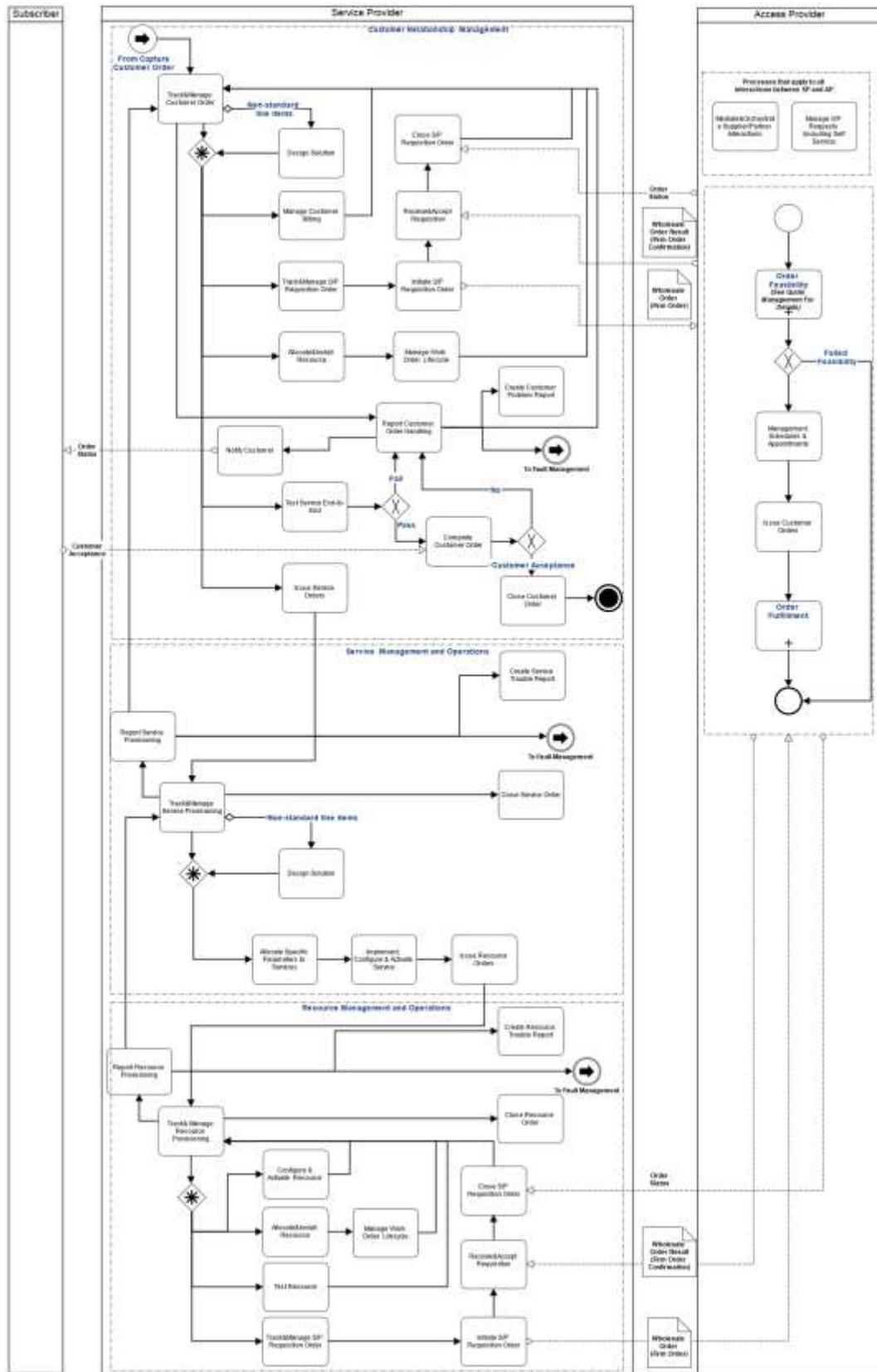


Figure 10 – Service Configuration and Activation Process Flow

The Process Flow in Figure 10 illustrates the activities applicable to Service Configuration and Activation. This flow reflects the coordination of activities that occur at the commercial, service and resource levels. Customer orders, based on product definitions and parameters, drive activities with direct commercial impact such as setting up billing, shipping of CPE equipment and installation. Service orders derived from the customer order drive the provisioning of services within the Service Provider. Services orders are based on the Service Provider's service definitions, which are closely aligned with MEF service concepts and parameters. Service orders in turn result in Resource Orders will drive the configuration of the network to support the required services.

In Figure 10, incoming customer orders are coordinated by the "Track & Manage Customer Orders" Process Element. This Process Element manages the overall lifecycle of the customer order and coordinates its processing as it drives the setup of appropriate billing configuration (Manage Customer Billing), initiates orders to Access Providers for wholesale products included in the Service Provider's product catalog (Track & Manage S/P Requisition Order, Initiate S/P Requisition Order, Receive & Accept Requisition, Close S/P Requisition Order), identifies CPE equipment (Allocate & Install Resource), initiates appropriate work force management operations for CPE installation (Manage Work Order Lifecycle), and also initiates service orders to driver Service Provider provisioning operations (Issue Service Orders), initiates end-to-end testing (Test Service End-to-End), customer acceptance testing (Complete Customer Order) and closes the customer order (Close Customer Order). Note that *Section 8.5* further details end-to-end testing of Carrier Ethernet services.

In addition to the coordination of these activities, the "Design Solutions" Process Element represents the case in which non-standard order items requiring a unique customer solution are included in the customer order.

Closely related to the "Track & Manage Customer Orders" Process Element is the Process Element "Report Customer Order Handling" which represents the activities around tracking customer order status and notifying other processes. This Process Element will trigger appropriate Customer Order status information to be sent to the customer (Notify Customer), and trigger problem reporting (Create Customer Problem Report) and fault management. This status notification is used to coordinate customer acceptance testing, with the results enabling the closure of the customer order, or appropriate fault resolution.

The processing of Service Orders is coordinated though the "Track & Manage Service Provisioning". Service Orders processing involves the allocation of service identifiers and parameters (Allocation Specific Parameters to Services), the detailing of required configuration (Implement, Configure & Allocate Service), the generation of Resource Orders, and finally the closure of the Service order (Close Service Order).

Associated with the "Track & Manage Service Orders" Process Element is the Process Element "Report Service Order Handling" which represents the activities around tracking

service order status and notifying other processes. This process will trigger problem reporting (Create Service Trouble Report) and fault management, and also provide updates to the “Track & Manage Customer Orders” Process Element.

The processing of Resource Orders is coordinated through the “Track & Manage Resource Provisioning” Process Element. Resource Order processing involves activating resources in the network (Configure & Activate Resource), identifying equipment (Allocate & Install Resource), initiating appropriate work force management operations for installation (Manage Work Order Lifecycle), and closing the resource order (Close Resource Order).

In addition, if the implementation design identifies third party service or resource components such as an OVC that has not been exposed at the commercial level, this may require the “Track & Manage Resource Provisioning” Process Element to initiate orders to Access Providers for wholesale products (Track & Manage S/P Requisition Order, Initiate S/P Requisition Order, Receive & Accept Requisition, Close S/P Requisition Order).

Associated with the “Track & Manage Resource Orders” Process Element is the Process Element “Report Resource Order Handling” which represents the activities around tracking resource order status and notifying other processes. This process will trigger problem reporting (Create Resource Trouble Report) and fault management, and also provide updates to the “Track & Manage Service Orders” Process Element.

In this process flow, the Access Provider may be the recipient of wholesale orders originating from the Service Provider either as a result of wholesale product offering presented directly as Service Provider product offerings, or orders generated as part of the design of the Service Provider’s internal service implementation. In both cases the flow and interactions between the Service Provider and the Access Providers are represented by the same process flows.

The Service Provider initiates an order (Initiate S/P Requisition Order) with a Wholesale Order to the Access Provider. Within the Access Provider, the Feasibility of the request is verified, and order acceptance is communicated via the Whole Order Result (Firm Order Confirmation). If the order is feasible, scheduling is performed (Manage Schedules & Appointments), the Order is captured and then fulfilled using a process corresponding to the flow shown within the Service Provider pool. Order status is reported to the Service Provider, which will ultimately trigger the closure of the wholesale order.

Table 15 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Track & Manage Customer Order	1.1.1.5.4	No	Ensure customer provisioning activities are assigned, managed and tracked efficiently to meet the agreed committed availability date
Complete Customer Order	1.1.1.5.5	No	Manage customer information and interactions after customer contracts or associated service orders have been finalized and during the order completion phase
Issue Customer Orders	1.1.1.5.6	No	Issue correct and complete customer orders
Report Customer Order Handling	1.1.1.5.7	No	Monitor the status of customer orders, provide notifications of any changes and provide management reports.
Close Customer Order	1.1.1.5.8	No	Close a customer order when the customer provisioning activities have been completed. Monitor the status of all open customer orders, and recognize that a customer order is ready to be closed when the status is changed to completed.
Create Customer Problem Report	1.1.1.6.5	No	This process creates a new Customer Problem Report.
Manage Customer Billing	1.1.1.11.1	No	Ensure effective management of the customer's billing account as it relates to the products purchased and consumed throughout the appropriate billing cycle.
Notify Customer	1.1.1.18.5	No	Notify the customer when interesting events happen.
Design Solution	1.1.2.2.1	No	Develop an end-end specific service design which complies with a particular customer's requirement
Allocate Specific Parameters to Services	1.1.2.2.2	No	Issue service identifiers for new services.
Track & Manage Service Provisioning	1.1.2.2.3	No	Ensure service provisioning activities are assigned, managed and tracked efficiently.
Implement, Configure & Activate Service	1.1.2.2.4	No	Implement, configure and activate the specific services allocated against an issued service order.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Test Service End-to-End	1.1.2.2.5	No	Test specific services to ensure all components are operating within normal parameters, and that the service is working to agreed performance levels
Issue Service Orders	1.1.2.2.7	No	Issue correct and complete service orders
Report Service Provisioning	1.1.2.2.8	No	Monitor the status of service orders, provide notifications of any changes and provide management reports.
Close Service Order	1.1.2.2.9	No	Close a service order when the service provisioning activities have been completed
Create Service Trouble Report	1.1.2.3.1	No	Create a new service trouble report.
Allocate & Install Resource	1.1.3.2.1	No	Allocate specific resources required to support a specific service
Configure & Activate Resource	1.1.3.2.2	No	Configure and activate the specific resources allocated against an issued resource order
Test Resource	1.1.3.2.3	No	Test specific resources to ensure they are operating within normal parameters
Track & Manage Resource Provisioning	1.1.3.2.5	No	Ensure resource provisioning activities are assigned, managed and tracked efficiently
Report Resource Provisioning	1.1.3.2.6	No	Monitor the status of resource orders, provide notifications of any changes and provide management reports.
Close Resource Order	1.1.3.2.7	No	This process monitors the status of the order and changes the status to closed when it is completed.
Issue Resource Orders	1.1.3.2.8	No	Issue correct and complete resource orders
Create Resource Trouble Report	1.1.3.3.7	No	Create a new resource trouble report
Manage Schedules & Appointments	1.1.3.7.1	No	Manages the appointment schedule of assignable staff.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Manage Work Order Lifecycle	1.1.3.7.9	No	A Work Order is an aggregation of jobs that are to be completed to achieve some business goal: to provide a customer service, to fix a problem, etc. Work Order Lifecycle Management processes are responsible for processing and monitoring the execution of a work order through its entire lifecycle, from issuance to closing.
Track & Manage S/P Requisition Order	1.1.4.2.3	No	Ensure S/P requisition orders are being processed and delivered efficiently and effectively
Receive & Accept Requisition	1.1.4.2.4	No	Records delivery of S/P requisitions, and arranges for any acceptance testing or commissioning required
Initiate S/P Requisition Order	1.1.4.2.5	No	Generate a correctly formatted and specified S/P requisition order, and issue this to the selected supplier/partner
Close S/P Requisition Order	1.1.4.2.7	No	Close a S/P requisition order when the S/P requisition has been successfully completed
Manage S/P Requests (Including Self Service)	1.1.4.6.1	No	Accept requests and enable the supplier / partner to obtain the desired information from the enterprise, or identify and activate the appropriate process area to accomplish the request
Mediate & Orchestrate Supplier/Partner Interactions	1.1.4.6.3	No	Ensure that transaction message structure and interactions conform to agreed, externally defined standards used by the enterprise and its suppliers/partners

**Table 15 Service Configuration and Activation Process Elements**

Table 16 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Order Status	Service Provider	Subscriber	Service Provider reports status of customer order to Subscriber
Customer Acceptance	Subscriber	Service Provider	Subscriber confirms to Service Provider that the service meets their acceptance criteria.
Wholesale Order (Firm Order)	Service Provider	Access Provider	Service Provider requests product from Access Provider
Wholesale Order Result (Firm Order Confirmation)	Access Provider	Service Provider	Access Provider indicates whether wholesale product can be provided for Service Provider
Order Status	Access Provider	Service Provider	Access Provider reports status of customer order to Service Provider

**Table 16 Service Configuration and Activation Messages**

## 8.5 End-to-End Service Testing

This section defines the Process Elements and Process Flow for the End-to-End Service Testing stage of the Service Operations Lifecycle. Figure 11 illustrates the Process Flow for the End-to-End Service Testing stage.

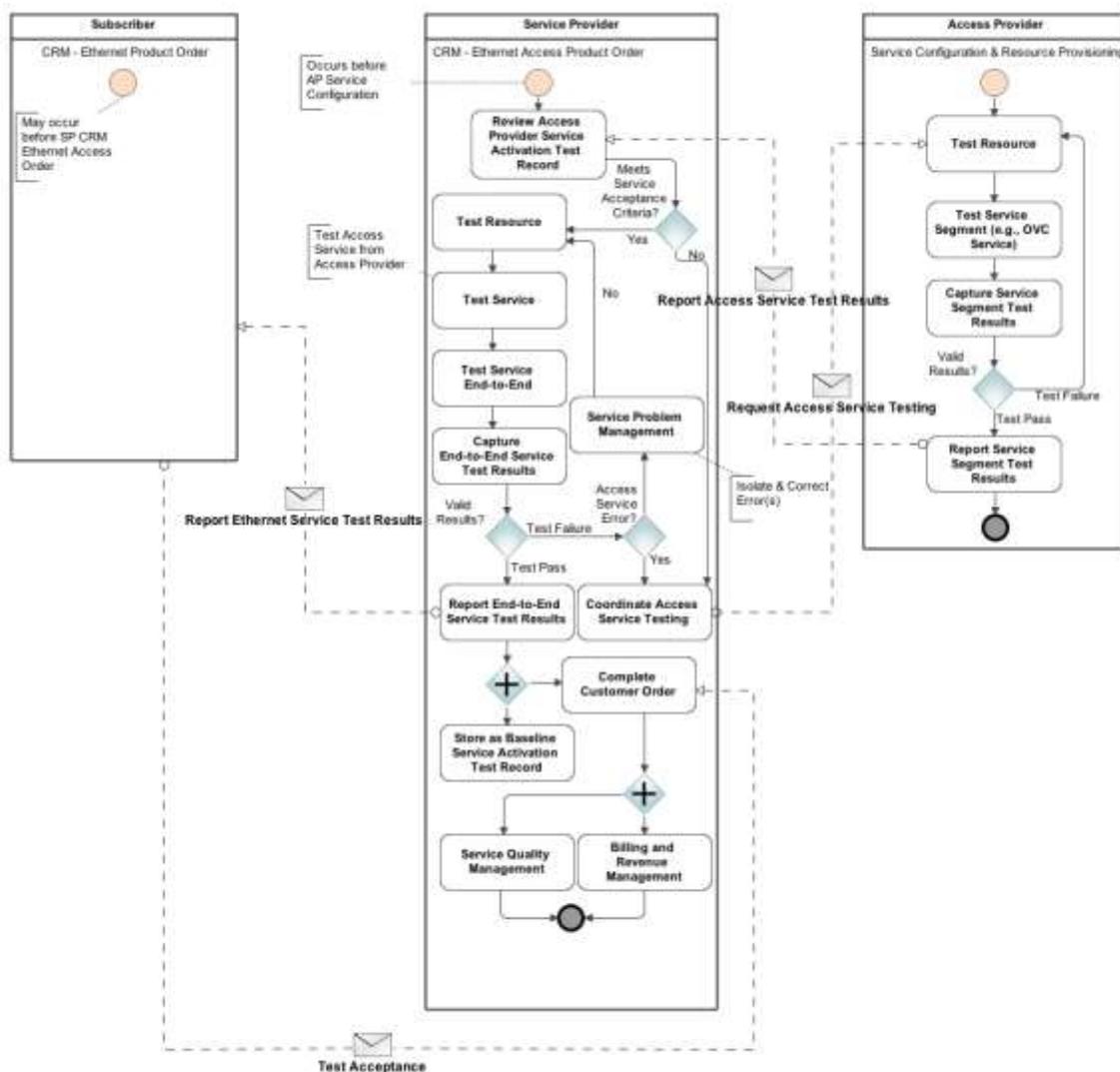


Figure 11 – End-to-End Service Testing Process Flow

The Process Flow illustrates the interconnection points between the Subscriber, Service Provider and Access Provider with respect to testing the Ethernet Service before the service is turned over to the Subscriber. In addition, the Service Provider and Access Provider Pools illustrate the Process Flow of Service Activation Testing (SAT) activities within each of their organizations. The process generally occurs with a Subscriber ordering an Ethernet Service from the Service Provider that requires the Service Provider to order an E-Access service from an Access Provider. As such, several different Ethernet segments (EVC and OVC) must be tested to validate the end-to-end Subscriber service. When the Service Provider orders the E-Access service, they likely request a Service Activation Test Record from the Access Provider showing the validation test results of the ordered Access Service. This might be a baseline SAT Record for the Access EPL or Access EVPL service the Service Provider is receiving from the Access Provider. If the Access Provider's SAT Record meets the Service Acceptance Criteria (SAC), the Service Provider also performs testing on their segment, or the EVC/OVC within their footprint, both at the resource and service level. If the Service Provider has access to the Access

Provider's UNI for SAT testing purposes, the Service Provider can finally test the UNI-to-UNI, or end-to-end service for generating a SAT Record. This SAT Record can be stored as a service baseline SAT Record or birth certification test report for historical comparison purposes. In the event that end-to-end testing uncovers faults, troubleshooting can occur within the Service Providers Ethernet segment, or coordination with the Access Provider can occur if the issue is within the E-Access service. Once the testing has passed, the customer order can be marked completed and the end-to-end service can be turned over to the Subscriber.

Table 17 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Review Access Provider Service Activation Test Record	N/A	Yes	Review Ethernet Access Service Service Activation Test Record to confirm adequate testing and performance of SP purchased E-Access service.
Test Resource	1.1.3.2.3	No	Test specific resources to ensure they are operating within normal parameters.
Test Service	1.1.2.2.5.1	Yes	Test specific services to ensure all components are operating within normal parameters, and that the service is working to agreed performance levels before its activation for the customer. This purpose is performed through testing the service end-to-end as far as possible. Specific to Carrier Ethernet service definitions, these processes test specific services against test procedures defined in [6].
Test Service End-to-End	1.1.2.2.5	No	Test specific services to ensure all components are operating within normal parameters, and that the service is working to agreed performance levels.
Test Service Segment	N/A	Yes	Specific to Carrier Ethernet service definitions, these processes test specific services against test procedures defined in [6]. This process focuses on testing the OVC (E-Access service).
Capture End-to-End Service Test Results	N/A	Yes	Capture and store the test results for historical and downstream testing comparison purposes. This is done for the end-to-end Subscriber Ethernet service.
Capture Service Segment Test Results	N/A	Yes	Capture and store the test results for historical and downstream testing comparison purposes. This is done for the Ethernet Access Services service segment.
Report End-to-End Service Test Results	N/A	Yes	Report the end-to-end Subscriber Ethernet service SAT results.
Report Service Segment Test Results	N/A	Yes	Report the Ethernet Access Service SAT results.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Store as Baseline Service Activation Test Record	N/A	Yes	Store SAT results as a baseline for historical comparison purposes (e.g., birth certificate).
Service Problem Management	1.1.2.3	No	Respond immediately to customer-affecting service problems or failures in order to minimize their effects on customers, and to invoke the restoration of the service, or provide an alternate service as soon as possible.
Coordinate Access Service Testing	N/A	Yes	Initiate and execute Access Service testing. SP may perform all or part of this testing or may request AP to perform all or part of this testing.
Complete Customer Order	N/A	Yes	SP closes Subscriber order since Ethernet service can now be handed over to the Subscriber (SAT results accepted by Subscriber).
Service Quality Management	1.1.2.4	No	Managing, tracking, monitoring, analyzing, improving and reporting on the performance of specific services
Billing & Revenue Management	L1 Vertical Grouping	No	Responsible for the production of timely and accurate bills, for providing pre-bill use information and billing to customers, for processing their payments, and performing payment collections.

Table 17 End-to-End Service Testing Process Elements

Table 18 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Report Ethernet Service Test Results	SP	Subscriber	SP notifies Subscriber of the end-to-end Ethernet service SAT results.
Test Acceptance	Subscriber	SP	Subscriber accepts the SP SAT results.
Report Access Service Test Results	AP	SP	AP reports Access Service test results to the SP.
Request Access Service Testing	SP	AP	SP coordinates testing of the Access Services with AP.

Table 18 End-to-End Service Testing Messages

## 8.6 Service Problem Management

This section defines the Process Elements and Process Flow for the Service Problem Management (a.k.a., Fault Management) function of the Service Operations Lifecycle. Figure 12 illustrates the Process Flow for the Service Problem Management function.

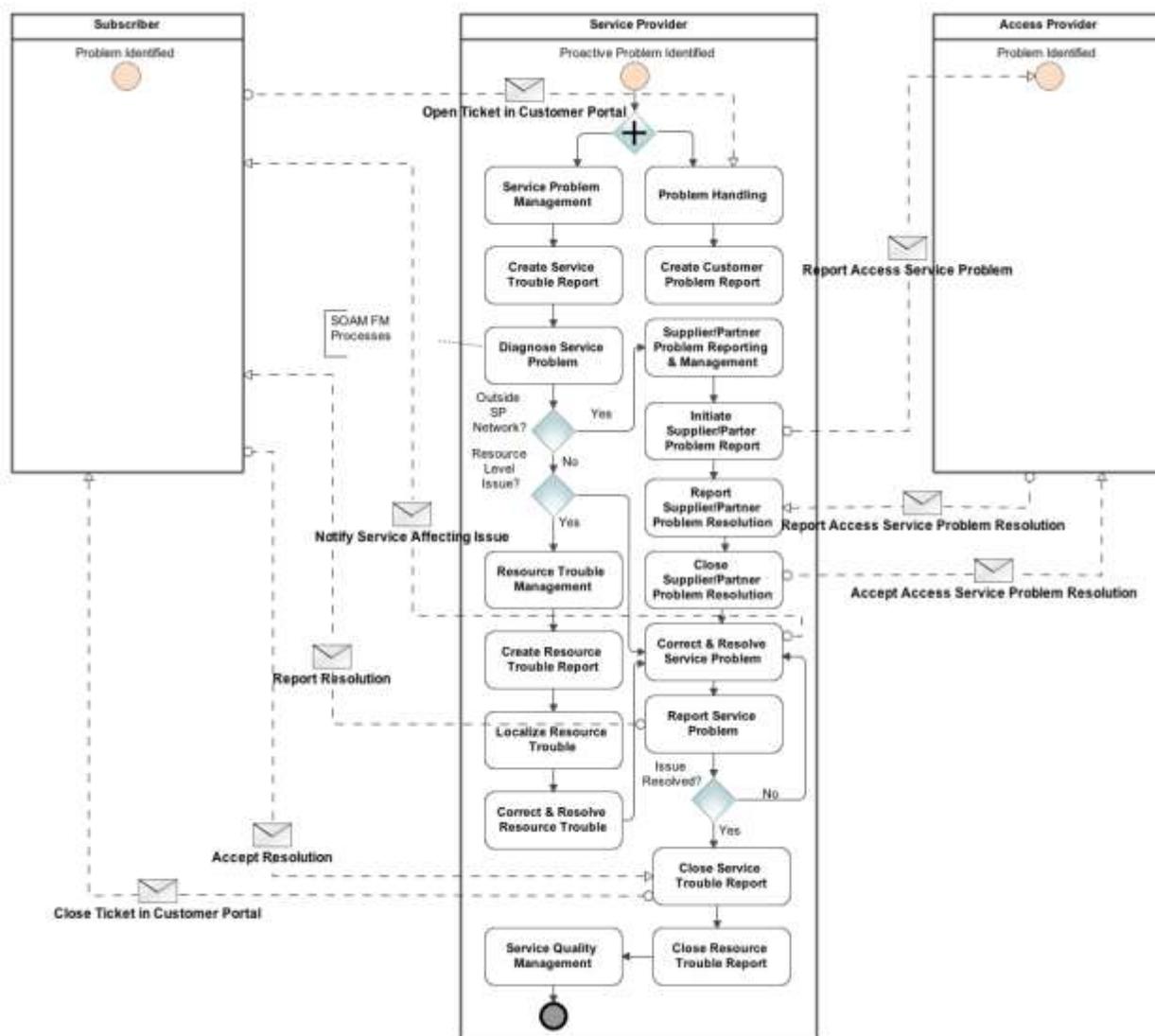


Figure 12 – Service Problem Management Process Flow

The Process Flow illustrates the interconnection points between the Subscriber, Service Provider and Access Provider with respect to Service Problem (Fault) Management activities including Fault Management for Service OAM. In addition, the Service Provider Pool illustrates the Process Flow of Fault Management activities within their organization. The Process Flow shown in the diagram generally starts in one of two ways: 1) Subscriber identifies an issue with their Ethernet service and opens a problem in their

customer portal, or 2) Service Provider proactively identifies an issue with the service. Once the problem has entered the Service Provider's problem handling system, the process flow takes two parallel tracks where the issue is handled at the service and resource facing perspective (e.g., internal to the Service Provider) and handled at customer facing perspective (e.g., externally to the Service Provider). Another perspective is the interactions with the Access Provider to troubleshoot and resolve issues with the E-Access service the Service Provider has ordered from the Access Provider. If an issue is isolated to the Access Service, the Service Provider reports the problem to the Access Provider via the interconnection point as shown in the Process Flow diagram. It's up to the Access Provider to troubleshoot and resolve the Access Service problem and then report the resolution and correction back to the Service Provider. The Service Provider has the opportunity to accept the Access Provider problem resolution and close the problem report. Similar to this interaction is the interaction between the Subscriber and the Service Provider when the Subscriber opens a problem report in their customer portal. The Service Provider isolates and corrects the problem at the service and potentially resource levels within their network (and the Access Provider's network as just discussed) and notifies the Subscriber of the problem resolution. The Subscriber has the opportunity to accept the Service Provider problem resolution and notify the Service Provider. Once the Subscriber has accepted the problem resolution, the Service Provider closes the open Problem in the Subscriber's customer portal. Another scenario exists where the Service Provider proactively identifies a service affecting issue and notifies the Subscriber of the problem. Once the problem has been resolved, the Service Provider notifies the Subscriber of the problem resolution.

Table 19 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Problem Handling	1.1.1.6	No	Responsible for receiving trouble reports from customers, resolving them to the customer's satisfaction and providing meaningful status on repair and/or restoration activity to the customer.
Create Customer Problem Report	1.1.1.6.5	No	This process creates a new Customer Problem Report.
Service Problem Management	1.1.2.3	No	Respond immediately to customer-affecting service problems or failures in order to minimize their effects on customers, and to invoke the restoration of the service, or provide an alternate service as soon as possible.
Create Service Trouble Report	1.1.2.3.1	No	Create a new service trouble report.
Diagnose Service Problem	1.1.2.3.2	Yes	Identify the root cause of the specific service problem, including those service problems related to security events. Service OAM Fault Management processes occur here.
Correct & Resolve Service Problem	1.1.2.3.3	No	Restore the service to a normal operational state as efficiently as possible.
Report Service Problem	1.1.2.3.5	No	Monitor the status of service trouble reports, provide notifications of any changes and provide management reports. This includes service trouble caused by security events.
Close Service Trouble Report	1.1.2.3.6	No	Close a service trouble report when the service problem has been resolved.
Service Quality Management	1.1.2.4	No	Managing, tracking, monitoring, analyzing, improving and reporting on the performance of specific services.
Resource Trouble Management	1.1.3.3	No	Responsible for the management of troubles with specific resources.
Localize Resource Trouble	1.1.3.3.2	No	Perform analysis to identify the root cause of the specific resource trouble including those resource troubles related to security events.
Correct & Resolve Resource Trouble	1.1.3.3.3	No	Restore or replace resources that have failed as efficiently as possible.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Close Resource Trouble Report	1.1.3.3.6	No	Close a resource trouble report when the resource problem has been resolved.
Create Resource Trouble Report	1.1.3.3.7	No	Create a new resource trouble report.
Supplier/Partner Problem Reporting & Management	1.1.4.3	No	Track, monitor and report on the Service Provider initiated problem engagements to ensure that the interactions are in accordance with the agreed commercial arrangements between the Service Provider and the Access Provider.
Initiate Supplier/Partner Problem Report	1.1.4.3.1	No	Report specific problems to the Access Provider.
Report Supplier/Partner Problem Resolution	1.1.4.3.4	No	Monitor the status of Partner problem reports, provide notifications of any changes and provide management reports.
Close Supplier/Partner Problem Resolution	1.1.4.3.5	No	Close a Partner problem report when the Partner problem has been resolved.

**Table 19 Service Problem Management Process Elements**

Table 20 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Open Ticket in Customer Portal	Subscriber	Service Provider	Customer opens problem ticket in customer portal.
Notify service affecting issue	SP	Subscriber	SP notifies Subscriber, perhaps via the Customer Portal, or via email, of a service affecting condition the SP or AP has detected.
Report resolution	SP	Subscriber	SP reports the problem resolution to the Subscriber.
Accept resolution	Subscriber	SP	Subscriber accepts the SP problem resolution and likely performs some level of their own testing to validate the issue resolution.
Close Ticket in Customer Portal	SP	Subscriber	Once Subscriber accepts the resolution, SP closes the open problem ticket in the Customer Portal.
Report Access Service Problem	SP	AP	SP notifies AP of a service-level problem with the Access Service.
Report Access Service Problem Resolution	AP	SP	AP reports the problem resolution to the SP
Accept Access Service Problem Resolution	SP	AP	SP accepts the AP problem resolution and likely performs some level of their own testing to validate the issue resolution.

Table 20 Service Problem Management Messages

## 8.7 Service Quality Management

This section defines the Process Elements and Process Flow for the Service Quality Management (a.k.a., Performance Management) function of the Service Operations Lifecycle. Figure 13 illustrates the Process Flow for the Service Quality Management function.

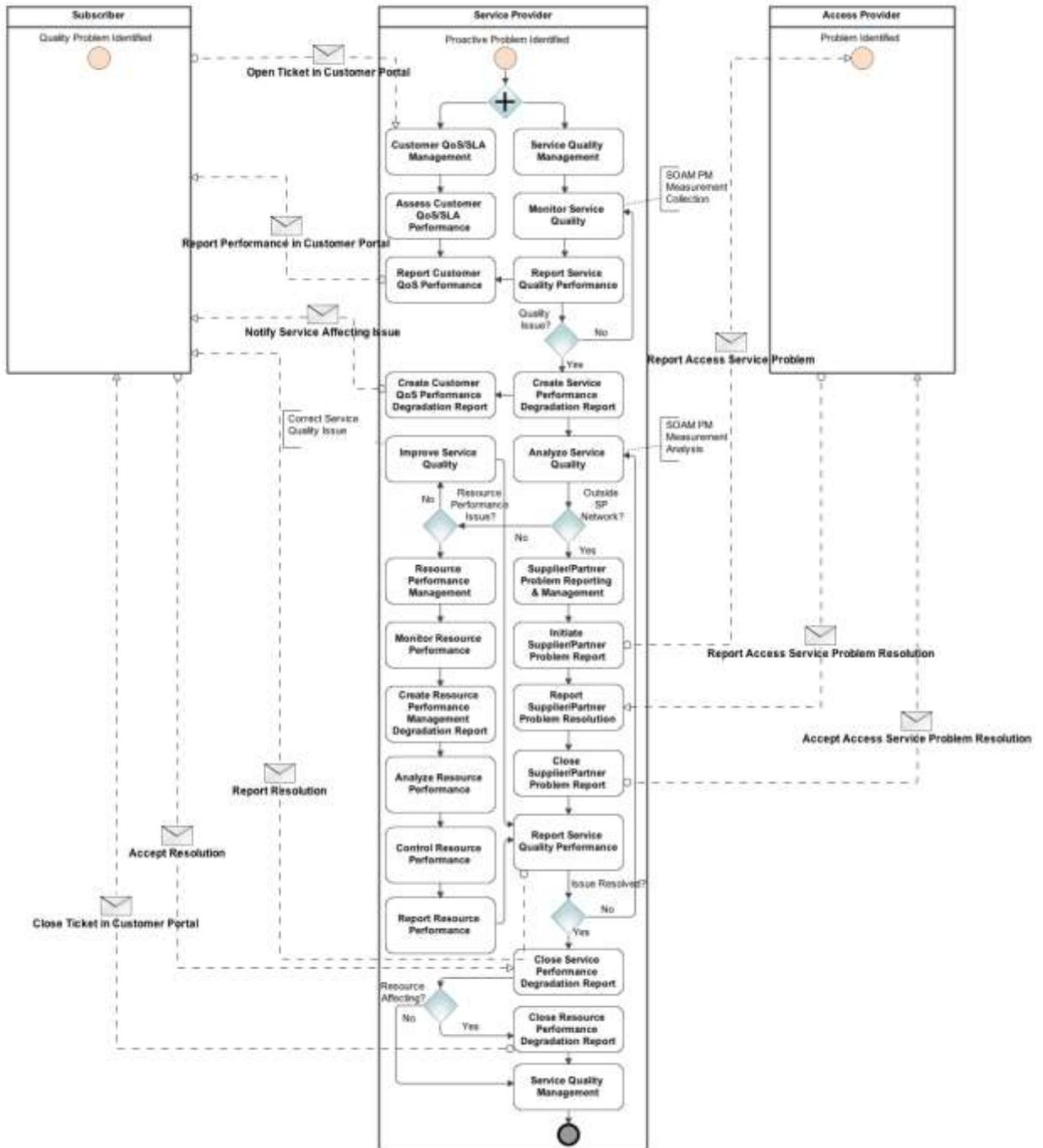


Figure 13 – Service Quality Management Process Flow

The Process Flow illustrates the interconnection points between the Subscriber, Service Provider and Access Provider with respect to Service Quality (Performance) Management activities including Performance Monitoring for Service OAM. In addition, the Service Provider Pool illustrates the Process Flow of Performance Management activities within their organization. The Process Flow shown in the diagram generally starts in one of two ways: 1) Subscriber identifies a service quality issue with their Ethernet service and opens the issue in their customer portal, or 2) Service Provider proactively identifies

a quality issue with the service (e.g., service degradation occurring). Once the issue has entered the Service Provider's problem handling system, the process flow takes two parallel tracks where the issue is handled at the service and resource facing perspective (e.g., internal to the Service Provider) and handled at customer facing perspective (e.g., externally to the Service Provider). Another perspective is the interactions with the Access Provider to troubleshoot and resolve issues with the E-Access service the Service Provider has ordered from the Access Provider. If an issue is isolated to the Access Service, the Service Provider reports the problem to the Access Provider via the interconnection point as shown in the Process Flow diagram. It's up to the Access Provider to troubleshoot and resolve the Access Service problem and then report the resolution and correction back to the Service Provider. The Service Provider has the opportunity to accept the Access Provider problem resolution and close the problem report. Similar to this interaction is the interaction between the Subscriber and the Service Provider when the Subscriber opens a problem report in their customer portal. The Service Provider isolates and corrects the problem at the service and potentially resource levels within their network (and the Access Provider's network as just discussed) and notifies the Subscriber of the problem resolution. The Subscriber has the opportunity to accept the Service Provider problem resolution and notify the Service Provider. Once the Subscriber has accepted the problem resolution, the Service Provider closes the open Problem in the Subscriber's customer portal. Another scenario exists where the Service Provider proactively identifies a service quality affecting issue and notifies the Subscriber of the problem. Once the problem has been resolved, the Service Provider notifies the Subscriber of the problem resolution. Performance reporting is another requirement for the Subscriber to enable SLA compliance verification of the Ethernet service as delivered by the Service Provider. This is shown in the diagram as a continual process of reporting performance in the customer performance in a near-real time manner.

Table 21 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Customer QoS/SLA Management	1.1.1.7	No	Monitoring, managing and reporting of delivered vs. contractual QoS, as defined in the SP's service descriptions, customer contracts or product catalog.
Assess Customer QoS/SLA Performance	1.1.1.7.1	No	Manage the overall assessment of the customer QoS/SLA performance.
Report Customer QoS Performance	1.1.1.7.3	No	Report on the customer's QoS/SLA performance.
Create Customer QoS Performance Degradation Report	1.1.1.7.4	No	Create a new customer QoS performance degradation report.
Service Quality Management	1.1.2.4	No	Managing, tracking, monitoring, analyzing, improving and reporting on the performance of specific services.
Monitor Service Quality	1.1.2.4.1	Yes	Monitor received service quality information and undertake first-in detection. Perform Service OAM Performance Monitoring here.
Analyze Service Quality	1.1.2.4.2	Yes	Analyze and evaluate the service quality performance of specific services. Perform analysis of Service OAM Performance metrics here.
Improve Service Quality	1.1.2.4.3	No	Restore the service quality to a normal operational state as efficiently as possible.
Report Service Quality Performance	1.1.2.4.4	No	Monitor the status of service performance degradation reports, provide notifications of any changes and provide management reports.
Create Service Performance Degradation Report	1.1.2.4.5	No	Create a new service performance degradation report.
Close Service Performance Degradation Report	1.1.2.4.7	No	Close a service performance degradation report when the service performance has been resolved.
Resource Performance Management	1.1.3.4	No	Managing, tracking, monitoring, analyzing, controlling and reporting on the performance of specific resources.
Monitor Resource Performance	1.1.3.4.1	No	Monitor received resource performance information and undertake first-in detection.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Analyze Resource Performance	1.1.3.4.2	No	Analyze and evaluate the performance of specific resources.
Control Resource Performance	1.1.3.4.3	No	Apply controls to resources in order to optimize the resource performance
Report Resource Performance	1.1.3.4.4	No	Monitor the status of resource performance degradation reports, provide notifications of any changes and provide management reports.
Create Resource Performance Management Degradation Report	1.1.3.4.5	No	Create a new resource performance degradation report.
Close Resource Performance Degradation Report	1.1.3.4.7	No	Close a resource performance degradation report when the resource performance has been resolved.
Supplier/Partner Problem Reporting & Management	1.1.4.3	No	Track, monitor and report on the Service Provider initiated problem engagements to ensure that the interactions are in accordance with the agreed commercial arrangements between the Service Provider and the Access Provider.
Initiate Supplier/Partner Problem Report	1.1.4.3.1	No	Report specific problems to the Access Provider.
Report Supplier/Partner Problem Resolution	1.1.4.3.4	No	Monitor the status of Partner problem reports, provide notifications of any changes and provide management reports.
Close Supplier/Partner Problem Report	1.1.4.3.5	No	Close a Partner problem report when the Partner problem has been resolved.

**Table 21 Service Quality Management Process Elements**

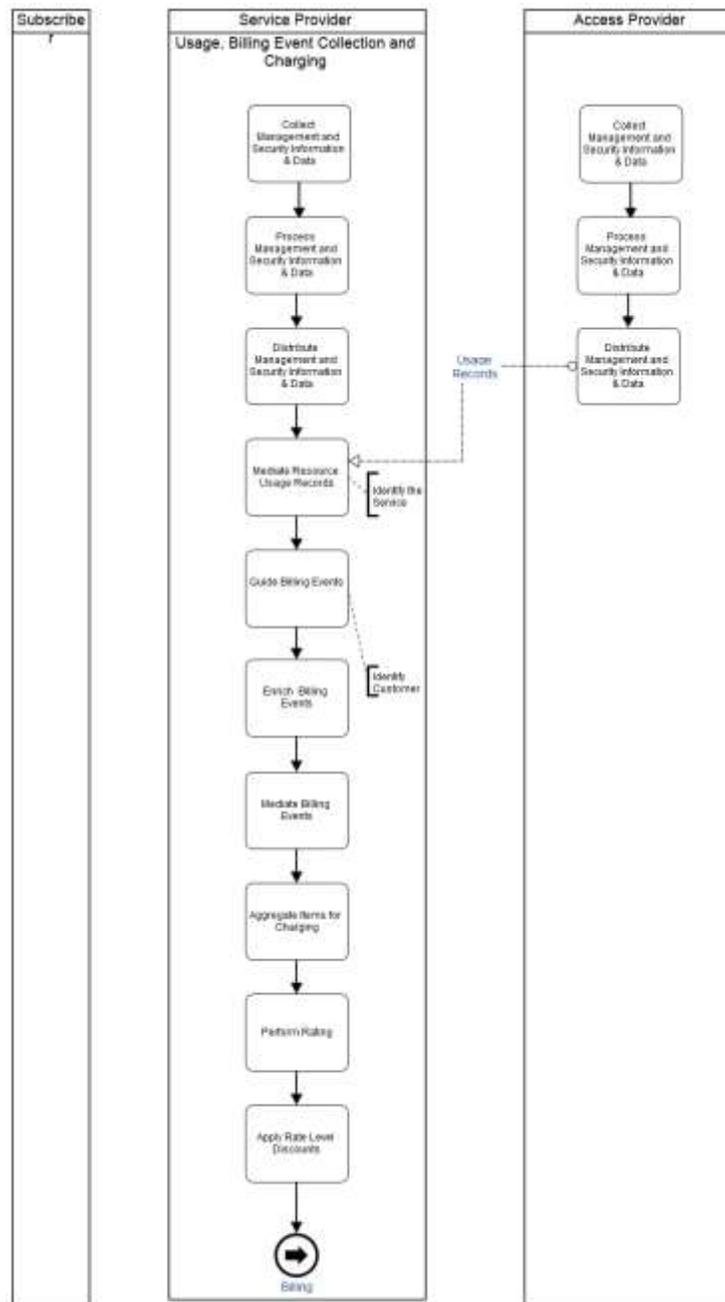
Table 22 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Open Ticket in Customer Portal	Subscriber	Service Provider	Subscriber opens quality problem ticket in customer portal.
Report Performance in Customer Portal	SP	Subscriber	SP populates Customer Portal with near-real time service level Performance data.
Notify service affecting issue	SP	Subscriber	SP notifies Subscriber, perhaps via the Customer Portal, or via email, of a service affecting condition the SP or AP has detected.
Report resolution	SP	Subscriber	SP reports the quality problem resolution to the Subscriber.
Accept resolution	Subscriber	SP	Subscriber accepts the SP quality problem resolution and likely performs some level of their own testing to validate the issue resolution.
Close Ticket in Customer Portal	SP	Subscriber	Once Subscriber accepts the resolution, SP closes the open quality problem ticket in the Customer Portal.
Report Access Service Problem	SP	AP	SP notifies AP of a service-level quality problem with the Access Service.
Report Access Service Problem Resolution	AP	SP	AP reports the quality problem resolution to the SP
Accept Access Service Problem Resolution	SP	AP	SP accepts the AP quality problem resolution and likely performs some level of their own testing to validate the issue resolution.

Table 22 Service Quality Management Messages

## 8.8 Billing and Revenue Management

This section defines the Process Elements and Process Flow for the Billing and Revenue Management stage of the Service Operations Lifecycle. Note that the activities around setting up a billing account for a Subscriber and associating pricing to the Subscriber's products are established during Service Fulfillment, specifically in the "Manage Customer Billing" Process Element referenced in Figure 10.



**Figure 14 – Charging Process Flow**

The Process Flow in Figure 14 illustrates the activities involved in usage collection, billing event management and charging.

The collection of data and events relevant to resource and service usage information is performed by activities within the “Collect Management and Security Information & Data” Process Element. Usage data and events are then aggregated, formatted, and filtered by the “Process Management and Security Information & Data” Process Element, which identifies data and events relevant to billing and charging. This data and events

are then distributed to appropriate downstream processes by the “Distribute Management and Security Information & Data” Process Element.

Usage data is filtered to remove duplication, validated and correlated with services within the “Mediate Usage Records” Process Element. This process may receive usage information from the Access Provider in addition to usage records received directly from within the Service Provider.

The events represented by usage and network events are then associated with customer and product information within the “Guide Billing Events” Process Element. The resultant billing events are then enriched with pricing information from product and customer data in the “Enrich Billing Events” Process Element. This is followed by “Mediate Billing Events” which performs any reformatting of data necessary prior to rating operations.

Processing within “Aggregate Items for Charging” allows usage to be aggregated (if necessary) and the aggregated items used as a basis for rating or discounts. “Perform Rating” calculates the value of each product, with discounts applied by “Apply Rate Level Discounts”.

This overall sequence of operations provides the information set upon which Billing will operate.

Table 23 introduces the Process Elements used in the Charging Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Perform Rating	1.1.1.13.1	No	Calculating the value of the service/product, before, during or after the rendering of the service.
Apply Rate Level Discounts	1.1.1.13.2	No	Applies discounts to product prices
Aggregate Items for Charging	1.1.1.13.3	No	Manages the accumulation of items that may be used in the selection of a value or in calculation of a rate/discount.
Enrich Billing Events	1.1.1.14.1	No	Enrich billing event records with additional data.
Guide Billing Events	1.1.1.14.2	No	Ensures that the event records used in the billing processes are related to the correct customer billing account and subscribed products.
Mediate Billing Events	1.1.1.14.3	No	Edits and reformats data for recipient applications.
Collect Management and Security Information & Data	1.1.3.5.1	No	Collection of management and security information and data records from resource and service instances and other enterprise processes
Process Management and Security Information & Data	1.1.3.5.2	No	Process the management and security information and/or data into a form suitable for the intended recipient processes, resource instances or service instances
Distribute Management and Security Information & Data	1.1.3.5.3	No	Distribute processed management and security information and/or data to resource instances, service instances or other processes within the enterprise for further analysis and/or reporting.
Mediate Resource Usage Records	1.1.3.6.1	No	Validate, normalize, convert and correlate usage records collected from the network.

**Table 23 Usage, Billing Event Collection and Charging Process Elements**

Table 24 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Usage Records	Access Provider	Service Provider	Access Provider sends relevant Usage Records to the Service Provider.

Table 24 Charging Messages

This section defines the Process Elements and Process Flow for the Customer Billing and Payment stage of the Service Operations Lifecycle.

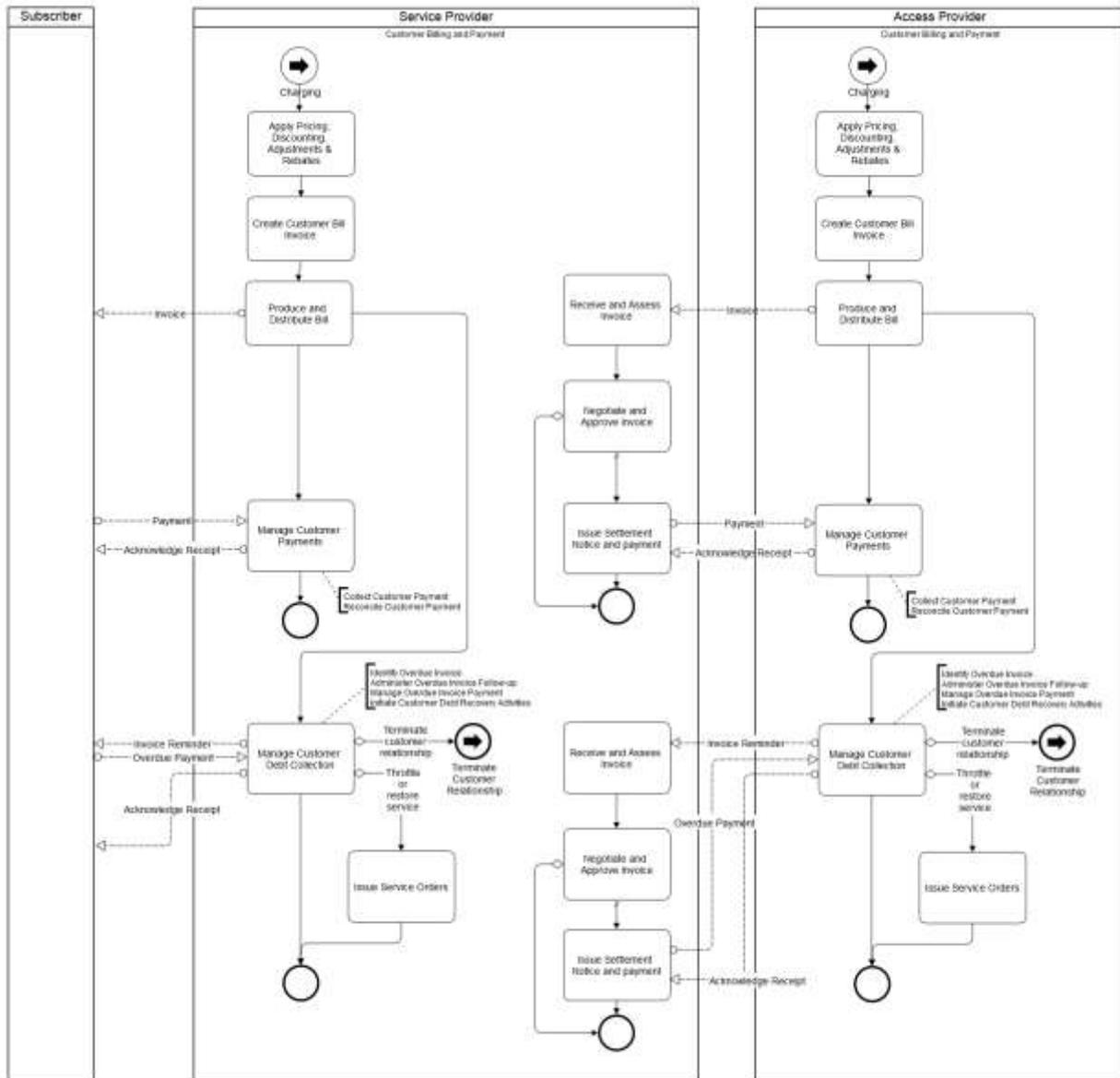


Figure 15 – Subscriber Billing and Payment Process Flow

The Process Flow in Figure 15 illustrates the activities involved in generating Subscriber bills and payment collection.

At an appropriate time, as determined by the contract between the Service Provider and the Subscriber, the Service Provider shall determine all the relevant items for inclusion in the Subscriber bill within the “Apply Pricing, Discounting, Adjustments & Rebates” Process Element. These are used to generate the Subscriber invoice within the “Create Customer Bill Invoice” Process Element. The invoice is then converted into the relevant customer-friendly format (hard-copy, email, etc) and provided to the Subscriber by the processes within the “Produce and Distribute Bill” Process Element.

Payments made by the Subscriber are collected, recorded, applied to the Subscriber account and acknowledged by the processes within the “Manage Customer Payments” Process Element.

Subscriber late-, partial- or non-payment are identified and appropriate decisions made on how to handle this within the “Manage Customer Debt Collection” Process Element. These decisions might include the issuing of reminder notifications to the Subscriber, agreeing and establishing a repayment schedule, throttling the services used by the customer (e.g., by reducing the agreed bandwidths or QoS parameters), or initiating more formal debt recovery activities. Should a decision to throttle the Subscriber service be made, then this is managed and executed by the processes within the “Issue Service Orders” Process Element; a subsequent Subscriber payment may result in a decision to fully or partially restore the service, when again the same “Issue Service Orders” Process Element is used to manage and execute this.

As an ultimate decision to handle late- or non-payment by the Subscriber, the relationship may be terminated, following the processes defined in the “Terminate Customer Relationship” section below

When the Service Provider receives a bill from an Access Provider (that is, when the Service Provider is a Subscriber of the Access Provider), the Service Provider will assess the correctness of the received bill using the processes defined in the “Receive and Assess Invoice” Process Element. Any issues, questions or clarifications resulting from this are resolved with the Access provider in the “Negotiate and Approve Invoice” Process Element. Should the Service Provider agree to pay the bill, then this is accomplished by the processes within the “Issue Settlement Notice & Payment” Process Element.

Table 25 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Apply Pricing, Discounting, Adjustments & Rebates	1.1.1.10.1	No	Ensure that the bill invoice is reflective of all the commercially agreed billable events and any bill invoice adjustments agreed between a Service Provider and the customer
Create Customer Bill Invoice	1.1.1.10.2	No	Production of a timely and accurate invoice in accordance with the specific billing cycles and reflective of the final charges for services, together with any adjustments, delivered to the customer by the Service Provider and respective trading partners.
Produce and Distribute Bill	1.1.1.10.3	No	Physical production and distribution of bills to customers in accordance with the specified billing cycle.
Manage Customer Payments	1.1.1.11.2	No	Collect payments made by the customer and reconcile the payments to the invoices.
Manage Customer Debt Collection	1.1.1.11.3	No	Collect past due payments from the customer.
Issue Service Orders	1.1.2.2.7	No	Issue correct and complete service orders (throttle or restore services to reflect Subscriber non-payment status)
Receive and Assess Invoice	1.1.4.5.2	No	Receive & Assess Invoice processes compare invoices against usage records and offsets, and manage the interactions between the supplier/partner and the enterprise to confirm usage records and resolve account differences.
Negotiate and Approve Invoice	1.1.4.5.3	No	Negotiate & Approve Invoice processes manage the interactions between the supplier/partner and the enterprise, in relation to enquiries about the billing account, handling disputes and any subsequent negotiations.
Issue Settlement Notice and payment	1.1.4.5.4	No	Confirm the payment of the Access Providers' bills, arranges for the appropriate transfer of monies from the Service Provider to the Access Provider, and confirm receipt by the Access Provider

Table 25 Subscriber Billing and Payment Process Elements

Table 26 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Invoice	Service Provider	Subscriber	The statement of monies due to the Service Provider for the supplied services
Payment	Subscriber	Service Provider	The transfer of funds from the Subscriber to the Service Provider to settle the issued Invoice
Acknowledge Receipt	Service Provider	Subscriber	Confirmation of receipt by the Service Provider of the Payment made by the Subscriber
Invoice Reminder	Service Provider	Subscriber	A reminder from the Service Provider to the Subscriber of the monies due for the supplied services
Overdue Payment	Subscriber	Service Provider	The transfer of funds after the expected date from the Subscriber to the Service Provider to settle the issued Invoice
Invoice	Access Provider	Service Provider	The statement of monies due to the Access Provider for the supplied services
Payment	Service Provider	Access Provider	The transfer of funds from the Service Provider to the Access Provider to settle the issued Invoice
Acknowledge Receipt	Access Provider	Service Provider	Confirmation of receipt by the Access Provider of the Payment made by the Service Provider
Invoice Reminder	Access Provider	Service Provider	A reminder from the Access Provider to the Service Provider of the monies due for the supplied services
Overdue Payment	Service Provider	Access Provider	The transfer of funds after the expected date from the Service Provider to the Access Provider to settle the issued Invoice

**Table 26 Subscriber Billing and Payment Messages**

## 8.9 Terminate Customer Relationship

This section defines the Process Elements and Process Flow for the Terminate Customer Relationship stage of the Service Operations Lifecycle. Figure 16 illustrates the Process Flow for the Terminate Customer Relationship stage.

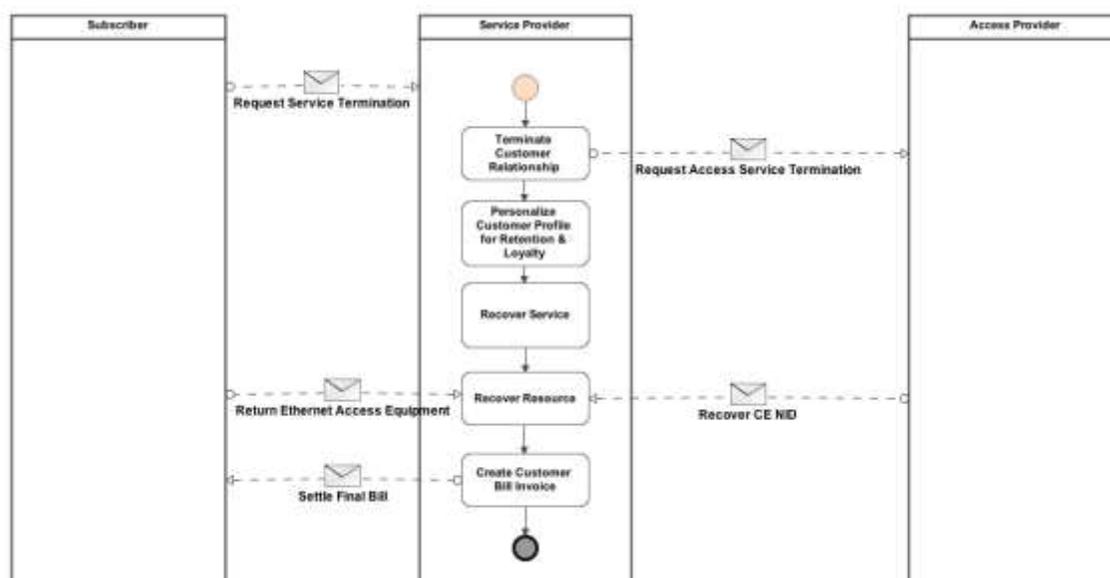


Figure 16 – Terminate Customer Relationship Process Flow

The Process Flow in Figure 16 illustrates the collaboration between the Service Provider and Access Provider business entities through a set of messages over an interface. The same relationship is shown between the Subscriber and the Service Provider. Both the Subscriber and Access Provider process Pools are shown empty to indicate they are treated as black boxes. The only interest is with the Service Provider's interface to each of these actors. The Subscriber initiates the Process Flow by submitting a request to the Service Provider to cancel their service subscription. This might be through an automating on-line system or over the phone. The Process Elements are shown in the Service Provider Pool to illustrate the activities that occur within the Service Provider's business enterprise. Each Process Element is described in Table 2. Since this scenario assumes an Access Service is part of the overall end-to-end service provided to the Subscriber, the Service Provider must initiate an Access Service termination request with the Access Provider. When the Service Provider needs to recover the resources or network element from the Customer Premises, there is another interface with both the Subscriber and Access Provider. The Service Provider may request the Subscribers in their geographical footprint to return the devices to a local customer service center. The Service Provider may request the Access Provider to collect the SP-owned devices via a similar method, or a method the AP has defined. Finally, the Service Provider settles the final bill with the Subscriber through the interface between those two actors, perhaps via an automated billing system.

Table 27 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font.

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Create Customer Bill Invoice	1.1.1.10.2	No	Produce the final bill for service delivered to customer
Personalize Customer Profile for Retention & Loyalty	1.1.1.16.1.3	No	Collection of Personalization information to win back lost customers
Terminate Customer Relationship	1.1.1.16.4	No	Customer relationship is terminated with appropriate records retained.
Recover Service	1.1.2.2.10	No	Recover specific services that are no longer required by customers
Recover Resource	1.1.3.2.9	No	Recover specific resources that are no longer required

**Table 27 Terminate Customer Relationship Process Elements**

Table 28 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Request Service Termination	Subscriber	Service Provider	Customer submits request to cancel their service.
Request Access Service Termination	SP	AP	SP submits request to cancel Access Service with AP.
Recover CE NID	SP	AP	SP recovers the Ethernet access equipment from Subscriber locations in AP footprint.
Return Ethernet Access Equipment	Subscriber	SP	Subscriber returns SP-owned Ethernet access equipment to SP.
Settle Final Bill	SP	Subscriber	SP sends out final bill for service.

**Table 28 Terminate Customer Relationship Messages**

## 9. References

- [1] Business Process Framework (eTOM), Extended Process Decompositions and Descriptions, GB921 Addendum DX, Business Process Framework Release 14.5.0, November 2014
- [2] MEF 6.2, EVC Ethernet Services Definitions Phase 3, August 2014.

- [3] MEF 12.1, Carrier Ethernet Network Architecture Framework Part 2: Ethernet Services Layer – Base Elements, April 15, 2010.
- [4] MEF 26.1, External Network Network Interface (ENNI) – Phase 2, January 2012.
- [5] MEF 33, Ethernet Access Services Definition, January 2012.
- [6] MEF 48, Carrier Ethernet Service Activation Testing (SAT), October 2014.
- [7] TM Forum Guide Book, Business Process Framework Concepts and Principles, GB921CP, Business Process Framework Release 13.0, August 2013.
- [8] Business Process Framework (eTOM), Business Process Framework Primer, GB921 Addendum P, Release 14.5.0, November 2014.
- [9] Business Process Model Notation (BPMN), Version 2.0, Object Management Group, January 2011.

## **10. Acknowledgements**

This document was prepared by contributions from the following members of the MEF Service Operations Committee:

- Brian Hedstrom, MEF (Co-editor)
- Glenn Swanson, Oracle (Co-editor)
- Janet Lawrie, Allstream
- August-Wilhelm Jagau, Ericsson
- Dawn Kaplan, Ericsson
- Bruno Giguere, EXFO
- Ralph Santitoro, Fujitsu
- Stephen Connor, Oracle
- Shahar Steiff, PCCW Global

## Appendix I BPMN Collaboration Diagram Conventions (Informative)

This Appendix contains an illustrative description of the conventions used in the BPMN collaboration diagrams. BPMN collaboration diagrams capture interactions between entities (e.g., Subscriber, Service Provider, and Access Provider) as well as business process flows occurring within each entity (e.g., Service Provider). Figure 17 illustrates the conventions of an example BPMN collaboration diagram used in this document.

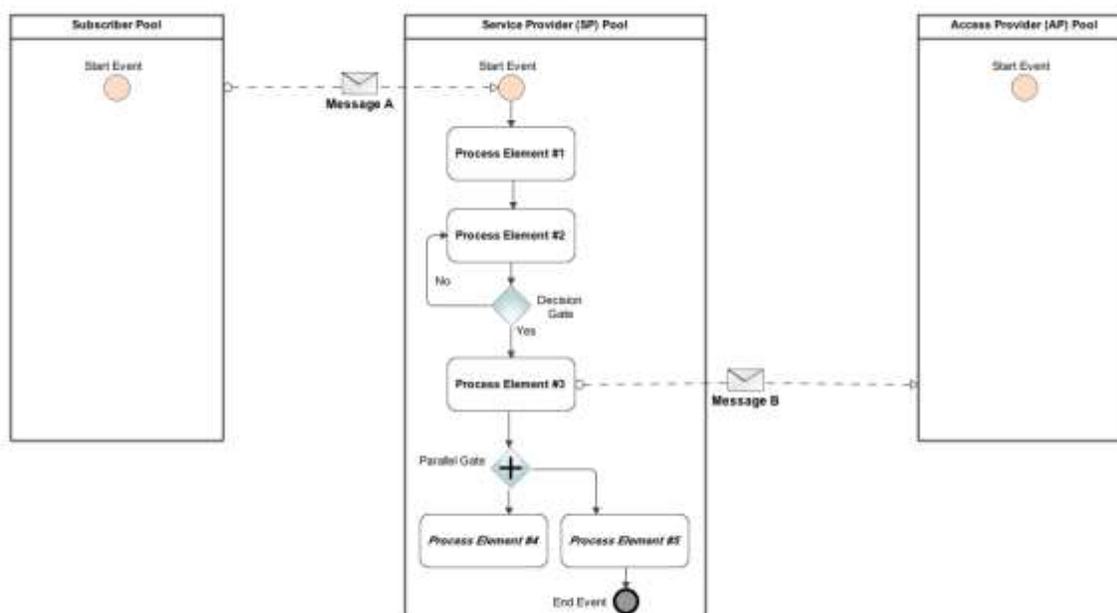


Figure 17 – Process Flow Diagram Conventions

The BPMN collaboration diagram, or Process Flow diagram, shows the interaction of the Subscriber, SP and AP entities. Each entity is represented by its “Pool”. Process Flows for each entity are shown within the respective pools as shown for the SP in Figure 17. Interactions between entities are shown using messages, such as Messages A and B in the figure. Processes that occur inside the business entity are defined using rectangular boxes and represent Process Elements (Process Elements 1-5 are defined for the SP in the figure). A diamond represents a decision gate where the process flow can take two different paths based on the decision. A diamond with a plus sign represents a parallel gate where the process flow splits into two flows.

Table 29 introduces the Process Elements used in the Process Flow and identifies those that are defined in [1] by listing the TMF eTOM Process Identifier. If a Process Element has not been defined within eTOM, the level is listed as N/A and the Process Element name in the Process Flow is shown in italic font. The Carrier Ethernet Extension column indicates if the eTOM Process Element is being extended uniquely for Carrier Ethernet beyond the generalized approach for eTOM Process Elements and Process Flows being applied to the Carrier Ethernet services (e.g., in the context of this paper, all Process Elements and Process Flows are being extended to Carrier Ethernet services).

Process Element	TMF eTOM Identifier	Carrier Ethernet Extension?	High Level Description
Process Element #1	u.v.w.x	No	Process Element #1 description from TM Forum eTOM.
Process Element #2	u.v.w.x.y	No	Process Element #2 description from TM Forum eTOM.
Process Element #3	u.v.w.x.y.z	Yes	Process Element #3 description from TM Forum eTOM plus Carrier Ethernet extension.
Process Element #4	N/A	Yes	Process Element #4 description for Carrier Ethernet.
Process Element #5	N/A	Yes	Process Element #5 description for Carrier Ethernet.

**Table 29 Process Elements Convention Table**

Table 30 introduces the messages used in the Process Flow and identifies the originator and receiver of the message along with the behavior of the message sequence.

Message	Originator	Receiver	High Level Description
Message A	Subscriber	Service Provider	Subscriber initiates an interaction with SP.
Message B	SP	AP	SP initiates an interaction with AP.

**Table 30 Messages Convention Table**