Working Draft
Mplify W133.1 Draft (R2)

Allegro, Interlude and Legato Fault Management and Performance Monitoring Business Requirements &Use Cases

July 2025

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1 List of Contributing Members

The following members of Mplify participated in the development of this document and have requested to be included in this list.

2 Abstract

This document defines the Business Requirements and Use Cases to support Performance Monitoring at the Allegro, Interlude and Legato Interface Reference Points (IRPs). The requirements and use cases contained in this document support Service Performance and Fault Management. Information contained within this specification will be utilized by both the Buyer/Client and Seller/Server for the development of a suite of automated APIs based interaction.

3 Release Notes

This document is still under review and is subject to change.

4 Terminology and Abbreviations

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 Mplify or external documents.

Term	Definition	Reference
API	Application Programming Interface	MEF 55.1 [6]
TCA	Threshold Crossing Alert	This document.
UBC(k)	Upper Bin Count (k)	MEF 35.1 [4]

Table 1 - Abbreviations

Term	Definition	Reference
Alarm	A specific type of notification concerning detected faults or abnormal conditions.	ITU - T M.3703
Alert	Synonymous to *Alarm* in the scope of this document	This document.
Application Programming Interface	In the context of LSO, API describes one of the Management Interface Reference Points based on the requirements specified in an Interface Profile, along with a data model, the protocol that defines operations on the data and the encoding format used to encode data according to the data model.	MEF 55.1 [6]
Event	A specific occurrence or a change in state that is noteworthy to the system administrator.	ITU - T Rec. X.734 [10]
Message	Typically defined as a unit of information exchanged between components or services in a distributed system. In context of this standard, we scope this definition to aa unit of information, that is a manifestation on an event, exchanged between producer and consumer using event drive architectural pattern.	This document
Notification	In general, a mechanism used to inform the recipient about certain event in the system. In context of this document notification is a synchronous communication from the observed system towards recipient.	This document.
On - Demand	FM/PM Job actions that are initiated for a limited time to carry out the FM/PM Job or measurements.	This document.
Passive	PM/FM Job action to support the collection and reporting of network and service statistics/faults. The statistics collections include but are not limited to telemetry associated with an interface, (Net/Application) Flow, VLAN, bridging/Ethernet, IP, TCP, UDP layers.	This document.
PM Metric	A metric that is measured or calculated as a part of Performance Monitoring.	MEF 105 [7]

Term	Definition	Reference
Proactive	FM/PM Job actions that are carried on continuously to permit timely reporting of fault and/or performance status.	This document.
Threshold Crossing Alert	Mechanism used to monitor and notify when specific thresholds or performance limits are exceeded or crossed	This document.
Use Case	A Use Case within a UML represents one a system's behavior based on stimuli from an external source (i.e., an actor). A system may have several Use Cases that define all its behavior.	OMG [8]

298 **Table 2 - Terminology**

5 Compliance Levels

The key words "**MUST**", "**MUST NOT**", "**REQUIRED**", "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**NOT RECOMMENDED**", "**MAY**", and "**OPTIONAL**" in this document are to be interpreted as described in BCP 14 (RFC 2119 [1], RFC 8174 [2]) when, and only when, they appear in all capitals, as shown here. All key words must be in bold text.

Items that are **REQUIRED** (contain the words **MUST** or **MUST NOT**) are labeled as **[Rx]** for required. Items that are **RECOMMENDED** (contain the words **SHOULD** or **SHOULD NOT**) are labeled as **[Dx]** for desirable. Items that are **OPTIONAL** (contain the words **MAY** or **OPTIONAL**) are labeled as **[Ox]** for optional**.**

A paragraph preceded by **[Cra]<** specifies a conditional mandatory requirement that **MUST** be followed if the condition(s) following the "<" have been met. For example, "**[CR1] <** [D38]" indicates that Conditional Mandatory Requirement 1 must be followed if Desirable Requirement 38 has been met. A paragraph preceded by **[CDb]<** specifies a Conditional Desirable Requirement that **SHOULD** be followed if the condition(s) following the "<" have been met. A paragraph preceded by **[Coc]<** specifies a Conditional Optional Requirement that **MAY** be followed if the condition(s) following the "<" have been met.

6 Numerical Prefix Conventions

This document uses the prefix notation to indicate multiplier values as shown in Table 3.

Decimal		**Binary**	
Symbol	**Value**	**Symbol**	**Value**
k	10^3	Ki	2^{10}
M	10^6	Mi	2^{20}
G	10^9	Gi	2^{30}
T	10^{12}	Ti	2^{40}
P	10^{15}	Pi	2^{50}
E	10^{18}	Ei	2^{60}
Z	10^{21}	Zi	2^{70}
Y	10^{24}	Yi	2^{80}

Table 3 - Numerical Prefix Conventions

7 Scope

This specification defines the process in multiple functional areas at the Allegro, Interlude and Legato Interface Reference Points (IRPs). The use cases detailed in this document are intended to support all network services including, but not limited to Carrier Ethernet, IP/IPVPN, SD - WAN and L1CS.

The scope of the project for the initial release is the ability for Seller/Server system to perform the lifecycle management operations in each of the functional areas specified above. The following Use Case categories are included in the scope of this specification:

- Fault Management
- Performance Monitoring Profile Management
- Performance Monitoring Jobs, Notifications and Collection
- Passive Statistics Collection
- Threshold Crossing Alert Profile Management
- Alarm Management
- Streaming Management

Note: TCA Threshold Values are not set via the API. They are configured by the Seller and TCAs are subscribed to by the Buyer.

8 Introduction

The requirements and use cases are the same for the Allegro, Interlude and Legato Interface Reference Point (IRPs). There are no differences identified within this document between them. The requirements and Use Cases within this document will be used to develop an API specification and Developer's Guide.

NOTE: The use cases and business requirements in this document assume a two - actor relationship based on the set of actors in the LSO architecture. The names of the relationship are specific to the Interface Reference Point. For both Allegro and Interlude there is a Buyer and Seller. For Allegro the Buyer is the Customer and the Seller is the Service Provider. For Interlude the Buyer is the Service Provider and the Seller is the Partner. In the case of the Legato IRP, given this is within a single Service Provider or Partner, the relationship is Client and Seller/Server, where the Business Application (BA) is the Client, and the Service Orchestration Functionality (SOF) is the Seller/Server.

These Use Cases are intended to allow the Buyer/Client to perform tasks related to SOAM including receiving alarms and warnings, creating on - demand and proactive FM/PM Jobs, retrieving FM/PM results for the Jobs, and receiving notifications when FM/PM results are available.

Fault Management

- Fault Job
  - Buyer/Client requested Fault Job.
  - Buyer/Client Modify Fault Job
  - Buyer/Client Cancel Fault Job
  - Buyer/Client Suspend Fault Job
  - Buyer/Client Resume Fault Job
- Fault Notifications
  - Buyer/Client Subscription to Fault Job Notifications.
  - Seller/Server generation of Fault Job Notifications.
- Fault Management Results
  - Buyer/Client retrieves FM Job results in one of two formats as indicated in the request.
  - Results are in the API.
  - Results are in a referenced file.

- Buyer/Client retrieves a list of Fault Management Jobs that have results using filter criteria.

Performance Monitoring

- Performance Monitoring Profiles
  - Buyer/Client requests Performance Monitoring Profile creation, modification, and deletion.
  - Seller/Server notifies the Buyer/Client when Performance Monitoring Profile changes occur.
- On - Demand Performance Monitoring
  - Buyer/Client requests On - Demand Performance Monitoring Job for a given service including all attributes of the Job.
  - Buyer/Client requests modification of an On - Demand Performance Monitoring Job for a given service including all modified attributes of the Job.
  - Buyer/Client requests cancellation of an On - Demand Performance Monitoring Job for a given service .
  - Buyer/Client requests suspension of an On - Demand Performance Monitoring Job for a given service.
  - Buyer/Client requests resumption of an On - Demand Performance Monitoring Job for a given service.
  - Seller/Server notifies the Buyer/Client when results of the PM Job are ready.
  - Buyer/Client retrieves a list of Performance Monitoring Jobs.
  - Buyer/Client retrieves a Performance Monitoring Job by Performance Monitoring Job ID.
- Proactive Performance Monitoring
  - Buyer/Client requests a Proactive Performance Monitoring Job for a given service including all attributes of the Job.
  - Buyer/Client requests modification of an Proactive Performance Monitoring Job for a given service including all modified attributes of the Job
  - Buyer/Client requests cancellation of a Proactive Performance Monitoring Job for a given service.

- Buyer/Client requests suspension of a Proactive Performance Monitoring Job for a given service.
- Buyer/Client requests resumption of a Proactive Performance Monitoring Job for a given service.
- Seller/Server notifies Buyer/Client when results of the Performance Monitoring Job are ready.
- Buyer/Client retrieves a list of Performance Monitoring Jobs.
- Buyer/Client retrieves a Performance Monitoring Job by Performance Monitoring Job ID.

- Passive Statistics Monitoring
  - Buyer/Client requests a Passive Statistics Monitoring Job for a given service including all attributes of the Job.
  - Buyer/Client requests a modification to a Passive Statistics Monitoring Job for a given service including all attributes of the Job.
  - Buyer/Client requests a cancellation of a Passive Statistics Monitoring Job for a given service.
  - Buyer/Client requests a Passive Statistics Monitoring Job is suspended.
  - Buyer/Client requests a Passive Statistics Monitoring Job is resumed.
  - Seller/Server notifies Buyer/Client when results of the Passive Monitoring Statistics Collection is ready.
  - Buyer/Client retrieves a Passive Statistics Job by Passive Statistics Job ID.
- Performance Monitoring Job Notifications
  - Buyer/Client subscription/unsubscription to PM Job Notifications.
  - Seller/Server generation of PM Job Notifications.
- Performance Monitoring Reports
  - Buyer/Client retrieves a list of Performance Monitoring Reports.
  - Buyer/Client retrieves PM Reports in one of four (*JSON XML, AVRO, CSV*) formats as indicated in the PM Job request.
  - Results are in the API as payload, or retrieved as an attachment in a form of a Url to an external file.

- Buyer/Client subscribes to streaming Performance Monitoring.
- Buyer/Client receives streaming Performance Monitoring data where Seller/Server make it available to the agreed streaming topic.

9 Use Cases Summary

The following section provides a use case summary with use case name, use case description and corresponding reference section where detailed use case procedures are provided. All of these use cases are mandatory.

UC #	Use Case Name	Use Case Description	Reference Section
	Fault Management Use Cases		
1	Create Fault Management Job	A request is initiated by the Buyer/Client to perform a FM Job on a Service.	10.1.1
2	Modify Fault Management Job	A request is initiated by the Buyer/Client to modify a FM Job on a Service.	10.1.2
3	Cancel Fault Management Job	A request is initiated by the Buyer/Client to cancel an existing FM Job on a Service.	10.1.3
4	Suspend Fault Management Job	A request is initiated by the Buyer/Client to suspend an existing FM Job on a Service.	10.1.4
5	Resume Fault Management Job	A request is initiated by the Buyer/Client to resume a suspended existing FM Job on a Service.	10.1.5
6	Retrieve List of Fault Management Jobs	A request initiated by the Buyer/Client to retrieve a list of Fault Management Jobs.	10.1.6
7	Retrieve Fault Management Job by ID	A request initiated by the Buyer/Client to retrieve details on a specified Fault Management Job	10.1.7
8	Subscribe to Fault Management Job Notifications	A request is initiated by the Buyer/Client to subscribe to notifications for an existing FM Job on a Service.	10.1.8
9	Generation of Fault Management Job Notifications	The Seller/Server generates and sends FM Job	10.1.9

UC #	Use Case Name	Use Case Description	Reference Section
		Notifications to subscribed Buyer/Client.	
10	Unsubscribe from Fault Management Job Notifications	A request is initiated by the Buyer/Client to unsubscribe from FM Job Notifications.	10.1.10
11	List Fault Management Reports	A request initiated by the Buyer/Client to the Seller/Server to list the Fault Measurement Reports based on filtered criterion.	10.1.11
12	Collect Fault Management Report	A request initiated by the Buyer/Client to the Seller/Server to collect a Fault Measurement Report.	10.1.12
Performance Monitoring Profiles Use Cases			
13	Create Performance Monitoring Profile	A request initiated by the Buyer/Client to the Seller/Server to create a PM Profile.	11.1.1
14	Retrieve Performance Monitoring Profile List	A request initiated by the Buyer/Client to the Seller/Server to retrieve a list of PM Profiles.	11.1.2
15	Retrieve Performance Monitoring Profile by Identifier	A request initiated by the Buyer/Client to the Seller/Server to retrieve a PM Profile.	11.1.3
16	Modify Performance Monitoring Profile	A request initiated by the Buyer/Client to the Seller/Server to modify a PM Profile.	11.1.4
17	Delete Performance Monitoring Profile	A request initiated by the Buyer/Client to the Seller/Server to delete a PM Profile.	11.1.5
18	Subscribe to Performance Monitoring Profile Notifications	A request initiated by the Client to the Seller/Server to subscribe to PM Profile Notifications.	11.1.6

UC #	Use Case Name	Use Case Description	Reference Section
19	Performance Monitoring Profile Notification	A PM Profile Notification is initiated by the Seller/Server to a subscribed Buyer/Client.	11.1.7
20	Unsubscribe from Performance Monitoring Profile Notifications	A request initiated by the Buyer/Client to unsubscribe from PM Profile Notifications.	11.1.8
Performance Monitoring Job, Collection and Notifications Use Cases			
21	Create Performance Monitoring Job	A request initiated by the Buyer/Client to create a PM Job.	11.2.1
22	Modify Performance Monitoring Job	A request initiated by the Client to the Seller/Server to modify a PM Job.	11.2.2
23	Cancel Performance Monitoring Job	A request initiated by the Client to the Seller/Server to cancel a PM Job.	11.2.3
24	Suspend Performance Monitoring Job	A request initiated by the Client to the Seller/Server to suspend a PM Job.	11.2.4
25	Resume Performance Monitoring Job	A request initiated by the Client to the Seller/Server to resume a PM Job.	11.2.5
26	Retrieve Performance Monitoring Job List	A request initiated by the Buyer/Client to retrieve a PM Job List based on a filtered criterion.	11.2.6
27	Retrieve Performance Monitoring Job by ID	A request initiated by the Buyer/Client to retrieve a PM Job based on a unique identifier, ID.	11.2.7
28	Subscribe to Performance Monitoring Job/Collection Notifications	A request initiated by the Buyer/Client to subscribe to PM Job/Collection Notifications.	11.2.8
29	Unsubscribe from Performance Monitoring Job/Collection Notifications	A request initiated by the Buyer/Client to unsubscribe from PM Job/Collection Notifications.	11.2.9

UC #	Use Case Name	Use Case Description	Reference Section
30	Performance Monitoring Job/Collection Notification	A PM Job/Collection Notifications is initiated by the Seller/Server to a subscribed Buyer/Client.	11.2.10
31	List Performance Measurement Reports	A request initiated by the Buyer/Client to the Seller/Server to list the Performance Measurement Reports based on a filtered criterion.	11.2.11
32	Collect Performance Measurement Report	A request initiated by the Buyer/Client to the Seller/Server to collect a Performance Measurement Report.	11.2.12
Passive Performance Monitoring Job			
36	Create Passive Performance Monitoring Job	A request initiated by the Buyer/Client to create a Statistics Collection Job.	12.1.1
37	Modify Passive Performance Monitoring Job	A request initiated by the Buyer/Client to the Seller/Server to modify a Passive PM Job.	12.1.2
38	Cancel Passive Performance Monitoring Job	A request initiated by the Client to the Seller/Server to cancel a Statistics Collection Job.	12.1.3
39	Suspend Passive Performance Monitoring Job	A request initiated by the Client to the Seller/Server to suspend a Passive PM Job.	12.1.4
40	Resume Passive Performance Monitoring Job	A request initiated by the Client to the Seller/Server to resume a Passive PM Job.	12.1.5
41	Retrieve List of Passive PM Jobs	A request initiated by the Buyer/Client to retrieve a Passive PM Job List based on a filtered criterion.	12.1.6
42	Retrieve Passive PM Job by Identifier	A request initiated by the Buyer/Client to retrieve a Passive PM Job based	12.1.7

UC #	Use Case Name	Use Case Description	Reference Section
		on a unique identifier, ID.	
43	List Passive Statistics Reports	A request initiated by the Buyer/Client to the Seller/Server to list the Passive Statistics Reports based on a filtered criteria.	12.1.8
44	Collect Passive Statistics Reports	A request initiated by the Buyer/Client to the Seller/Server to collect a Statistics Collection Report.	12.1.9
45	Subscribe to Passive PM Job Notifications	A request is initiated by the Buyer/Client to subscribe to Passive PM Job Notifications.	
46	Unsubscribe to Passive PM Job Notifications	A request is initiated by the Buyer/Client to unsubscribe to Passive PM Job Notifications.	
47	Generate Passive PM Job Notifications	The Seller/Server generates and sends Passive PM Job Notifications to subscribed Buyer/Client.	
Streaming (Topics) Use Cases			
41	Retrieve Topic by Identifier	A request is initiated by the Buyer/Client to retrieve a Topic that match the provided filter criteria.	13.2.1
42	Retrieve Available Topic List	A request is initiated by the Buyer/Client (Subscriber) to retrieve a Topic list.	13.2.2
43	Retrieve Subscribed Topic List	A request is initiated by the Buyer/Client (Subscriber) to retrieve a Topic list which the Subscriber is currently subscribed.	13.2.3
Subscriber/Publisher Streaming Use Cases			

UC #	Use Case Name	Use Case Description	Reference Section
44	Subscribe to Topic	A request is initiated by the Buyer/Client (Subscriber) to subscribe to a Topic.	13.2.4
45	Unsubscribe from a Topic	A request is initiated by the Buyer/Client (Subscriber) to unsubscribe from a Topic.	13.2.5
46	Publish Topic Message	A Seller/Server (Publisher) publishes a Topic/Message to Buyers/Sellers (Subscriber(s)).	13.2.6
47	Retrieve Topic/Messages	A Buyer/Client retrieves the Topic/Message that it is subscribed to.	13.2.7
Alarm Management Use Cases			
48	Send Alarm Notification	A request is made by Seller/Server to create an Alarm based on an event. This is optional.	14.1.1
49	Retrieve Alarm List	A request is initiated by the Buyer/Client to retrieve a list of Alarms. This is optional.	14.1.2
50	Retrieve Alarm by Identifier	A request is initiated by the Buyer/Client to retrieve an identified Alarm. This is optional.	14.1.3
51	Subscribe to Alarms	A request initiated by the Buyer/Client to the Seller/Server to subscribe to Alarms.	14.1.4
52	Unsubscribe from Alarms	A request initiated by the Client to unsubscribe from Alarms.	14.1.5
53	Stateful TCA Notifications	A TCA lifecycle Notification is initiated by the Seller/Server to a subscribed Client.	14.1.6

UC #	Use Case Name	Use Case Description	Reference Section
54	Stateless TCA Notifications	A TCA lifecycle Notification is initiated by the Seller/Server to a subscribed Client.	14.1.7
Retrieve PM Data from PM Database			
55	Retrieve PM Data from PM Database	A request initiated by the Buyer/Client to retrieve PM data from a database that contains PM data.	15

439 **Table 4 - Use Case Summary**

10 Fault Management Use Cases

This section provides a comprehensive set of Use Cases needed to support Fault Management Job. These Use Cases are based on business process standards of interactivity between Client and Seller/Server.

10.1 Fault Management Job, Collection and Notification Use Cases

The Buyer/Client can request that the Seller/Server perform FM Job on a Service. Examples of FM Job are Link Trace or Loopback using FM protocols (i.e., BFD, Y.1731). A FM Job will typically run as part of a troubleshooting or diagnostic process. The following sub - section defines use cases for the Fault Management Job. Included are the ability for a client to initiate a Fault Management Job and retrieve the results of the Job. The use cases also provide the ability for the Client to subscribe and unsubscribe to Fault Management Notifications.

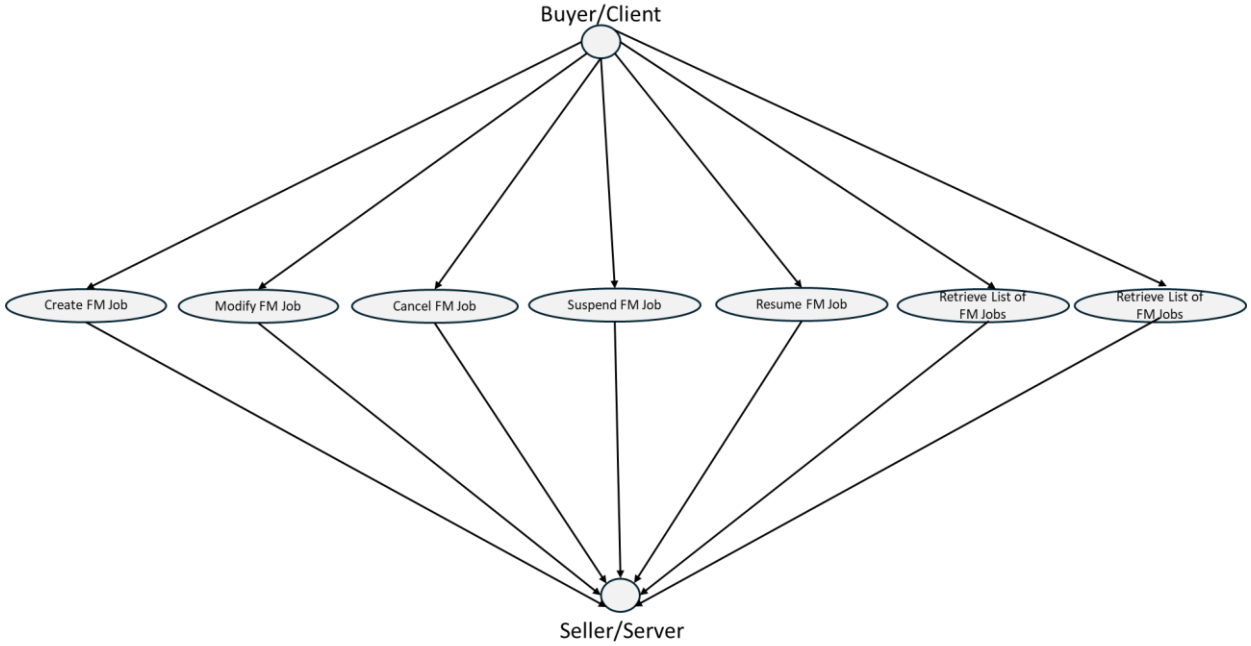
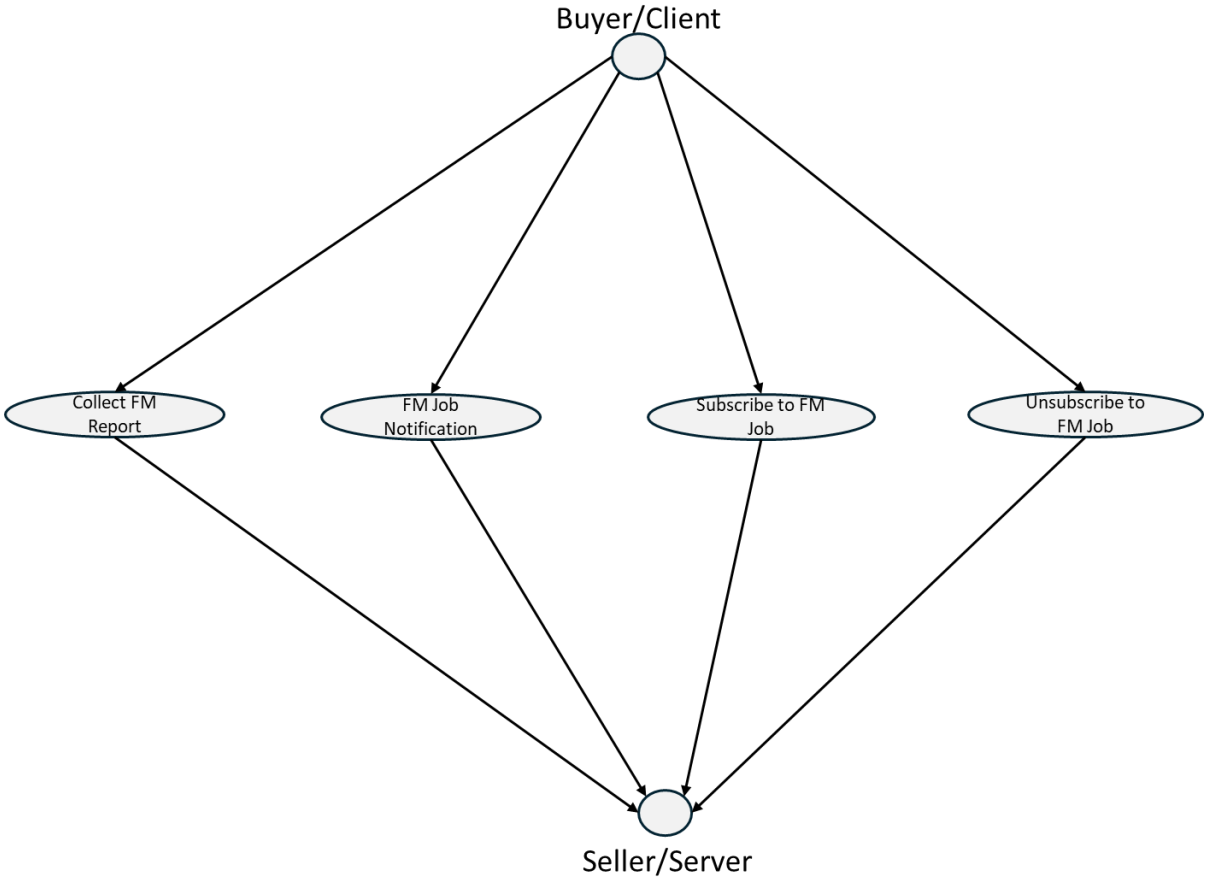


Figure 1 - Fault Management Job Use Cases



453

454 **Figure 2 - Fault Management Job Notification and Collection Use Cases**

455 ### 10.1.1 Create Fault Management Job Use Case

Field	Description
Use Case Number	1
Use Case Name	Create Fault Management Job
Description	A request is initiated by the Buyer/Client to perform a FM Job on a Service.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to request a FM Job on a Service in the Seller/Server system.

Field	Description
Process Steps	1. The Buyer/Client creates a FM Job request using the attributes show in Table FM Job Attribute. **[R1]** The Buyer/Client's Create FM Job request **MUST** contain the following attributes: • Job Type (On - Demand, Proactive, Passive) • Output Format • Granularity • Reporting Period • Result Format • Schedule Definition • Service Specific Configuration • Service ID, Service Pair, or Entity Reference **[O1]** The Buyer/Client's Create FM Job request **MAY** contain the following attributes: • Description • FM Job Priority 2. The Seller/Server responds with an acknowledgement and notifies the Buyer/Client when results are available. **[R2]** The Seller/Server sets the Creation Time and Job Identifier attribute. **[R3]** The Seller's/Server's response **MUST** echo back all Buyer/Client provided attributes. **[R4]** The FM Job Identifier supplied by the Seller/Server **MUST** be unique within the Seller/Server's network.
Post - Conditions	1. The Buyer/Client receives a Response, including a FM Job ID. 2. The Seller/Server initiates a FM Job. 3. If the Seller/Server supports notifications and the Buyer/Client has registered for notifications, the Seller/Server notifies the Buyer/Client of commitment to provide the request. 4. The Seller/Server notifies the Buyer/Client when Job results are available. **[R5]** If the Buyer/Client registered for FM Notifications, the Seller/Server **MUST** notify the Buyer/Client when FM Job results are available.

Field	Description
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while constructing and persistently storing the FM Job.

456 **Table 5 - Create FM Job Use Case**

Attribute Name	Description	Value	Comments
Description	A textual description of the FM Job	String	Set by Buyer/Client
Creation Time	Time the Job was created	String	Set by Seller/Server
FM Job Identifier	The identifier of the management Job.	String	Set by the Seller/Server
FM Job Priority	The priority of the management Job. The way the management application will use the Job priority to schedule Job execution is application specific and out the scope.	Integer	Set by the Buyer/Client The priority is on a 1 - 10 scale with 1 being highest priority and 10 being lowest priority
FM Job Type	The type of FM Job	One of : *On - Demand* *Proactive* *Passive*	
Last Time Modified	The last time a FM Job was modified.	Date - Time	Set by Seller/Server
Output Format	The format of the output report	One of the following: *JSON* *XML* *AVRO* *CSV*	Set by Buyer/Client
Result Format	List of possible result formats that define how Seller/Server will deliver Fault Report to the Buyer/Client	One of the following: *Payload* *Attachment*	Payload Output Format for *Payload* is always *JSON*
Service Payload Specific Attributes	Attributes that are obtained from the applicable Service definition.		Set by Buyer/Client
Granularity	The sampling rate of the collection of fault indicators.	See Table 27	Set by Buyer/Client

Reporting Period	The time - period for the report.	See Table 27	
Schedule Definition	The definition of schedule attributes	See Table 7	
State	State of FM Job.	See Table 87.	
Tracking Record	A list of tracking records. Tracking records allow the tracking of modifications on the Job. The tracking records should not be embedded in the Job to allow retrieving the Job without the tracking records.	See Table 9.	
Service ID	The Service ID at the To side of the Service.	String	
Service Pair	The Service ID at the From and To side of the Service.	String	
Entity Reference	The identifier of the Entity	String	

457 **Table 6 - Fault Management Job Attributes**

Attribute Name	Description	Value	Comments
Schedule Definition Start Time	The start time of the Schedule Definition.	String Format: Date – Time	Set by Buyer/Client
Schedule Definition End Time	The end time of the Schedule Definition. If the attribute is empty the Schedule runs forever, not having a time constraint.	String Format: Date - Time	Set by Buyer/Client
Recurring Schedule ~~Frequency~~	A recurring frequency to run a job within a day that is included in Schedule Definition, for example: every 5 minutes, 15 minutes, 30 minutes, 1 hour.	Recurring Schedule	Set by Buyer/Client
Execution Duration	Total time for running one execution of a schedule. Depending on the Reporting Period attribute, one execution of a schedule might produce multiple reports (e.g., when reporting period is 15 minutes and	Duration/Interval	Set by Buyer/Client

Attribute Name	Description	Value	Comments
	execution duration is 1 hour, every execution of a schedule will produce 4 reports)		

458 **Table 7 - Schedule Definition Attributes**

459

Attribute Name	Description	Value	Comments
Second	A definition of time (seconds) to run a job based on the Cron utility in Linux-like systems.	Allowed values: 0-59, and special characters: (,-*/), where: - `*` -> any value - `,` -> value list separator - `-` -> range of values - '/' -> step values For example: - */5 * * * * * -> run a job at every 5th second. - */30 */1 * * * * -> run a job at every 30 seconds past every minute.	Set by Buyer/Client
Minute	A definition of time (minutes) to run a job based on the Cron utility in Linux-like systems.	0 */10 * * * * -> run a job at every 10th minute.	Set by Buyer/Client
Hour	A definition of time (hours) to run a job based on the Cron utility in Linux-like systems.	0 0 10 10 * * -> run a job 10 am on 10th day of every month.	Set by Buyer/Client
Day of Month	A definition of time (day of month) to run a job based on the Cron utility in Linux-like systems.	0 0 0 1,5,10,15 * * -> run a job at midnight	Set by Buyer/Client
Month	A definition of time (month) to run a job based on the Cron utility in Linux-like systems.	0 5 0 * 8 * -> run a job at 00:05 on every day in August	Set by Buyer/Client
Day of Week	A definition of time (day of week) to run a job based on the Cron utility in Linux-like systems.	0 5 4 * * sun -> run a job at 04:05 on Sunday.	Set by Buyer/Client

Hour Range	A list of time ranges within a specific day that the schedule will be active on, for example, 08:00-12:00, 16:00-19:00.	String	Set by Buyer/Client

460 **Table 8 - Recurring Schedule Attributes**

461

Attribute Name	Description	Value	Comments
Description	Allow the tracking of modifications of Performance Job, Profile or Report.	String	Set by Seller/Server
Creation Date	Date when record was created.	String	Set by Seller/Server
Identifier	Identifier of the Tracking Record.	String	Set by Seller/Server
Related Object Identifier	Identifier of the FM Job or Report.	String	Set by Seller/Server
Request	Request that created the Tracking Record	String	Set by Seller/Server
System	Describes the system from which the action was done.	String	Set by Seller/Server
User	Describes the user doing the action.	String	Set by Seller/Server

462 **Table 9 - Tracking Record Attributes**

463 Note: All Tracking Record Attributes are set by the Seller/Server.

464 ### 10.1.2 Modify Fault Management Job Use Case

Field	Description
Use Case Number	2
Use Case Name	Modify Fault Management Job
Description	A request is initiated by the Buyer/Client to modify a FM Job on a Service.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to request a modification to an existing FM Job on a Service in the Seller/Server system. 2. The attributes that are intended to be modified by the Client will not break or disrupt the Service.

Field	Description
Process Steps	1. Buyer/Client creates a Modify FM Job request that includes the FM Job Identifier and the attributes to modify. **[R6]** The Buyer's/Client's Modify FM Job request **MUST** include the FM Job Identifier. **[R7]** The Buyer's/Client's Modify FM Job request **MUST** contain one or more of the following attributes: • Output Format • Granularity • Description • FM Job Priority • Reporting Period • Result Format • Schedule Definition • Service Specific Configuration 2. The Seller/Server verifies that the requested attributes to be modified will not result in the Service being broken or disrupted. 3. The Seller/Server responds to the Modify FM Job request and if accepted updates the attribute(s). **[R8]** The Seller's/Server's response to the Buyer's/Client's Modify FM Job request **MUST** echo back the attributes in the Client's request. **[R9]** The Seller's/Server's response to the Buyer's/Client's Modify FM Job request **MUST** indicate if the request has been accepted or rejected.
Post - Conditions	1. The Buyer/Client receives a FM Job response. 2. The FM Job is modified with requested attributes changes. 3. If the Seller/Server supports notifications and the Buyer/Client has registered for notifications, the Seller/Server notifies the Buyer/Client of commitment to provide the request.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response. 2. If the modification request cannot be serviced, the Seller/Server returns an error code with specific reason(s).

Table 10 - Modify Fault Management Job Use Case

10.1.3 Cancel Fault Management Job Use Case

Field	Description
Use Case Number	3
Use Case Name	Cancel Fault Management Job

Field	Description
Description	A request is initiated by the Buyer/Client to cancel an existing FM Job on a Service.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to request a cancellation of an existing FM Job on a Service in the Seller/Server system.
Process Steps	1. The Buyer/Client creates a Cancel FM Job request that includes the FM Job Identifier. **[R10]** The Buyer's/Client's Cancel FM Job request **MUST** include the FM Job Identifier. **[O2]** The Buyer/Client's Cancel FM Job request **MAY** contain the Cancellation Reason. 2. The Seller/Server acknowledges the Buyer's/Client's Cancel FM Job request and indicates if the request has been accepted or declined in their response. *NOTE: Resources include, but are not limited to CPU allocation, memory, etc. required for supporting a PM Profile.* **[R11]** The Seller's/Server's response to the Buyer's/Client's Cancel FM Job request **MUST** indicate if the request is Accepted or Declined. **[R12]** If the Seller/Server accepts the Buyer's/Client's Cancel FM Job request, the Job **MUST** stop. **[R13]** If the Seller/Server declines the Client's Cancel FM Job request, the Job **MUST NOT** stop. **[R14]** If the Seller/Server declines the Client's Cancel FM Job request, they **MUST** provide a reason the request was declined.
Post - Conditions	1. The Buyer/Client receives a confirmation that the FM Job has been canceled. 2. All resources on the Seller/Server side associated with the FM Job are canceled. 3. All FM results generated prior to deletion remain available for collection.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response, including error codes and specific reasons(s).

467 **Table 11 - Cancel Fault Management Job Use Case**

468 ### 10.1.4 Suspend Fault Management Job Use Case

Field	Description
Use Case Number	4
Use Case Name	Suspend Fault Management Job
Description	A request is initiated by the Buyer/Client to suspend an existing FM Job on a Service.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to request a suspension of an existing FM Job on a Service in the Seller/Server system. 2. An existing FM Job is running on an existing Service. 3. FM Job is in condition/state which can be suspended.
Process Steps	1. The Client creates a Suspend FM Job request that includes the FM Job Identifier. **[R15]** The Client's Suspend FM Job request **MUST** include the Job Identifier. **[R16]** The FM Job **MUST** be in the In - Progress state to be Suspended. 2. The Seller/Server acknowledges the Client's Suspend FM Job request and indicates if the request has been accepted or declined in their response. **[R17]** The Seller/Server's response to the Client's Suspend FM Job request **MUST** indicate if the request is Accepted or Declined. **[R18]** If the Seller/Server accepts the Client's Suspend FM Job request, the Job **MUST** be suspended. **[R19]** If the Seller/Server declines the Client's Suspend FM Job request, the Job **MUST NOT** be suspended. **[R20]** If the Seller/Server declines the Client's Suspend FM Job request, they **MUST** provide a reason the request was declined.
Post - Conditions	1. If the Seller/Server encounters errors, they should return an error with explanation to the Client. 2. If the Client is subscribed to FM Job Notifications the Seller/Server transmits a Notification.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response. 2. If the suspended request cannot be serviced, the Seller/Server returns an error code with specific reason(s).

469 **Table 12 - Suspend Fault Management Job Use Case**

470 ### 10.1.5 Resume Fault Management Job Use Case

Field	Description
Use Case Number	5
Use Case Name	Resume Fault Management Job
Description	A request is initiated by the Buyer/Client to resume a suspended existing FM Job on a Service.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to request a resumption of an existing FM Job on a Service in the Seller/Server system. 2. An existing FM Job is in a Suspended state on an existing Service.
Process Steps	1. The Client creates a Resume FM Job request that includes the FM Job Identifier. **[R21]** The Client's Resume FM Job request **MUST** include the Job Identifier. **[R22]** The FM Job **MUST** be in the Suspended state. 2. The Seller/Server acknowledges the Client's Resume FM Job request and indicates if the request has been accepted or declined in their response. **[R23]** The Seller/Server's response to the Client's Resume FM Job request **MUST** indicate if the request is Accepted or Declined. **[R24]** If the Seller/Server accepts the Client's Resume FM Job request, the Job **MUST** be resumed and return to the In - Progress or Scheduled state. **[R25]** If the Seller/Server declines the Client's Resume FM Job request, the Job **MUST NOT** be resumed. **[R26]** If the Seller/Server declines the Client's Resume FM Job request, they **MUST** provide a reason the request was declined.
Post - Conditions	1. If the Seller/Server encounters errors, they should return an error with explanation to the Client. 2. If the Client is subscribed to FM Job Notifications the Seller/Server transmits a Notification.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response. 2. If the resume request cannot be serviced, the Seller/Server returns an error code with specific reason(s).

471 **Table 13 - Resume Fault Management Job Use Case**

472 ### 10.1.6 Retrieve List of Fault Management Jobs

Field	Description
Use Case Number	6
Use Case Name	Retrieve List of Fault Management Jobs
Description	A request is initiated by the Buyer/Client retrieve a list of Fault Management Jobs
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to retrieve a list of Fault Management Jobs in the Seller/Server system.
Process Steps	1. The Client creates a Retrieve List of Fault Management Jobs request that includes none or more filter criteria. **[R27]** The Buyer/Client's Retrieve List of Fault Management Jobs request **MUST** include none or more of the following filter criteria: • Job Type (On - Demand, Proactive, Passive) • Output Format • Granularity • Reporting Period • Result Format • Schedule Definition • Service Specific Configuration • Service ID, Service Pair, or Entity Reference • State • Creation date greater than, Creation date lower than • Job Priority 3. The Seller/Server acknowledges the Buyer/Client's Retrieve List of Fault Management Jobs request and indicates if the request has been accepted or declined in their response. **[R28]** The Seller/Server's response to the Buyer/Client's Retrieve List of Fault Management Jobs request **MUST** indicate if the request is Accepted or Declined. **[R29]** The Seller/Server's response **MUST** include a list of Fault Management Job Identifiers that match the filter criteria. **[R30]** If no Fault Management Jobs match the filter criteria, the Seller/Server **MUST** return and empty list.

Field	Description
Post - Conditions	1. The Buyer/Client receives a list of Fault Management Jobs that meet their filter criteria.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response.

Table 14 - Retrieve List of Fault Management Job Use Case

10.1.7 Retrieve Fault Management Job by Identifier

Field	Description
Use Case Number	7
Use Case Name	Retrieve Fault Management Job by Identifier
Description	A request initiated by the Buyer/Client to retrieve details on a specified Fault Management Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to retrieve a Fault Management Job in the Seller/Server system.
Process Steps	1. The Client creates a Retrieve Fault Management Job by Identifier request that includes the Fault Management Job Identifier. **[R31]** The Buyer/Client's Retrieve Fault Management Job by Identifier request **MUST** include the Fault Management Job Identifier. 2. The Seller/Server returns attributes of the specified Fault Management Job. **[R32]** The Seller/Server MUST return the attributes in Table 6.
Post - Conditions	2. The Buyer/Client receives a list of Fault Management Jobs that meet their filter criteria.
Alternative Paths	2. If errors occurred, the Seller/Server returns all identified errors in a reject response.

Table 15 - Retrieve List of Fault Management Job Use Case

10.1.8 Subscribe to Fault Management Job Notifications Use Case

Field	Description
Use Case Number	6
Use Case Name	Subscribe to Fault Management Job Notifications
Description	A request is initiated by the Buyer/Client to subscribe to FM Job Notifications.
Actors	Buyer/Client, Seller/Server

Field	Description
Pre - Conditions	1. The Buyer/Client is authorized to subscribe to FM Job/Collection Notifications in the Seller/Server system. 2. The Seller/Server support FM Job/Collection Notifications.
Process Steps	1. The Client subscribes to FM Job Notifications by specifying the notification types and target addresses for the notifications to be sent to. **[R33]** The Client request **MUST** contain the following: • FM Job Notification Target Information **[O3]** The Buyer/Client request **MAY** contain the List of Job Notification Types. 2. The Seller/Server responds to indicate acceptance of the request. **[R34]** The Seller/Server **MUST** respond to the Client's Register for FM Job Notifications request to indicate that the request was accepted or rejected. **[R35]** If the Seller/Server rejects the Client's Register for FM Job Notifications request, the response **MUST** include a reason for the rejection.
Post - Conditions	1. If the Seller/Server encounters errors, they should return an error with explanation to the Client.

478 **Table 16 - Subscribe to Fault Management Job Notifications Use Case**

479

Attribute	Description	Value	Definition
Notification Target Information	The detailed information on the technical API end - point address specifying where the Seller/Server is to send any FM Job Notifications. There can be multiple locations for one Buyer/Client.	String	This is the Callback target in the API

List of Notification Types	The types of notifications that the Buyer/Client wishes to receive.	List of one or more of: FM Job created FM Job state changed FM Job attribute value changed FM Report Ready FM Report Preparation Failed	This is a list of attributes

480 **Table 17 - Buyer/Client Request Attributes for Subscribe to Notifications**

481 ### 10.1.9 Generation of Fault Management Job Notifications Use Case

Field	Description
Use Case Number	7
Use Case Name	Generation of Fault Management Job Notifications
Description	The Seller/Server generates and sends FM Job Notifications to subscribed Buyer/Client.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client has subscribed to FM Job Notifications.
Process Steps	1. The Seller/Server generates and sends FM Job Notifications to subscribed Buyer/Client(s). **[R36]** The Seller/Server FM Notifications **MUST** be sent to Buyer/Clients who have subscribed to FM Notifications. **[R37]** The Seller/Server FM Notifications **MUST** Not be sent to Buyer/Clients who have not subscribed to FM Notifications. **[R38]** The Seller/Server's FM Notification **MUST** include the attributes in Table 19 - Fault Management Notification Attributes.
Post - Conditions	1. The Client has received the FM Job Notification sent by Seller/Server.
Alternative Paths	

482 **Table 18 - FM Job Notifications Use Case**

483

Attribute Name	Description	Value	Comments
FM Notification Type	The type of FM Notification	One of the following: • FM Job created,	Job notification occurs when a FM Job (i.e., Link Trace) is

		• FM Job modified, • FM Job State change • FM Collection ready • FM Job Report Failed	complete with results or changes state.
FM Notification Identifier	The identifier of the FM Notification	String	The FM Notification Identifier is assigned by the Seller/Server

Table 19 - Fault Management Notification Attributes

10.1.10 Unsubscribe from Fault Management Job Notifications Use Case

Field	Description
Use Case Number	8
Use Case Name	Unsubscribe from Fault Management Job Notifications
Description	A request is initiated by the Buyer/Client to unsubscribe from FM Job Notifications.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to request an unsubscribe from FM Job Notifications on a Service in the Seller/Server system.
Process Steps	1. The Client unsubscribes from FM Job Notifications by specifying the unique identifier of the listener.
Post - Conditions	1. The Seller/Server discontinues sending FM Job/Collection Notification Types to Client specific to Buyer/Client Unsubscribe request. 2. The Client is no longer receiving FM Job Notifications.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

Table 20 - Unsubscribe from Fault Management Job Use Case

10.1.11 List Fault Management Reports

Field	Description
Use Case Number	9
Use Case Name	List Fault Management Reports
Description	A request initiated by the Buyer/Client to the Seller/Server to list the Fault Management Reports based on a filtered criterion.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve a list of Fault Management Reports in the Seller/Server system.

Process Steps	1. The Buyer/Client submits a Retrieve List of Fault Management Reports request including the following filter criteria the Seller/Server should apply: • Output Format • Result Format • State • Service ID, Service Pair, or Entity Reference • Creation date • Fault Management Job ID • Granularity • Reporting Timeframe • Service Specific Configuration 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server determines if any Fault Management Reports match the filter criteria in the request. **[R39]** The Seller/Server **MUST** support the retrieval of a List of Fault Management Reports Use Case. **[R40]** Buyer/Client **MUST** support the retrieval of a List of Fault Management Reports Use Case. **[R41]** The Seller/Server's response to the Buyer's/Client's retrieve List of Fault Management Reports **MUST** include the following attributes as applicable: • FM Job Identifier • FM Report Identifier • Reporting Timeframe • State • Creation date • Description • Granularity • Service ID, Service Pair, or Entity Reference • Output Format • Reporting Timeframe • Result Format • Service Specific Configuration **[O4]** The Seller/Server's response to the Buyer/Client's retrieve List of Fault Management Reports **MAY** include the Description. **[R42]** If the Seller/Server validates the Buyer's/Client's request but finds no matching Fault Management Reports, the Seller/Server **MUST** return an empty list.

Field	Description
Post - Conditions	1. The Buyer/Client receives a list of all Fault Management Reports that match the Buyer's/Client's filtered selection criteria. 2. The Buyer/Client may initiate a finer granularity query to obtain detailed information for a specific Fault Management Reports based on unique identifier.

Table 21 - List Fault Management Reports Use Case

10.1.12 Collect Fault Management Reports

Field	Description
Use Case Number	10
Use Case Name	Collect Fault Management Report
Description	A request initiated by the Buyer/Client to the Seller/Server to collect a Fault Management Report.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to collect a Fault Measurement Report in the Seller/Server system.
Process Steps	1. The Buyer/Client submits a Retrieve Fault Management Report request to the Seller/Server. 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server determines if a Fault Management Report matches the request. 4. The Seller/Server provides results: a. The Seller/Server's response includes the results from the specified report as payload in the envelope. b. The Seller/Server's response includes the results from the specified report as file in the attachment.
Post - Conditions	1. The Client receives the Fault Measurement Report that match the Client's selection criteria. 2. The Client receives the location of the file collection for the Fault Measurement Report. 3. If errors occurred, the Seller/Server returns all identified errors in a reject response.

Table 22 - Collect Fault Measurement Report Use Case

Attribute Name	Description	Value	Comments
Report Identifier	The identifier of the FM Job Result Report	String	Set by the Seller/Server

Table 23 - Fault Management Job Results

Table 24 - Retrieve Fault Management Results in Payload Attributes

[R43] The results regardless of the format **MUST** contain the FM results as specified with FM Job request.

11 Performance Monitoring Use Cases

The Use Cases for Performance Monitoring are defined in this section. The Service Level Specification describes the performance objectives for the performance of conformant traffic (i.e., frames, packets) that flow over a VC (i.e., EVC, IPVC, etc.). For example, objectives specified in the SLS might be specified for frame or packet delay (latency). The performance objectives specified in the SLS often form part of a Service Level Agreement (SLA), which can also specify penalties for the SP or Operator providing the service if the objectives are not met. The PM use cases are divided into the following specific operations: PM Profiles, PM Jobs, and PM Collections. There are three types of PM Jobs – Proactive, On - Demand and Passive.

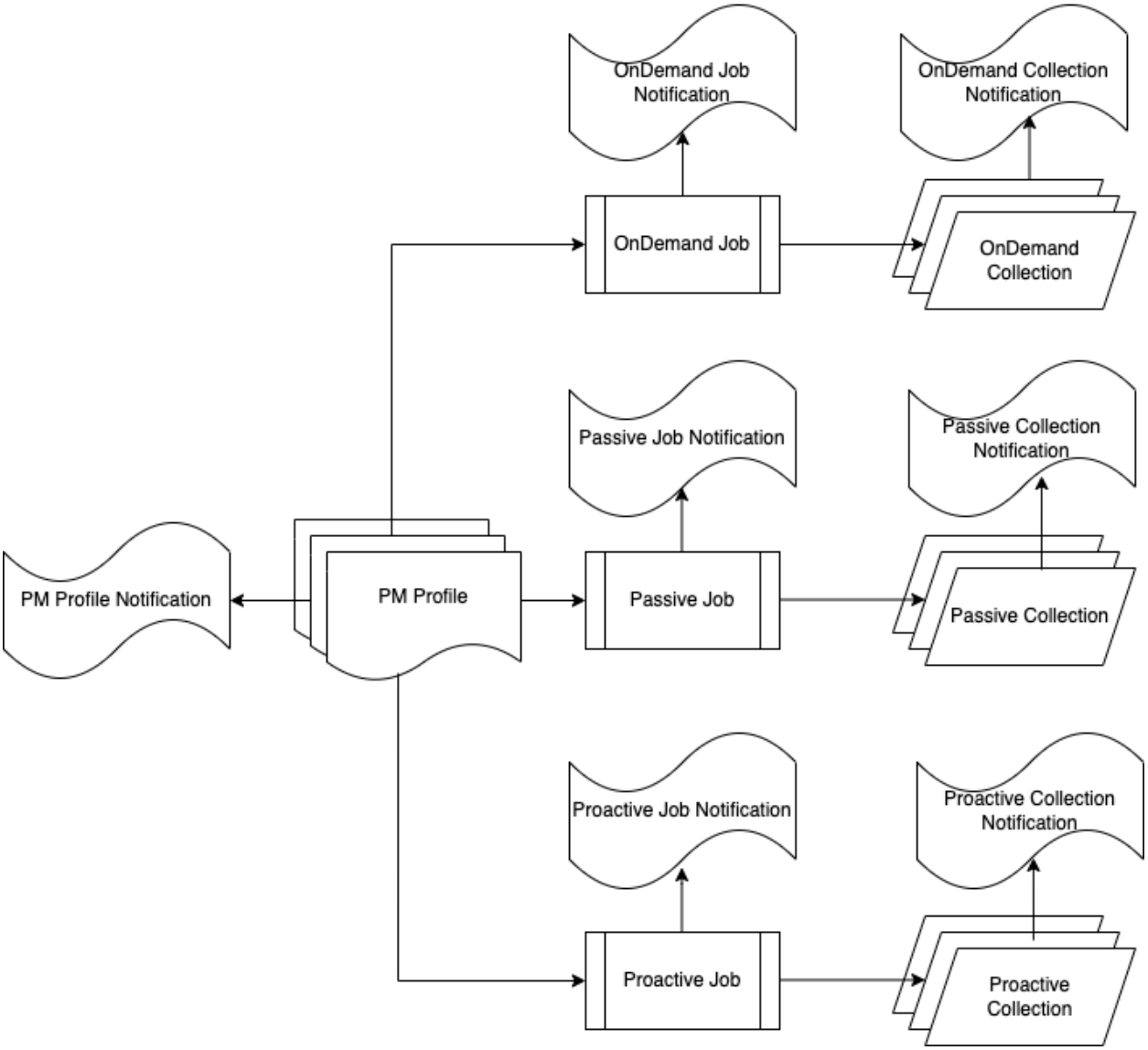


Figure 3 - Performance Monitoring Process Diagram

PM Profile provisioning is the lifecycle process of defining performance attributes of a PM Profile. A PM Profile Notification is defined such that a client can subscribe to PM Profile Notifications and be asynchronously informed when PM Profiles are created, modified, or deleted.

Jobs are responsible for the provisioning of measurement intervals, schedules, and performance objectives. Performance objectives are typically associated with an SLS but can be used for an On - Demand Job for making measurements as part of a troubleshooting procedure. There are three types of Jobs – Proactive, On - Demand and Passive, with the time schedule of the Job being the main difference between Proactive and On - Demand. Passive is discussed in detail later in section 13.2. The Proactive PM Job is in support of provisioning an SLS between one or more ordered pairs. An individual PM Job is assigned to each ordered pair. An ordered pair is an association between two end points.

An On - Demand PM Job is typically a single run or non - continual run performed during service assurance. A Proactive PM Job is typically in support of a SLS measurement and will run for the lifetime of the service, while an On - Demand is a short duration performance management test. On - Demand PM Job has an end date while Proactive PM Job runs indefinitely for the lifetime of the service.

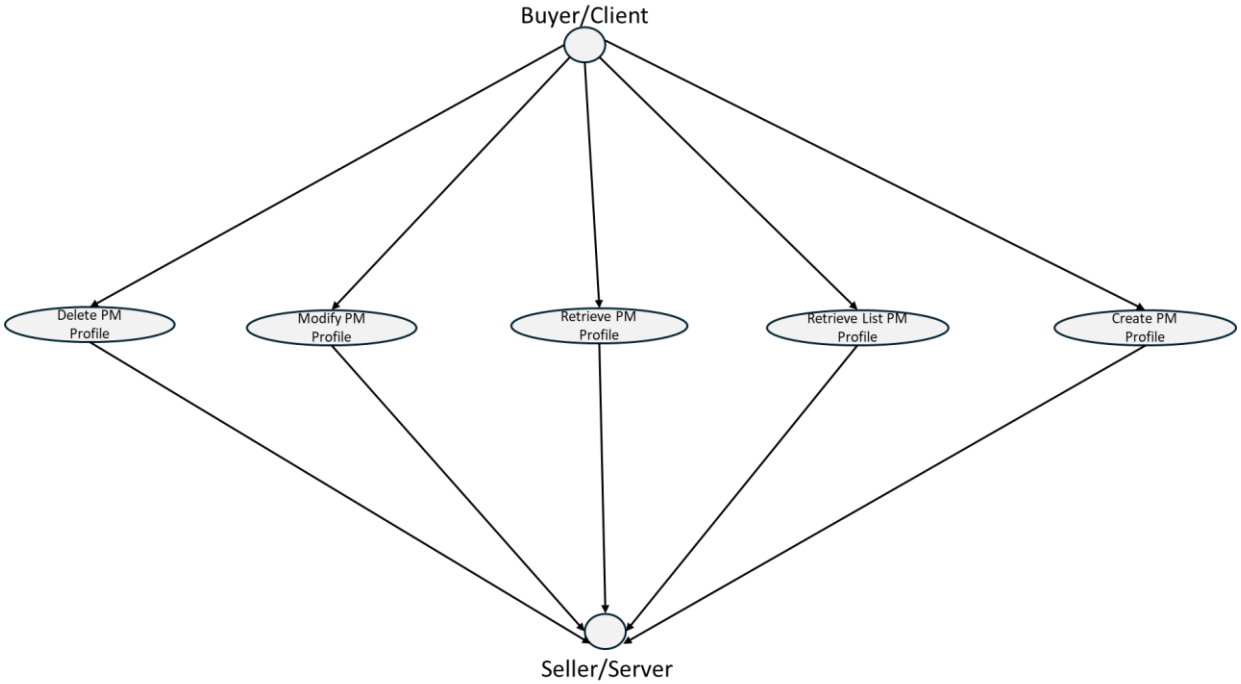
Proactive, On - Demand and Passive PM Jobs use PM Profiles for the provisioning lifecycle. The performance objectives include, but are not limited to frame/packet delay, frame/packet loss ratio, inter - frame/packet delay variation. A PM Profile of the same PM Job Type as the PM Job can be reused for PM Jobs or can be created for a specific Proactive, On - Demand or Passive PM Jobs. Proactive, On - Demand and Passive PM Jobs support Notifications. A client can subscribe to these respective Notifications and be asynchronously informed when a Job is created, canceled, or modified.

The Proactive, On - Demand and Passive Collections are where a client requests the retrieval of performance management reports. Proactive, On - Demand and Passive Collections support Notifications. A client can subscribe to these Notifications and be asynchronously notified when a Collection is ready for retrieval.

There are no restrictions on a Proactive and On - Demand PM Job running on the same Service or Entity (i.e., Interface, Port, VLAN). For example, a Proactive PM Job could be associated with SLA during Service Activation. While the Service is active a Service Assurance - based On - Demand PM Job may be requested to immediate (real - time) feedback purposes. A Passive PM Job can be associated with a Service or Entity. An Entity is defined as an object other than a Service that can be monitored and have associated telemetry.

11.1 Performance Monitoring Profiles Use Cases

This section defines the use cases that support Performance Monitoring (PM) Profiles. PM Profiles are a mechanism used to simplify the PM Job provisioning. Some attributes of a PM Job are defined in the PM Profiles which can be centralized and leveraged across multiple job requests. See Table 26 - Create Performance Monitoring Profile Attributes. A PM Profile can be used for multiple PM Jobs, or it can be for a specific PM Job.



552

553 **Figure 4 - Performance Monitoring Profile Use Cases**

554 The Buyer/Client can create, retrieve, modify, and delete PM Profiles. The Seller/Server is re-
555 sponsible for interpreting the Client PM Profile requests and performing any necessary intra -
556 Seller/Server and inter - Seller/Server communications to assure the Clients request are met.

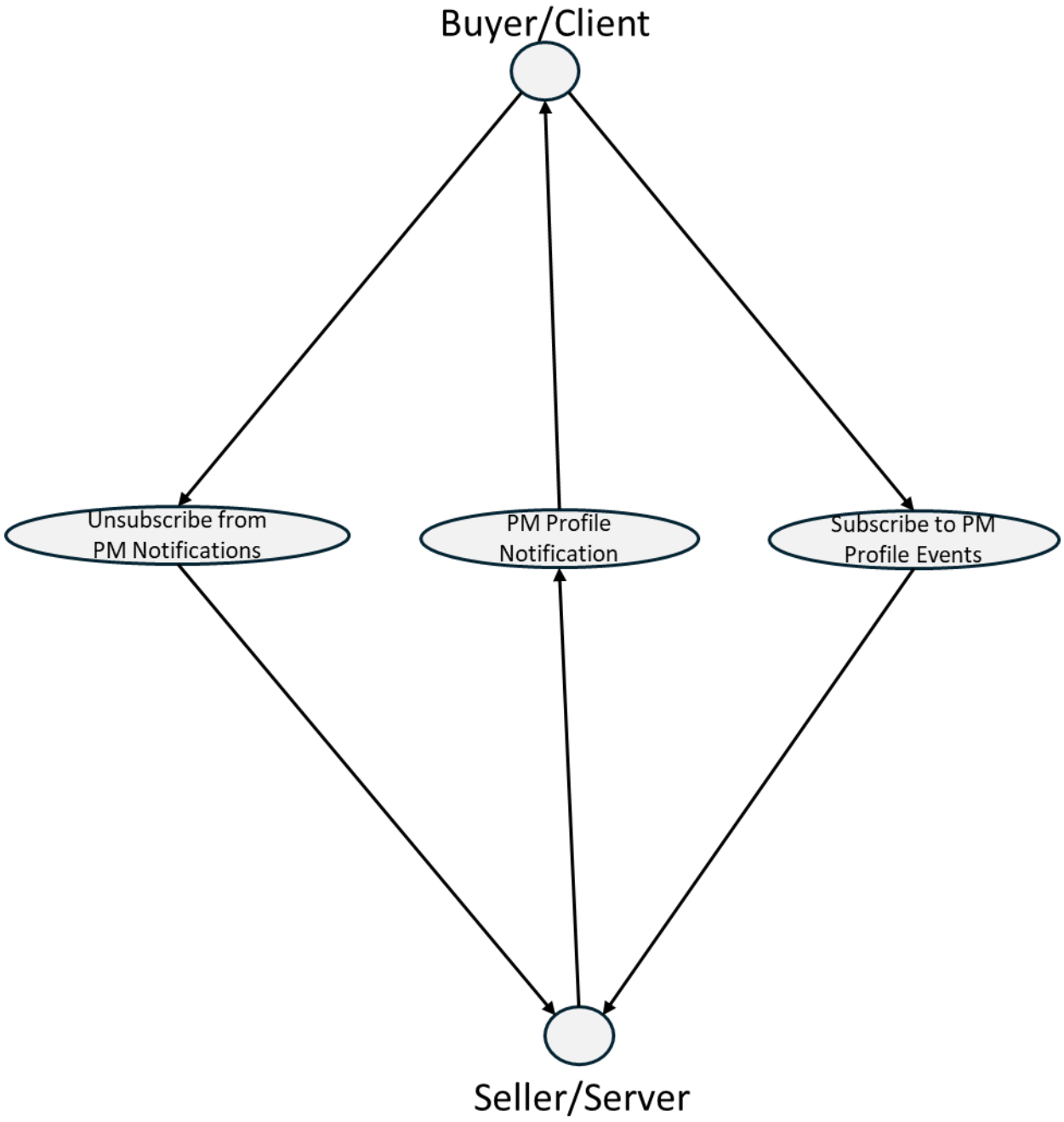


Figure 5 - Performance Monitoring Profile Notification Use Cases

The Buyer/Client can subscribe, unsubscribe to and from PM Profile Notifications. In the case of a Partner providing Profiles, the Service Provider will subscribe to PM Profile Notifications and the Partner will send corresponding Notifications. These scenarios are dependent upon the IRP on the operation of Notifications and actors. The Seller/Server (SOF) is responsible for providing PM Profile Notifications to the Client (BA) specified callback.

A Seller may allow a Buyer to create PM Profiles via the API. In this case, the Buyer uses the Create PM Profile request to create the profiles they require. If the Seller opts to not allow the Buyer to create PM Profiles, then the Buyer has the ability to select from a set of PM Profiles that are created by the Seller through some means other than the API. The Buyer selects from the set of Seller-created PM Profiles and assigns it to the PM Job that the Buyer creates.

11.1.1 Create Performance Monitoring Profile Use Case

Field	Description
Use Case Number	11
Use Case Name	Create Performance Monitoring Profile
Description	A request initiated by the Buyer/Client to the Seller/Server to create a PM Profile.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to perform the request.
Process Steps	1. The Buyer/Client determines what PM objectives will be needed. **[R44]** The Buyer's/Client's Create PM Profile request **MUST** contain the following attributes: • PM Job Type • Granularity • Reporting Period • Output Format • Result Format • Service Specific Configuration **[O5]** The Buyer's/Client's Create PM Profile **MAY** contain the following attributes: • Description • PM Job Priority 2. The Seller/Server receives request and determines if the PM Profile is valid.
Post - Conditions	1. PM profile is allocated and available. 2. Service returns PM Profile ID. 3. The PM Profile is available for PM Job provisioning.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while constructing and persistently storing the PM profile. 2. The Seller/Server returns a specific error message that the requested PM Job will collect to too much data.

Table 25 - Create Performance Monitoring Profile Use Case

Attribute Name	Description	Value	Comments
Description	A textual description of the PM Job	String	Set by Buyer/Client

Attribute Name	Description	Value	Comments
PM Profile ID	Unique identifier of existing Performance Management Profile.	*String*	Set by Seller/Server
PM Job Type	The type of PM Job	One of the following: *Proactive* *OnDemand* *Passive*	Set by Buyer/Client
PM Job Priority	The priority of the management Job. The way the management application will use the Job priority to schedule Job execution is application specific and out the scope.	Integer	Set by the Buyer/Client The priority is on a 1 - 10 scale with 1 being highest priority and 10 being lowest priority
Reporting Period	The attribute that defines how often a PM report is generated	See Table 27.	
Creation Time	Time the PM Profile was created	String	Set by Seller/Server
Last Time Modified	The last time a PM Profile was modified.	Date - Time	Set by Seller/Server
Granularity	The sampling rate of the collection of performance indicators.	See Table 27.	Set by Buyer/Client
Output Format	The format of the output report	One of the following: *JSON* *XML* *AVRO* *CSV*	Set by Buyer/Client
Result Format	List of possible result formats that define how Seller/Server will deliver Performance Report to the Buyer/Client	One of the following: *Payload* *Attachment*	Payload Output Format for *Payload* is always *JSON*
Tracking Record	A list of tracking records. Tracking records allow the tracking of modifications to the PM Profile. The tracking records should not be embedded in the PM Profile to allow retrieving the PM Profile without the tracking records.	See Table 9.	Set by Seller/Server.

Attribute Name	Description	Value	Comments
Service Specific Configuration	Attributes that define Service specific values used by the PM Profile.	JSON object	Set by the Buyer/Client
Lifecycle Status	Used to indicate the current Lifecycle Status of this PM Profile.	One of: Experimental Pending Approved Deprecated	Set by Buyer
PM Profile As-signed	Indicates if the Test Profile is assigned to a Test Job	Boolean	Set by Seller

Table 26 - Create Performance Monitoring Profile Attributes

The Buyer/Client may have the ability to create new PM Profiles or may choose from a "catalog" of PM Profiles made available by the Seller/Server.

Attribute Name	Description	Value	Comments
Time Duration Unit	This class is used to de-scribe durations expressed as a 2-tuple, (value, units). The units range from nano-seconds to years.	String enumeration one of the following: • *NS* • *US* • *MS* • *SEC* • *MIN* • *HOUR* • *DAY* • *WEEK* • *MONTH* • *YEAR*	
Time Duration Value	The value of the duration.	Integer	

Table 27 - Granularity Attributes

11.1.2 Retrieve Performance Monitoring Profile List Use Case

Field	Description
Use Case Number	12
Use Case Name	Retrieve Performance Monitoring Profile List
Description	A request initiated by the Buyer/Client to the Seller/Server to retrieve a list of PM Profiles.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to perform the query.

Field	Description
Process Steps	1. The Buyer/Client submits a Retrieve List of PM Profile request including filter criteria for profile the Seller/Server should apply. 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server determines if any PM Profiles match the filter criteria in the request. **[R45]** The Seller/Server **MUST** support the retrieval of a PM Profile List Use Case. **[R46]** The Buyer/Client **MUST** support the retrieval of a PM Profile List Use Case. **[R47]** The Seller/Server's response to the Buyer's/Client's retrieve List of PM Profiles **MUST** include the following attribute as applicable: • PM Profile ID • Description • CreationDate • Granularity • Job Priority • Job Type • Reporting Period **[R48]** If the Seller/Server validates the Buyer's/Client's request but finds no matching PM Profiles, the Seller/Server **MUST** return an empty list.
Post - Conditions	1. The Buyer/Client receives a list of all PM Profiles that match the Client's filtered selection criteria. 2. The Buyer/Client may initiate a request to obtain detailed information for a specific PM Profile based on unique identifier.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response. 2. If the quantity of the records requested to be returned exceeds a Seller/Server policy, the Seller/Server must choose to respond with either: a. An empty list and message that indicates the result set is too large and submit a new more specific filtered query or b. A response that indicates the result is too large and includes a subset of the matching PM Profiles. 3. If the query does not find any matching records, then the Seller/Server responds with an indication of this result by sending an empty list with a success code.

577 **Table 28 - Retrieve PM Profile List Use Case**

578 ### 11.1.3 Retrieve Performance Monitoring Profile by Profile Identifier Use Case

Field	Description
Use Case Number	13
Use Case Name	Retrieve Performance Monitoring Profile by Profile ID
Description	A request initiated by the Buyer/Client to the Seller/Server to retrieve a PM Profile.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to perform the query.
Process Steps	1. The Buyer/Client submits a PM Profile request with Profile ID. 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server returns the PM Profile. **[R49]** The Seller/Server **MUST** support the retrieval of a PM Profile Use Case. **[R50]** The Buyer/Client **MUST** support the retrieval of a PM Profile Use Case.
Post - Conditions	1. The Buyer/Client receives the PM Profile. Returned response includes all attribute of the PM Profile.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response.

579 **Table 29 - Retrieve PM Profile Use Case**

580 ### 11.1.4 Modify Performance Monitoring Profile Use Case

Field	Description
Use Case Number	14
Use Case Name	Modify Performance Monitoring Profile
Description	A request initiated by the Buyer/Client to the Seller/Server to modify a PM Profile that the Buyer created.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. A PM Profile exists in the Seller/Server's system. 2. The Seller/Server verifies that the Buyer/Client is authorized to modify the PM Profile. 3. There is no PM Job associated to the PM Profile. The verification process for checking if a PM Profile is not being used is the responsibility of the Seller/Server implementation.

Field	Description
Process Steps	1. The Buyer/Client initiates a modify request for PM Profile with specific attributes to modify. **[R51]** The Buyer/Client **MUST** be able to modify all Buyer/Client settable attributes except the PM Job Type. 2. The Seller/Server validates the modification request and provides a response with PM Profile with modifications. **[R52]** The Seller/Server **MUST** support modification of one or more attributes which are technology or non - technology specific. An example of a non - technology specific attribute would be a time interval attribute.
Post - Conditions	1. Seller/Server initiates the modification process and notifies Buyer/Client with a success message.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the modification.

581 **Table 30 - Modify Performance Monitoring Profile Use Case**

582 ### 11.1.5 Delete Performance Monitoring Profile Use Case

Field	Description
Use Case Number	15
Use Case Name	Delete Performance Monitoring Profile
Description	A request initiated by the Buyer/Client to the Seller/Server to delete a PM Profile that the Buyer created.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. A PM Profile exists in Seller/Server's system. 2. The Seller/Server verifies that the Buyer/Client is authorized to delete the PM Profile. 3. There is no PM Job associated to the PM Profile. The verification process for checking if a PM Profile is not being used is the responsibility of the Seller/Server implementation.

Field	Description
Process Steps	1. The Buyer/Client initiates a delete request for PM Profile with unique identifier. 2. The Seller/Server validates the PM Profile exists, deletes the PM Profile, and all the PM Profile associated resources. *NOTE: Resources include, but are not limited to CPU allocation, memory, etc. required for supporting a PM Profile.* 3. The Seller/Server provides a response indicating the PM Profile has been deleted. **[R53]** The Seller/Server **MUST** support the deletion of a PM Profile Use Case. **[R54]** The Buyer/Client **MUST** support the deletion of a PM Profile Use Case.
Post - Conditions	1. Seller/Server deletes the PM Profile and notifies Buyer/Client with a success message.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the deletion.

583 **Table 31 - Delete PMPM Profile Use Case**

584 ### 11.1.6 Subscribe to Performance Monitoring Profile Notifications Use Case

Field	Description
Use Case Number	16
Use Case Name	Subscribe to Performance Monitoring Profile Notifications
Description	A request initiated by the Buyer/Client to the Seller/Server to subscribe to PM Profile Notifications.
Actors	Buyer/Client, Seller/Server,
Pre - Conditions	1. The Buyer/Client is authorized to subscribe to PM Profile Notifications in the Seller/Server system. 2. The Seller/Server support notifications.

Field	Description
Process Steps	1. The Buyer/Client sends the Subscribe for PM Profile Notifications to the Seller/Server specifying where to send notifications and which PM Profile Notification Types to include in notifications. PM Profile Notification Types include: • PM Profile Created • PM Profile Modified • PM Profile Deleted 2. The Seller/Server receives the Subscribe request for PM Profile Notifications. 3. The Seller/Server records which PM Profile Notifications to send, where to send such notifications for this Buyer/Client. 4. The Seller/Server returns an acknowledgement to the Buyer/Client. **[O6]** The Seller/Server **MAY** support subscription to PM Profile Notifications Use Case. **[O7]** The Buyer/Client **MAY** support subscription to PM Profile Notifications Use Case.
Post - Conditions	1. The Seller/Server is aware of where to send notifications.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

585 **Table 32 - Subscribe to Performance Monitoring Profile Notifications Use Case**

Attribute Name	Description	Value	Comments
Notification Target Information	The detailed information on the technical API end - point address specifying where the Seller/Server is to send any PM Profile Notifications. There can be multiple locations for one Buyer/Client.	String	This is the Callback target in the API
List of Notification Types	The types of notifications that the Buyer/Client wishes to receive.	List of one or more of: • PM Profile Created. • PM Profile Modified. • PM Profile Deleted.	This is a list of attributes

Table 33 - Subscribe to PM Profile Notifications Attributes

11.1.7 Performance Monitoring Profile Notifications Use Case

Field	Description
Use Case Number	17
Use Case Name	Performance Monitoring Profile Notification
Description	A PM Profile Notification is initiated by the Seller/Server to a subscribed Buyer/Client.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Seller/Server supports PM Profile Notifications. 2. The Buyer/Client has subscribed to PM Profile Notifications.
Process Steps	1. The Seller/Server sends the notifications to the location(s) registered by the Buyer/Client. **[O8]** The Seller/Server **MAY** support PM Profile Notifications Use Case. **[O9]** The Buyer/Client **MAY** support PM Profile Notifications Use Case.
Post - Conditions	1. The Seller/Server has sent related PM Profile Notification.

Table 34 - Performance Monitoring Profile Notifications Use Case

11.1.8 Unsubscribe from Performance Monitoring Profile Notifications Use Case

Field	Description
Use Case Number	18
Use Case Name	Unsubscribe from Performance Monitoring Profile Notifications
Description	A request initiated by the Buyer/Client to unsubscribe from PM Profile Notifications.
Actors	Buyer/Client, Seller/Server

Field	Description
Pre - Conditions	1. The Buyer/Client has previously subscribed to PM Profile Notifications. 2. The Buyer/Client is authorized to unsubscribe to PM Profile Notifications in the Seller/Server system. 3. The Seller/Server support PM Profile Notifications.
Process Steps	1. The Buyer/Client sends the Unsubscribe from PM Profile Notifications to the Seller/Server specifying which PM Profile Notifications the Buyer/Client is unsubscribing from listening. 2. The Seller/Server receives the Unsubscribe request for PM Profile Notifications. 3. The Seller/Server discontinues PM Profile Notifications to Buyer/Client specific to Unsubscribe request. 4. The Seller/Server returns an acknowledgement to the Buyer/Client. **[O10]** The Seller/Server **MAY** support unsubscribing from PM Profile Notifications Use Case. **[O11]** The Buyer/Client **MAY** support unsubscribing from PM Profile Notifications Use Case.
Post - Conditions	1. The Service discontinues sending PM Profile Notifications to Buyer/Client specific to Buyer/Client Unsubscribe request.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

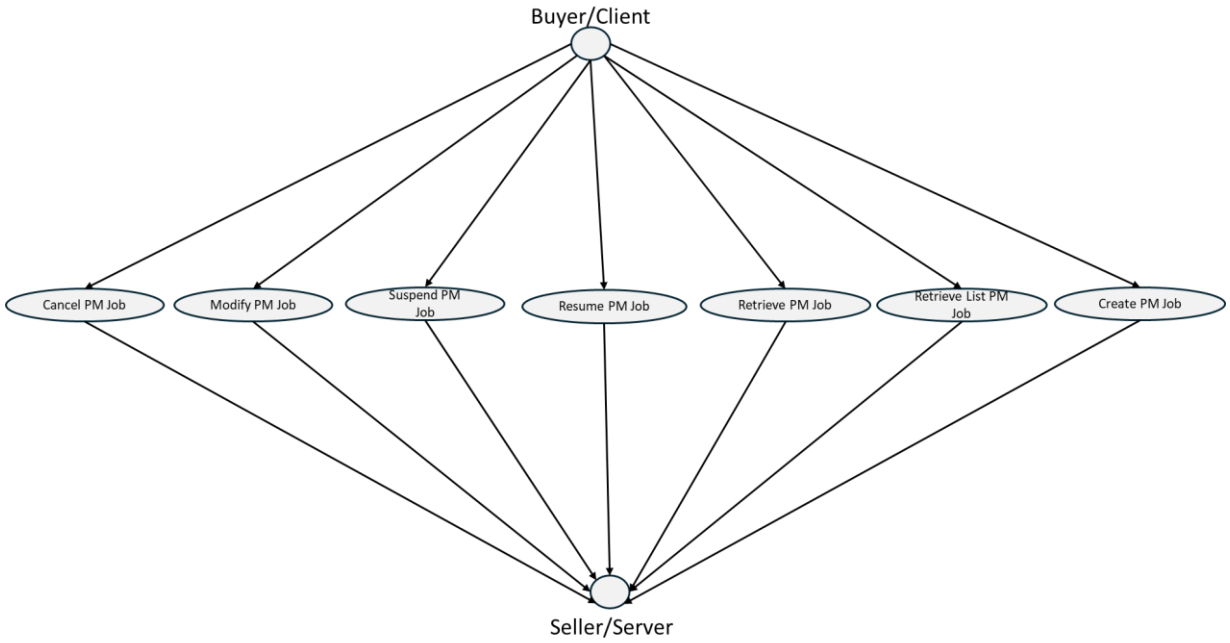
Table 35 - Unsubscribe from Performance Monitoring Profile Notifications Use Case

11.2 Performance Monitoring Job, Collection and Notification Use Cases

A Performance Monitoring Job is where the client specifies the performance monitoring objectives specific to each measurement point which could be an ordered pair (i.e., two UNIs) or an entity (i.e., port). An ordered pair is an association between two end points. A PM Job has start and stop times specified in the schedule definition. In the cases of the Proactive PM Job, the stop time is null.

NOTE: A customer could have multiple services each with an associated PM Job. Each PM Job would have its associated measurement point(s).

For the cases where the SLS is an attribute of the VC (Virtual Circuit) a Proactive PM Job is created by the VC provisioning process. This uses the same process as described for the Create PM Job request. The remaining functions described in this document are supported via standard processes. The PM Job implemented at Mplify LSO Allegro/Interlude/Legato is specific to an implementation that is using an Allegro/Interlude/Legato Performance Management Provisioning process.



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609 **Figure 6 - Performance Monitoring Job Use Cases**

610 The Buyer/Client can create, retrieve, modify, suspend, resume, and cancel PM Jobs. The PM
611 Jobs result in Performance Management collections that will provide the Buyer/Client with per-
612 formance objective results. A PM Profile does not need to be used if the Buyer/Client decides to
613 communicate all attributes associated with a PM Job. The Seller/Server is responsible for inter-
614 preting the PM Job requests and performing the necessary intra - SOF and inter - SOF communi-
615 cations to assure the Buyer/Client requests are met.

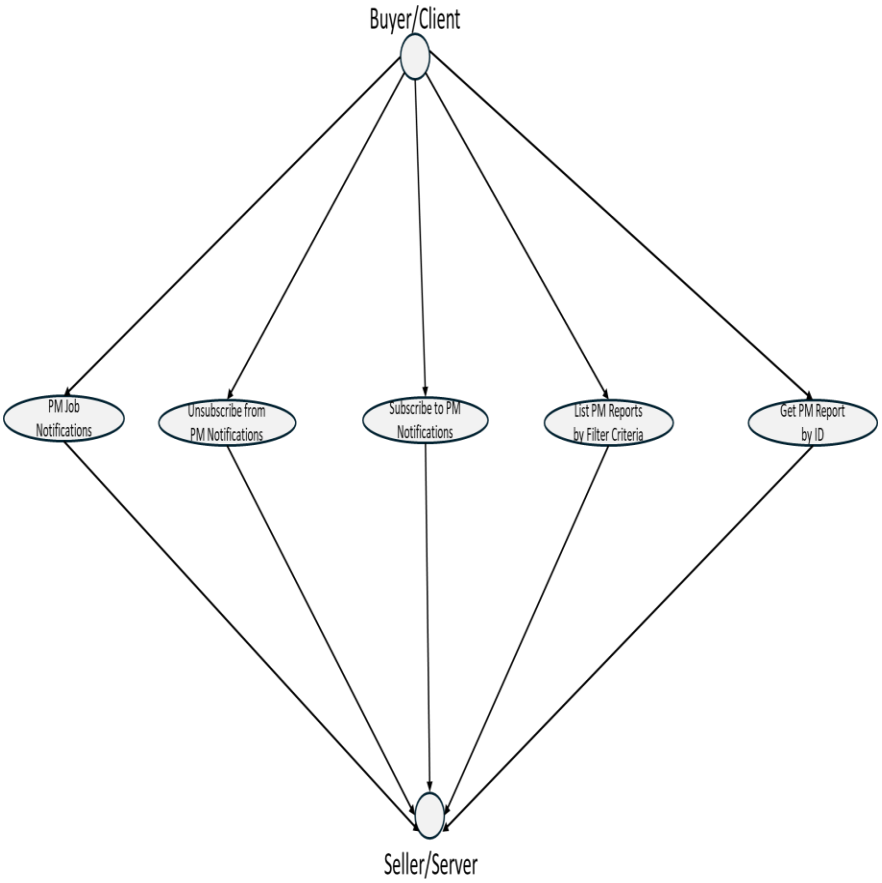

Figure 7 - Performance Monitoring Job Notification and Collection Use Cases

Note: These Use Cases shown in Figure 7 also apply to Collect PM Reports.

The Buyer/Client can subscribe, unsubscribe to and from PM Job/Collection Notifications. The Seller/Server is responsible for providing PM Job/Collection Notifications to the Buyer/Client specified callback. The Buyer/Client can perform Performance Management collections based on previously requested PM Jobs. The Collect Performance Management Use Case is responsible for the report(s) collection which will have the actual results of the performance measurement attributes specified in the Create Performance Monitoring Job Use Case. There is a Use Case for retrieving PM Job which will have the performance measurement objectives and schedule attributes.

627 ### 11.2.1 Create Performance Monitoring Job Use Case

Field	Description
Use Case Number	19
Use Case Name	Create Performance Monitoring Job
Description	A request initiated by the Buyer/Client to create a PM Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to create a PM Job from the Seller/Server.

Process Steps	1. The Buyer/Client determines the performance objectives, measurement interval and needed attributes as specified in PM Job payload which is specific to each service technology and not covered in this document. 2. The Buyer/Client initiates and submits a PM Job request that contains a Schedule Definition. **[R55]** The Buyer's/Client's Create PM Job **MUST** support the following attributes: • Service ID, Service Pair, or Entity Reference • PM Job Type (only present when no PM Profile ID is referenced) • Reporting Period (only present when no PM Profile ID is referenced) • Granularity (only present when no PM Profile ID is referenced) • PM Profile ID (if used) • Output Format (only present when no PM Profile ID is referenced) • Result Format (only present when no PM Profile ID is referenced) • Service Specific Configuration (Payload) (only present when no PM Profile ID is referenced) • Schedule Definition **[R56]** If the Buyer/Client request includes a Service, it **MUST** contain the following: • Service ID • Service Pair **[R57]** If the Buyer/Client request includes an Entity, it **MUST** contain an Entity Reference. **[O12]** The Buyer's/Client's Create PM Job **MAY** contain the following attributes: • Description • PM Job Priority • Buyer Job ID • Consuming Application ID • Producing Application ID **[O13]** A PM Job **MAY** be scheduled as reoccurring. 3. The Seller/Server validates the PM Job request and responds with PM Job including a unique identifier, in the response.

Field	Description
	[R58] The Seller/Server **MUST** assign a Job Identifier to the PM Job that is unique within the network. **[R59]** The PM Job Identifier supplied by the Seller/Server **MUST** be unique within the Seller/Server's network. **[R60]** The PM Job **MUST** use the attributes included in the Buyer's/Client's Create PM Job request.
Post - Conditions	1. The Buyer/Client receives a Response, including a PM Job ID. 2. The Seller/Server initiates a PM Job either immediately or as scheduled. 3. If the Seller/Server supports notifications and the Buyer/Client has registered for notifications, the Seller/Server notifies the Buyer/Client of PM Job creation. 4. The Seller/Server notifies the Buyer/Client when Job results are available if the Buyer/Client subscribed to these specific notifications. **[R61]** If the Buyer/Client registered for PM Job/Collection Notifications, the Seller/Server **MUST** notify the Buyer/Client when PM Job results are available.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from creating the PM Job.

628 **Table 36 - Create PM Job Use Case**

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Attribute Name	Description	Value	Comments
PM Job Identifier	The identifier of the PM Job	String	Set by Seller/Server
Description	The description of a PM Job	String	Set by Buyer/Client
Buyer Job ID	Identifier of the job understood and assigned by the Buyer/Client.	String	Set by Buyer/Client
PM Profile Identifier	The referenced PM Profile for this PM Job	String	Set by Buyer/Client Note: the table contains attributes that are not needed given they are in the Profile.

Attribute Name	Description	Value	Comments
			Note: PM Profile is NOT mandatory when creating a PM Job. If the PM Profile is not provided the attributes specified in the PM Profile must be provided by the Buyer/Client.
PM Job Type	The type of PM Job	One of the following: *Proactive* *OnDemand* *Passive*	This is only provided when a PM Profile ID is not specified.
PM Job Priority	The priority of the management Job. The way the management application will use the Job priority to schedule Job execution is application specific and out the scope.	Integer	Set by the Buyer/Client The priority is on a 1 - 10 scale with 1 being highest priority and 10 being lowest priority This is only provided when a PM Profile ID is not specified.
Consuming Application Indicator	The identifier of the application that consumes performance indicators.	String	Set by the Buyer/Client
Producing Application Identifier	The identifier of the application that produces performance indicators.	String	Set by Buyer/Client
Service ID	The Service ID at the To side of the Service.	String	
Service Pair	The Service ID at the From and To side of the Service.	String	
Entity Reference	The identifier of the Entity being monitored.	String	
Schedule Definition	The definition of schedule attributes	See Table 7.	Set by Buyer/Client

Attribute Name	Description	Value	Comments
Service Payload Specific Attrib-utes	List of payload specific attributes	JSON object	Set by Buyer/Client This is only pro-vided when a PM Profile ID is not specified.
Granularity	The sampling rate of the collection of performance indicators.	See Table 27.	Set by Buyer/Client
Reporting Pe-riod	List of possible result formats that de-fine how Seller/Server will deliver Per-formance Report to the Buyer/Client	One of the following: *Payload* *Attachment*	Payload Output Format for *Pay-load* is always *JSON*
Output Format	The format of the attachment output re-port	One of the following: *XML* *AVRO* *CSV* *JSON*	Set by the Buyer/Client
PM Job State	The state of the PM Job	One of: Acknowl-edged Cancelled Completed In-Progress Pending Pending Can-cel Resources Unavailable Rejected Scheduled Suspended	Set by the Seller/Server
Creation Time	Time the PM Job was created	String	Set by Seller/Server
Last Time Mod-ified	The last time a PM Job was modified.	Date - Time	Set by Seller/Server

Table 37 - Create Performance Monitoring Job Attributes

11.2.2 Modify Performance Monitoring Job Use Case

Field	Description
Use Case Number	20
Use Case Name	Modify Performance Monitoring Job

Field	Description
Description	A request initiated by the Client to the Seller/Server to modify a PM Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to modify a PM Job in the Seller/Server system. PM Job is in Scheduled or Suspended state.

Field	Description
Process Steps	1. The Buyer/Client submits a modify PM Job request with unique PM Job Identifier and specific attribute or set of attributes for modification. **[R62]** The Buyer's/Client's Modify PM Job request **MUST** include the PM Job Identifier. **[O14]** A PM Job **MAY** be scheduled as reoccurring. **[O15]** The Buyer's/Client's Modify PM Job request **MAY** include any of the following attributes as defined in Table 37:: • Description • Reporting Period • Schedule Definition • Granularity • Job Priority • Result Format • Output format • Consuming Application ID • Producing Application ID • Service Specific Configuration • Buyer Job ID 2. The Seller/Server receives the request and validates the request. **[R63]** The Seller/Server **MUST** support PM Job modifications. 3. The Seller/Server determines if the PM Job can be modified. 4. The Seller/Server returns the modified PM Job response.
Post - Conditions	1. The Buyer/Client receives a PM Job response. 2. The PM Job is modified with requested attributes changes. 3. If the Seller/Server supports notifications and the Buyer/Client has registered for notifications, the Seller/Server notifies the Buyer/Client of commitment to provide the request.

Field	Description
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response. 2. If the modification request cannot be serviced, the Seller/Server returns an error code with specific reason(s).

Table 38 - Modify Performance Monitoring Job Use Case

11.2.3 Cancel Performance Monitoring Job Use Case

Field	Description
Use Case Number	21
Use Case Name	Cancel Performance Monitoring Job
Description	A request initiated by the Client to the Seller/Server to cancel a PM Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to cancel a PM Job in the Seller/Server system.
Process Steps	1. The Buyer/Client submits a cancel PM Job request with PM Job unique identifier. **[R64]** The Buyer's/Client's Cancel PM Job request **MUST** include the PM Job Identifier. 2. The Seller/Server receives the request and validates the request. **[R65]** If the PM Job is In – Progress, Suspended, or Scheduled the Seller/Server **MUST** allow the Client to cancel the PM Job. 3. The Seller/Server determines if any PM Job exists and can be canceled. 4. The Seller/Server cancels the PM Job.
Post - Conditions	1. The Buyer/Client receives an asynchronous confirmation that the PM Job has been canceled. 2. All resources on the Seller/Server side associated with the PM Job are canceled. 3. All measurement results generated prior to cancellation remain available for collection by the unique Job ID.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response, including error codes and specific reasons(s).

Table 39 - Cancel PM Job Use Case

11.2.4 Suspend PM Job Use Case

Field	Description
Use Case Number	22
Use Case Name	Suspend Performance Monitoring Job
Description	A request initiated by the Client to the Seller/Server to suspend a PM Job.

Field	Description
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to suspend a PM Job in the Seller/Server system.
Process Steps	1. The Buyer/Client creates a Suspend PM Job request that includes the PM Job Identifier. **[R66]** The Buyer/Client's Suspend PM Job request **MUST** include the PM Job Identifier. **[R67]** The PM Job **MUST** be in the In - Progress state. *Note: in the case of a short running job, it may not be possible to suspend a job.* 2. The Seller/Server validates the Buyer/Client's Suspend PM Job request and suspends the PM Job. **[R68]** The Seller/Server's response to the Buyer/Client's Suspend PM Job request **MUST** indicate if the request is Accepted or Declined. **[R69]** If the Seller/Server accepts the Buyer/Client's Suspend PM Job request, the PM Job **MUST** be suspended and move to the Suspended state. **[R70]** If the Seller/Server declines the Buyer/Client's Suspend PM Job request, the PM Job **MUST NOT** be suspended. **[R71]** If the Seller/Server declines the Buyer/Client's Suspend PM Job request, they **MUST** provide a reason the request was declined.
Post - Conditions	1. The Buyer/Client receives a synchronous confirmation that the PM Job has been suspended. During a suspended state reports are not being generated. 2. All resources on the Seller/Server side associated with the PM Job are suspended.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response, including error codes and specific reasons(s).

Table 40 - Suspend Performance Monitoring Job Use Case

11.2.5 Resume Performance Monitoring Job Use Case

Field	Description
Use Case Number	23
Use Case Name	Resume Performance Monitoring Job

Field	Description
Description	A request initiated by the Buyer/Client to the Seller/Server to resume a PM Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to resume a PM Job in the Seller/Server system.
Process Steps	1. The Buyer/Client creates a Resume PM Job request that includes the PM Job Identifier. **[R72]** The Buyer/Client's Resume PM Job request **MUST** include the PM Job Identifier. **[R73]** The PM Job **MUST** be in the Suspended state. 2. The Seller/Server validates the Buyer/Client's Resume PM Job request and resumes the PM Job. **[R74]** The Seller/Server's response to the Buyer/Client's Resume PM Job request **MUST** indicate if the request is Accepted or Declined. **[R75]** If the Seller/Server accepts the Buyer/Client's Resume PM Job request, the PM Job **MUST** be resumed and return to the In – Progress or Scheduled state. **[R76]** If the Seller/Server declines the Buyer/Client's Resume PM Job request, the PM Job **MUST NOT** be resumed. **[R77]** If the Seller/Server declines the Buyer/Client's Resume PM Job request, they **MUST** provide a reason the request was declined. 3. The Seller/Server determines if a given PM Job exists and can be resumed. 4. The Seller/Server resumes the PM Job.
Post - Conditions	1. The Buyer/Client receives a confirmation that the PM Job has been resumed. 2. All resources on the Seller/Server side associated with the PM Job are resumed.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response, including error codes and specific reasons(s).

638 **Table 41 - Resume Performance Monitoring Job Use Case**

639 ### 11.2.6 Retrieve List of Performance Monitoring Jobs Use Case

Field	Description
Use Case Number	24
Use Case Name	Retrieve Performance Monitoring Job List
Description	A request initiated by the Buyer/Client to retrieve a PM Job List based on a filtered criterion.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to perform the query.

Process Steps	1. The Buyer/Client submits a Retrieve List of PM Job request. 2. The Buyer's/Client's Retrieve List of PM Jobs request may contain zero or more of the filter attributes. • Creation Time Lesser Than • Creation Time Greater Than • Service ID, Service Pair, or Entity Reference • Granularity • Reporting Period • Schedule Definition • Consuming Application Indicator • Job Priority • Buyer Job ID • Job Type • PM Profile Reference • Producing Application ID • State • Output Format • Result Format • Service Specific Configuration 3. The Seller/Server receives the request and validates the request. 4. The Seller/Server determines if any PM Jobs match the filter criteria in the request. 5. The Seller/Server returns a list of summarized PM Job instances. 6. The Seller/Server's response to the Buyer's/Client's retrieve List of PM Jobs includes the following attributes as applicable: • Job Identifier • Creation Time • Granularity • Reporting Period • Schedule Definition • Consuming Application Indicator • Job Priority • Description • Buyer Job ID • Job Type • PM Profile Reference • Producing Application ID • State • Service ID, Service Pair, or Entity Reference • Output Format • Result Format

Field	Description
	• Service Specific Configuration **[R78]** If the Seller/Server validates the Buyer's/Client's request but finds no matching PM Jobs, the Seller/Server **MUST** return an empty list.
Post - Conditions	1. The Buyer/Client receives a list of all PM Jobs that match the Buyer's/Client's filtered selection criteria. 2. The Buyer/Client may initiate a finer granularity query to obtain detailed information for a specific PM Job based on unique identifier.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response. 2. If the quantity of the records requested to be returned exceeds a Seller/Server policy, the Seller/Server must choose to respond with either: a. An empty list and message that indicates the result set is too large and submit a new more specific filtered query or b. A response that indicates the result is too large and includes a subset of the matching PM Jobs. 3. If the query does not find any matching records, then the Seller/Server responds with an indication of this result by sending an empty list with a success code.

Table 42 - Retrieve PM Job List Use Case

11.2.7 Retrieve PM Job by Job Identifier

Field	Description
Use Case Number	25
Use Case Name	Retrieve Performance Monitoring Job by ID
Description	A request initiated by the Buyer/Client to retrieve a PM Job based on a unique identifier, ID.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to perform the query.
Process Steps	1. The Buyer/Client creates a Retrieve PM Job by Job Identifier request. **[R79]** The Buyer/Client's Retrieve PM Job by Job Identifier request **MUST** contain the PM Job Identifier. 2. The Seller/Server validates the Buyer/Client's request and returns the details on the PM Job but not the results of the PM Job. **[R80]** The Seller/Server's response **MUST** contain all the PM Job attributes as specified in Table 37.

Field	Description
Post - Conditions	1. The Buyer/Client receives a PM Job that match the Buyer's/Client's filtered selection criteria.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response.

Table 43 - Retrieve PM Job Use Case

11.2.8 Subscribe to Performance Monitoring Job/Collection Notifications Use Case

Field	Description
Use Case Number	26
Use Case Name	Subscribe to Performance Monitoring Job/Collection Notifications
Description	A request initiated by the Buyer/Client to the Seller/Server to subscribe to PM Job/Collection Notifications.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to subscribe to PM Job/Collection Notifications in the Seller/Server system. 2. The Seller/Server support PM Job/Collection Notifications.
Process Steps	1. The Buyer/Client sends the Subscribe for PM Job/Collection Notifications as shown in table below to the Seller/Server specifying where to send notifications and which PM Job/Collection Notification Types to include in notifications. **[R81]** The Buyer/Client's Subscribe to PM Job/Collection Notifications request **MUST** include the attributes defined in Subscribe to PM Job Notifications Attributes Table. 2. The Seller/Server receives the Subscribe request for PM Job/Collection Notifications. 3. The Seller/Server records which PM Job/Collection Notifications to send, where to send such notifications for this Client. 4. The Seller/Server returns an acknowledgement to the Client.
Post - Conditions	1. The Seller/Server is aware of where to send PM Job/Collection Notifications.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

Table 44 - Subscribe to PM Job/Collection Notifications

Attribute Name	Description	Value	Comments
Notification Target Information	The detailed information on the technical API end - point address specifying where the Seller/Server	String	This is the Callback

Attribute Name	Description	Value	Comments
	is to send any PM Job Notifications. There can be multiple locations for one Buyer/Client.		target in the API
List of Notification Types	The types of notifications that the Buyer/Client wishes to receive.	List of one or more of: • PM Job Created • PM Job Attributes Modified • PM Job State Change • PM Job Results Available • PM Report Preparation Failed	This is a list of attributes

645 **Table 45 - Subscribe to PM Job Notifications Attributes**

646 ### 11.2.9 Unsubscribe from PM Job Notifications Use Case

Field	Description
Use Case Number	27
Use Case Name	Unsubscribe from Performance Monitoring Job/Collection Notifications
Description	A request initiated by the Client to unsubscribe from PM Job/Collection Notifications.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client has previously subscribed to PM Job/Collection Notifications. 2. The Buyer/Client is authorized to unsubscribe from PM Job/Collection Notifications in the Seller/Server system. 3. The Seller/Server support PM Job/Collection Notifications.
Process Steps	1. The Buyer/Client sends the Unsubscribe for PM Job/Collection Notifications to the Seller/Server specifying which PM Notification Types the Buyer/Client is unsubscribing from listening. 2. The Seller/Server receives the Unsubscribe request for PM Job/Collection Notifications. 3. The Seller/Server discontinues PM Job/Collection Notification Types to Buyer/Client specific to Unsubscribe request. 4. The Seller/Server returns an acknowledgement to the Buyer/Client.
Post - Conditions	1. The Seller/Server discontinues sending PM Job/Collection Notification Types to Client specific to Buyer/Client Unsubscribe request.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

Table 46 - Unsubscribe from Performance Monitoring Job/Collection Notifications Use Case

11.2.10 Generation of Performance Monitoring Job/Collection Notifications

Field	Description
Use Case Number	28
Use Case Name	Performance Monitoring Job/Collection Notification
Description	A PM Job/Collection Notifications is initiated by the Seller/Server to a subscribed Buyer/Client.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Seller/Server supports PM Job/Collection Notifications. 2. The Client has subscribed to PM Job/Collection Notifications.
Process Steps	1. The Seller/Server sends the PM Job/Collection Notifications to the location(s) registered by the Buyer/Client. **[R82]** The Seller/Server **MUST** send PM Job Created, PM Job Attribute Changed, PM Job State Changed, and PM Collection Notifications (Table 45) to a Buyer/Client who has subscribed to notifications. **[R83]** The Seller/Server **MUST NOT** send PM Job Created, PM Job Attribute Changed, PM Job State Changed, and PM Collection Notifications to a Buyer/Client who has not subscribed to notifications. **[R84]** The Seller/Server **MUST** include the following attributes in the PM Job State Change Notification: • Job Identifier • PM Job State for State Change Notifications – See Table 90. • Report Identifier for Collection Notification
Post - Conditions	1. The Seller/Server has sent related PM Job/Collection Notification.

Table 47 - PM Job/Collection Notifications Use Case

11.2.11 List Performance Measurement Reports

Field	Description
Use Case Number	29
Use Case Name	List Performance Measurement Reports
Description	A request initiated by the Buyer/Client to the Seller/Server to list the Performance Measurement Reports based on a filtered criterion.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve a list of Performance Measurement Reports in the Seller/Server system.

Process Steps	1. The Buyer/Client submits a Retrieve List of Performance Measurement Reports request including filter criteria the Seller/Server should apply. **[O16]** The Buyer's/Client's Retrieve List of Performance Measurement Reports request **MAY** contain none or more of the following attributes as filter criteria as defined in Table 37 and the following attributes: • Creation Time less than • Creation Time greater than • PM Job ID • Granularity • Reporting Timeframe • Output Format • Result Format • Service Specific Configuration • Service ID, Service Pair, or Entity Reference • State 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server determines if any Performance Measurement Reports match the filter criteria in the request. **[R85]** The Seller/Server **MUST** support the retrieval of a List of Performance Measurement Reports Use Case. **[R86]** Buyer/Client **MUST** support the retrieval of a List of Performance Measurement Reports Use Case. **[R87]** The Seller/Server **MUST** echo back the attributes in the Buyer/Client's request. **[R88]** The Seller/Server's response to the Buyer's/Client's retrieve List of Performance Measurement Reports **MUST** include the following attributes. • Description • Report ID • Creation date • Granularity • Service ID, Service Pair, or Entity Reference • Output Format • Performance Job Id • Reporting Timeframe • Result Format

Field	Description
	• Service Specific Configuration • State 4. If the Seller/Server validates the Buyer's/Client's request but finds no matching Performance Measurement Reports, the Seller/Server **MUST** return an empty list.
Post - Conditions	1. The Buyer/Client receives a list of all Performance Measurement Reports that match the Buyer's/Client's filtered selection criteria. 2. The Buyer/Client may initiate a finer granularity query to obtain detailed information for a specific Performance Measurement Reports based on unique identifier.

652 **Table 48 - List Performance Measurement Reports Use Case**

653 ### 11.2.12 Collect Performance Measurement Report

Field	Description
Use Case Number	30
Use Case Name	Collect Performance Measurement Report
Description	A request initiated by the Buyer/Client to the Seller/Server to collect a Performance Measurement Report. *NOTE: This use case covers the two scenarios where the PM Job is explicitly called and where the SLS is passed within the Service Order activations. In either case, a PM Job is created.* *Retrieving a report after a PM Job and/or Service have been canceled is beyond the scope of this document and is dependent on the implementation.*
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to collect a Performance Measurement Report in the Seller/Server system.

Field	Description
Process Steps	1. The Buyer/Client submits a Collect Performance Measurement Report request using the PM Report identifier **[R89]** The Buyer request **MUST** include the following: • Performance Report ID *NOTE: Service ID, Service Pair, or Entity Reference (attribute of envelope) should be used to list all reports available for a given service or entity. These reports could be described with some details (e.g., reporting period) to help client understand which reports to query. Selected report ids can then be used to query the content.* 2. .The Seller/Server receives the request and validates the request. a. The Seller/Server's response includes the results from the specified report as payload in the envelope. b. The Seller/Server's response includes the results as an attachment.
Post - Conditions	1. The Client receives the Performance Measurement Report that match the Client's selection criteria. *NOTE: In some cases of late events, the same collection queried twice may return different results.* 2. If errors occurred, the Seller/Server returns all identified errors in a reject response.
Alternative Paths	1. The Client receives the call location where the file collection for the Performance Measurement Report.

654 **Table 49 - Collect Performance Measurement Report Use Case**

Attribute Name	Description	Value	Comments
Report Identifier	The identifier of the PM Job Result Report	String	Set by the Seller/Server
PM Job Attributes	The initial PM Job attributes set including Service ID, Service Pair, or Entity Reference.	See Table 37.Table 37 - Create Performance Monitoring Job Attributes	
Results which are technology/service specific.			

655 **Table 50 - Performance Monitoring Job Results**

656 Table 50 shows the Performance Job attributes that define how Performance Report will be col-
657 lected.

658

Field Name	Field Format	Field Description
File Location	String ($uri)	File location.

Field Name	Field Format	Field Description
Retention Period	Date/Time	A Data/Time to retain the file(s) until.

Table 51 - File Transfer Data Attributes

[R90] The results regardless of the format **MUST** contain the PM Metric results as specified with PM Job request using the Output Format attribute.

12 Passive Statistics Use Cases

The following section details the set of use cases needed to support the collection and reporting of network and service performance (i.e., bandwidth utilization) and error statistics. The statistics collections include but are not limited to telemetry associated with an interface, (Net/Application) Flow, VLAN, bridging/Ethernet, IP, TCP, UDP layers.

The statistics measured in this section are outside the realm of measuring and reacting to performance objectives. Example statistics are errored frames in and out, packet utilization in and out. These are individually enabled and measured without an objective. This is opposed to such SLS attributes as packet loss ratio, packet transfer delay. Performance objectives are associated with a Service Level Specification (SLS). In some cases, these are statistics that do not need to be configured, but are enabled and ready for collection on an interface, VLAN, etc. This requires a PM Job to be configured to support passive statistic collection.

The representation of a unique identifier can be associated with a service, or entity. An entity could be a port, interface, VLAN, etc. An entity may or may not be associated with an existing service. An entity will have a unique identifier that needs to be reference as part of a Job. As an example, a Buyer/Client may be aware of a UNI Service ID and request that a given VLAN ID be monitored on the UNI. Service ID, Service Pair, and Entity Reference are mutually exclusive.

12.1 Passive Statistics Collection Use Cases

This section defines the set use cases that are associated with the creation and management of a Passive PM Job. There are two types of statistics collections, real - time and historical. A real - time request is a snapshot of the current statistics being requested. The main difference between real - time and historical statistics collection is the start and stop times. A historical request requires a specified query filter with such attributes as start time and end time. Suspend and Resume use cases are described in sections 11.2.4 and 11.2.5.

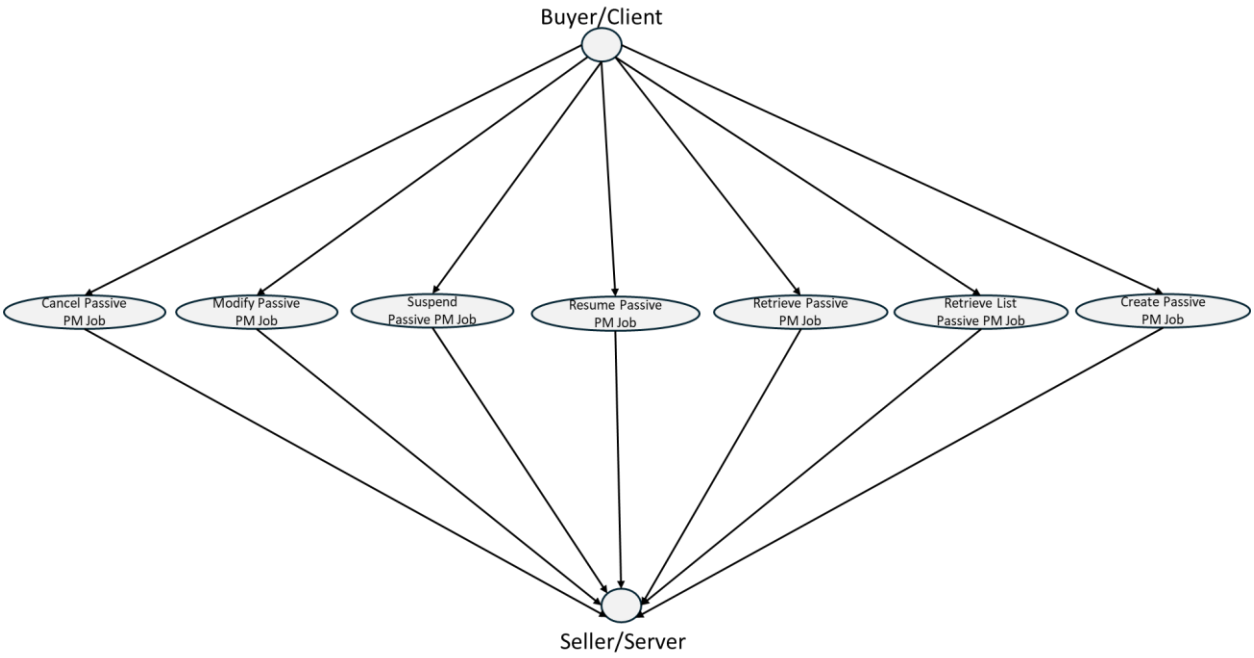


Figure 8 - Passive Statistics Job and Collection Use Cases

The Client can retrieve specified statistics. The Seller/Server will respond to the query request with the statistics per attribute.

12.1.1 Create Passive Performance Monitoring Job Use Case

Field	Description
Use Case Number	36
Use Case Name	Create Passive Performance Monitoring Job
Description	A request initiated by the Buyer/Client to create a Statistics Collection Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to create a Passive PM Job from the Seller/Server.

Process Steps	1. The Buyer/Client determines the statistics, measurement interval that will be used in initiate a Passive PM Job. 2. The Buyer/Client initiates and submits a Passive PM Job request that contains a Service Identifier, Service Pair (From/To) or Entity Reference, Performance Indicator Specification (Service Specific Configuration) and Schedule Definition. **[R91]** The Buyer's/Client's Create Passive PM Collection Job **MUST** provide the following attributes: • PM Profile ID (optional) • Job Type = Passive • Reporting Period (not used with Profile) • Service Specific Configuration (Payload) (not used with Profile) • Service ID (not provided if Entity Reference is specified) • Service Pair (not provided if Entity Reference is specified) • Entity Reference (not provided if Service ID is specified) • Schedule Definition • Granularity (not used with Profile) • Output Format (not used with Profile) • Result Format (not used with Profile) Note: PM Profile ID is not required if the Create PM Job defines all Profile attributes. **[O17]** The Buyer's/Client's Passive PM Collection Job **MAY** contain the following attributes: • Description • PM Job Priority • Buyer Job ID • Producing Application ID • Consuming Application ID 3. The Seller/Server validates the Passive PM Job request and responds with Statistics Collection Job including a unique identifier, ID in response. **[R92]** The Seller/Server **MUST** assign a Passive PM Job Identifier to the Passive PM Job that is unique within the network.

Field	Description
	[R93] The Passive PM Job Identifier supplied by the Seller/Server **MUST** be unique within the Seller/Server's network. **[R94]** The Passive PM Job **MUST** use the attributes included in the Buyer's/Client's Create Passive PM Collection Job request.
Post - Conditions	1. The Buyer/Client receives a Response, including a Passive PM Collection Job Identifier. 2. The Seller/Server initiates a Passive PM Job. 3. If the Seller/Server supports notifications and the Buyer/Client has registered for notifications, the Seller/Server notifies the Buyer/Client of commitment to provide the request. 4. The Seller/Server notifies the Buyer/Client when Job results are available. **[R95]** If the Buyer/Client registered for PM Notifications, the Seller/Server **MUST** notify the Buyer/Client when Passive PM Collection Job results are available.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from creating the Passive PM Collection Job.

694 **Table 52 - Create Passive PM Job Use Case**

695 ### 12.1.2 Modify Passive PM Job Use Case

Field	Description
Use Case Number	37
Use Case Name	Modify Passive Performance Monitoring Job
Description	A request initiated by the Buyer/Client to the Seller/Server to modify a Passive PM Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to modify a Passive PM Job in the Seller/Server system. 2. The Passive PM Job is in a Suspended state or is in the Scheduled state.

Field	Description
Process Steps	1. The Buyer/Client creates a Modify Statistics Collection Job request that includes the Statistics Collection Job Identifier and the attribute(s) to be modified. **[R96]** The Buyer's/Client's Modify Statistics Collection Job request **MUST** include the Statistics Collection Job Identifier. **[O18]** The Buyer's/Client's Modify Statistics Collection Job request **MAY** include one or more of the following attributes: • Granularity • Reporting Period • Job Priority • Service Specific Configuration • Schedule • Consuming Application Identifier • Producing Application Identifier • Result Format • Output Format • Description • Buyer Job ID 2. The Seller/Server receives the request and validates the request. **[R97]** The Seller/Server **MUST** support Statistics Collection Job modifications. 3. The Seller/Server determines if specified Statistics Collection Job can be modified. 4. The Seller/Server returns an immediate response.
Post - Conditions	1. The Buyer/Client receives a Statistics Collection Job immediate response. 2. The Statistics Collection Job is modified with requested attributes changes. 3. If the Seller/Server supports notifications and the Buyer/Client has registered for notifications, the Seller/Server notifies the Buyer/Client of update to state of Statistics Collection Job.
Alternative Paths	1. If the modification request cannot be serviced, the Seller/Server returns an error code with specific reason(s).

696 **Table 53 - Modify Passive Performance Monitoring Job Use Case**

12.1.3 Cancel Passive Performance Monitoring Job Use Case

Field	Description
Use Case Number	38
Use Case Name	Cancel Passive PM Job
Description	A request initiated by the Client to the Seller/Server to cancel a Statistics Collection Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to cancel a Passive PM Job in the Seller/Server system. 2. The Passive PM Job is in an In-Progress, Scheduled, or Suspended state.
Process Steps	1. The Buyer/Client submits a Cancel Statistics Collection Job request with Statistics Collection Job unique identifier. **[R98]** The Buyer's/Client's Cancel Statistics Collection Job request **MUST** include the Statistics Collection Job Identifier. 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server determines if the Statistics Collection Job specified by Identifier exists and can be canceled. 4. The Seller/Server cancels the Statistics Collection Job.
Post - Conditions	1. The Buyer/Client receives a confirmation that the Statistics Collection Job has been canceled. 2. All resources on the Seller/Server side associated with the Statistics Collection Job are canceled.
Alternative Paths	1. If the cancellation request cannot be serviced, the Seller/Server returns an error code with specific reason(s).

Table 54 - Cancel Passive Performance Monitoring Job Use Case

12.1.4 Suspend Passive PM Job Use Case

Field	Description
Use Case Number	39
Use Case Name	Suspend Passive Performance Monitoring Job
Description	A request initiated by the Client to the Seller/Server to suspend a Passive PM Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to suspend a Passive PM Job in the Seller/Server system.

Field	Description
Process Steps	1. The Buyer/Client creates a Suspend Passive PM Job request that includes the Passive PM Job Identifier. **[R99]** The Buyer/Client's Suspend Passive PM Job request **MUST** include the Passive PM Job Identifier. **[R100]** The Passive PM Job **MUST** be in the In - Progress state. Note: in the case of a short running job, it may not be possible to suspend a job. 2. The Seller/Server validates the Buyer/Client's Suspend Passive PM Job request and suspends the PM Job. **[R101]** The Seller/Server's response to the Buyer/Client's Suspend Passive PM Job request **MUST** indicate if the request is Accepted or Declined. **[R102]** If the Seller/Server accepts the Buyer/Client's Suspend Passive PM Job request, the Passive PM Job **MUST** be suspended and move to the Suspended state. **[R103]** If the Seller/Server declines the Buyer/Client's Suspend Passive PM Job request, the Passive PM Job **MUST NOT** be suspended. **[R104]** If the Seller/Server declines the Buyer/Client's Suspend Passive PM Job request, they **MUST** provide a reason the request was declined.
Post - Conditions	1. The Buyer/Client receives a synchronous confirmation that the PM Job has been suspended. During a suspended state reports are not being generated. 2. All resources on the Seller/Server side associated with the PM Job are suspended.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response, including error codes and specific reasons(s).

700 **Table 55 - Suspend Passive Performance Monitoring Job Use Case**

701 ### 12.1.5 Resume Passive Performance Monitoring Job Use Case

Field	Description
Use Case Number	40
Use Case Name	Resume Passive Performance Monitoring Job

Field	Description
Description	A request initiated by the Buyer/Client to the Seller/Server to resume a Passive PM Job.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to resume a Passive PM Job in the Seller/Server system.
Process Steps	1. The Buyer/Client creates a Resume Passive PM Job request that includes the PM Job Identifier. **[R105]** The Buyer/Client's Resume Passive PM Job request **MUST** include the PM Job Identifier. **[R106]** The Passive PM Job **MUST** be in the Suspended state. 2. The Seller/Server validates the Buyer/Client's Resume Passive PM Job request and resumes the PM Job. **[R107]** The Seller/Server's response to the Buyer/Client's Resume Passive PM Job request **MUST** indicate if the request is Accepted or Declined. **[R108]** If the Seller/Server accepts the Buyer/Client's Resume Passive PM Job request, the PM Job **MUST** be resumed and return to the In – Progress or Scheduled state. **[R109]** If the Seller/Server declines the Buyer/Client's Resume Passive PM Job request, the PM Job **MUST NOT** be resumed. **[R110]** If the Seller/Server declines the Buyer/Client's Resume Passive PM Job request, they **MUST** provide a reason the request was declined. 3. The Seller/Server determines if a given PM Job exists and can be resumed. 4. The Seller/Server resumes the PM Job.
Post - Conditions	1. The Buyer/Client receives a confirmation that the PM Job has been resumed. 2. All resources on the Seller/Server side associated with the PM Job are resumed.
Alternative Paths	2. If errors occurred, the Seller/Server returns all identified errors in a reject response, including error codes and specific reasons(s).

Table 56 - Resume Passive Performance Monitoring Job Use Case

703

12.1.6 Retrieve List of Passive Performance Monitoring Jobs Use Case

Field	Description
Use Case Number	41
Use Case Name	Retrieve Passive Performance Monitoring Job List
Description	A request initiated by the Buyer/Client to retrieve a Passive PM Job List based on a filtered criterion.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to perform the query.

Process Steps	1. The Buyer/Client submits a Retrieve List of Passive PM Job request. **[O19]** The Buyer's/Client's Retrieve List of Passive PM Jobs request **MAY** contain zero or more of the filter attributes. • Creation Time Lesser Than • Creation Time Greater Than • Service ID • Service Pair • Entity Reference • Granularity • Reporting Period • Schedule Definition • Consuming Application Indicator • Job Priority • Buyer Job ID • Job Type • PM Profile Reference • Producing Application ID • State • Output Format • Result Format • Service Specific Configuration 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server determines if any Passive PM Jobs match the filter criteria in the request. 4. The Seller/Server returns a list of summarized Passive PM Job instances. **[R111]** The Seller/Server's response to the Buyer's/Client's retrieve List of Passive PM Jobs **MUST** include the following attributes as applicable: • Job Identifier • Creation Time • Granularity • Reporting Period • Schedule Definition • Consuming Application Indicator • Job Priority • Description • Buyer Job ID

Field	Description
	• Job Type • PM Profile Reference • Producing Application ID • State • Service ID, Service Pair, or Entity Reference • Output Format • Result Format • Service Specific Configuration **[R112]** If the Seller/Server validates the Buyer's/Client's request but finds no matching Passive PM Jobs, the Seller/Server **MUST** return an empty list.
Post - Conditions	1. The Buyer/Client receives a list of all Passive PM Jobs that match the Buyer's/Client's filtered selection criteria. 2. The Buyer/Client may initiate a finer granularity query to obtain detailed information for a specific Passive PM Job based on unique identifier.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response. 2. If the quantity of the records requested to be returned exceeds a Seller/Server policy, the Seller/Server must choose to respond with either: a. An empty list and message that indicates the result set is too large and submit a new more specific filtered query or b. A response that indicates the result is too large and includes a subset of the matching PM Jobs. 3. If the query does not find any matching records, then the Seller/Server responds with an indication of this result by sending an empty list with a success code.

704 **Table 57 - Retrieve Passive PM Job List Use Case**

705 ### 12.1.7 Retrieve PM Job by Job Identifier

Field	Description
Use Case Number	42
Use Case Name	Retrieve Passive Performance Monitoring Job by ID
Description	A request initiated by the Buyer/Client to retrieve a Passive PM Job based on a unique identifier, ID.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to perform the query.

Field	Description
Process Steps	1. The Buyer/Client creates a Retrieve Passive PM Job by Job Identifier request. **[R113]** The Buyer/Client's Retrieve Passive PM Job by Job Identifier request **MUST** contain the PM Job Identifier. 2. The Seller/Server validates the Buyer/Client's request and returns the details on the Passive PM Job but not the results of the PM Job. **[R114]** The Seller/Server's response **MUST** contain all the PM Job attributes as specified in Table 37.
Post - Conditions	1. The Buyer/Client receives a Passive PM Job that match the Buyer's/Client's filtered selection criteria.
Alternative Paths	1. If errors occurred, the Seller/Server returns all identified errors in a reject response.

706 **Table 58 - Retrieve Passive PM Job Use Case**

707 ### 12.1.8 List Passive Statistics Reports

Field	Description
Use Case Number	39
Use Case Name	List Passive Statistics Reports
Description	A request initiated by the Buyer/Client to the Seller/Server to list the Passive Statistics Reports based on a filtered criteria.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve a list of Performance Measurement Reports in the Seller/Server system.

Field	Description
Process Steps	1. The Buyer/Client submits a Retrieve List of Performance Measurement Reports request including filter criteria the Seller/Server must apply. 2. The Seller/Server receives the request and validates the request. 3. The Seller/Server determines if any Performance Measurement Reports match the filter criteria in the request. **[R115]** The Seller/Server **MUST** support the retrieval of a List of Performance Measurement Reports Use Case. **[R116]** Buyer/Client **MUST** support the retrieval of a List of Performance Measurement Reports given a PM Job Identifier as filter criteria. **[R117]** The Seller/Server's response to the Buyer's/Client's retrieve List of Performance Measurement Reports **MUST** the following attributes associated with the Performance Management Job but not the results of that job: • Creation Time less than • Creation Time greater than • PM Job ID • Granularity • Reporting Timeframe • Output Format • Result Format • Service Specific Configuration • Service ID (not provided if Entity Reference is specified) • Service Pair (not provided if Entity Reference is specified) • Entity Reference (not provided if Service ID is specified) • State • Description • PM Report ID **[R118]** If the Seller/Server validates Buyer's/Client's request but finds no matching Performance Measurement Reports, the Seller/Server **MUST** return an empty list.

Field	Description
Post - Conditions	1. The Buyer/Client receives a list of all Performance Measurement Reports that match the Buyer's/Client's filtered selection criteria. 2. The Buyer/Client may initiate a finer granularity query to obtain detailed information for a specific Performance Measurement Report based on unique identifier.

708 **Table 59 - List Performance Measurement Reports Use Case**

709 ### 12.1.9 Collect Passive Statistics Report

Field	Description
Use Case Number	40
Use Case Name	Collect Passive Statistics Report
Description	A request initiated by the Buyer/Client to the Seller/Server to collect a Statistics Collection Report.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to collect a Statistics Collection Report in the Seller/Server system.
Process Steps	1. The Buyer/Client submits a Retrieve Statistics Collection Report request as for Results in Payload or Results as Attachment. The Client sends the Report identifier used in the request to identify the Report to collect. **[R119]** The Seller **MUST** support at least one of the two methods of retrieving results mentioned above. **[O20]** The Seller **MAY** support multiple methods of retrieving results. 2. Retrieve Result: The Buyer/Client submits a Retrieve Results in Payload request to the Seller/Server. 3. The Seller/Server receives the request and validates the request. 4. The Seller/Server's response includes the results from the report as payload in the envelope. **[R120]** The Seller/Server **MUST** provide the specified result in the API payload. 5. The Seller/Server's response includes the results from the specified report as an Attachment. **[R121]** The Seller/Server **MUST** provide the specified results as an attachment.

Field	Description
Post - Conditions	1. The Client receives the location where the file collection for the Statistics Collection Report is stored in Attachment mode only. 2. The Client receives the Statistics Collection Report that match the Client's filtered selection criteria. *NOTE: In some cases of late events, the same collection queried twice may return different results.* 3. If errors occurred, the Seller/Server returns all identified errors in a reject response.

710 **Table 60 - Collect Statistics Report Use Case**

711

13 Streaming Use Cases

Buyer/Clients may desire to receive streaming telemetry. Event streaming is the practice of capturing data in real - time from event sources like databases, sensors, mobile devices, cloud services, and software applications in the form of streams of events; storing these event streams durably for later retrieval; manipulating, processing, and reacting to the event streams in real - time as well as retrospectively; and routing the event streams to different destination technologies as needed.

Buyer/Clients subscribe to streaming telemetry using similar mechanisms as they use for Notifications. Because the streaming telemetry is provided in real - time or near real - time, the existing PM Notifications and retrieval is not expected to support streaming. Instead, it is expected that streamed telemetry will use some other mechanism to deliver results. While it is outside of the scope of this document to define how API implementations support streaming, discussions on binary implementations such as Kafka are thought to have the potential to support the requirements defined within this document.

The available telemetry that may be streamed are described as Topics within this document. The Buyer/Client can retrieve a list of available Topics, a list of Topics they have subscribed to, and a specific Topic. The Buyer/Client is then able to select a Topic and subscribe to that Topic. Streaming telemetry is sent by the Seller/Server to the Buyer/Client for the Topic as Messages.

Streaming is an implementation of a specific Pub/Sub pattern. A major characteristic of streaming is the events are in most cases being produced, ingested, and consumed at a high rate. An Event Driven Architecture (EDA) is needed to implement a streaming service and corresponding API. A general EDA is shown in the figures below. The architecture has three main components – Event Producer, Broker, and Event Consumer.

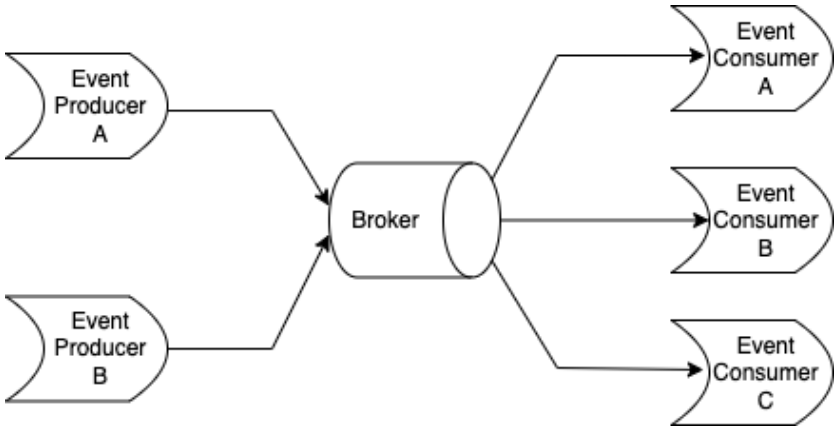
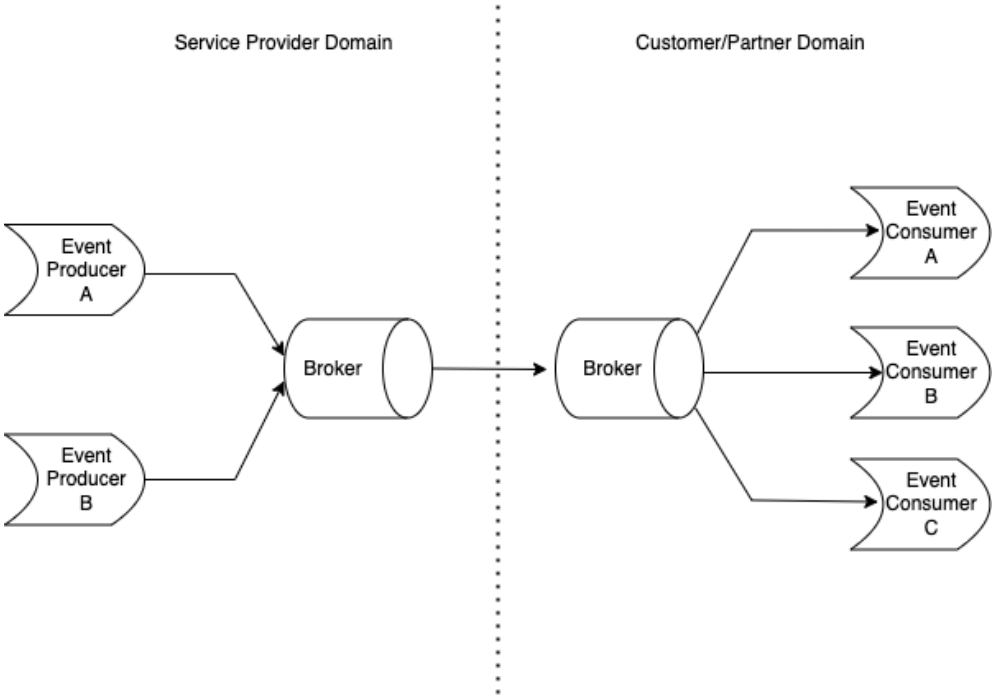


Figure 9 - Event Driven Architecture

A similar architecture between LSO Domains occurs with a Broker - to - Broker communication path is illustrated below.



738

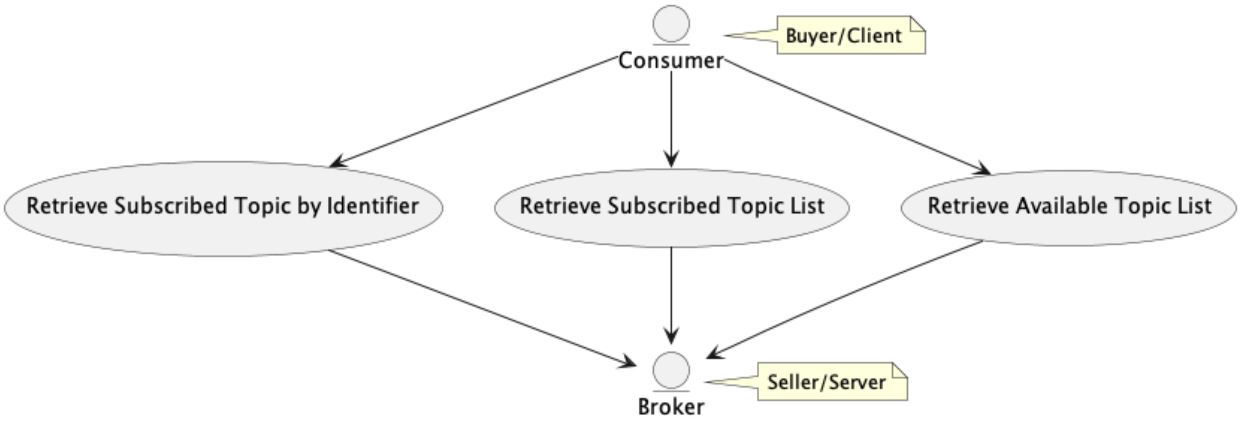
739 **Figure 10 - Broker - to - Broker Event Driven Architecture**

740 The Legato IRP provides a demarcation between the Event Producer/Event Ingestion and the cor-
741 responding Event Consumers. The EDA requires a mechanism for the Event Consumer to sub-
742 scribe to a specific topic. The Event Producer will send the asynchronous Events to the Event
743 Ingestion where the set of Event Consumers will receive the subscribed Events.

744 The major goal of the use cases defined for streaming will be in the development of a streaming
745 API. The streaming API will enable streaming of events using the EDA push technology and pro-
746 vide a subscription mechanism. The API will need to support multiple types of streaming events,
747 including, but not limited to generic events, platform events.

748 13.1 Streaming (Topics) Use Cases

749 The following sub - section defines use cases for the Topic management. Use cases are provided
750 for a Consumer to get a list of available topics to listen to, Consumer to get their subscribed topic
751 list and Consumer to get their specific subscriber topic.



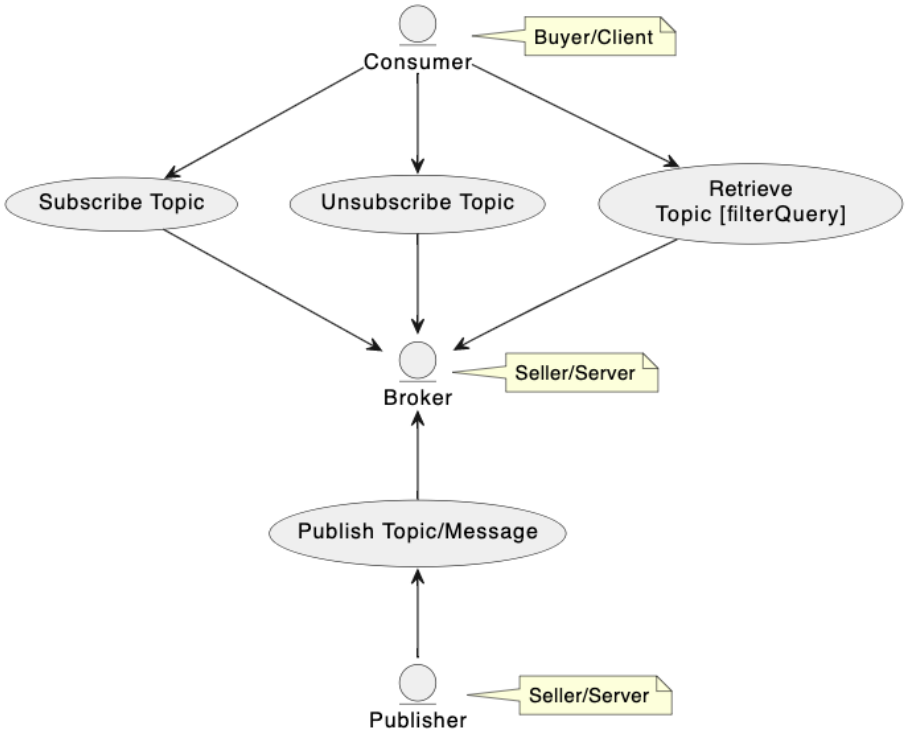
752

753 **Figure 11 - Streaming (Topics) Use Cases**

754 13.2 Subscribe/Publish Streaming Use Cases

755

756 The following sub - section defines use cases for the subscribe and publish streaming use cases.
757 The Consumer can subscriber and unsubscribe to/from a Topic. The Consumer can retrieve po-
758 tentially missed Topics due to a loss of communication based on an unfiltered or filtered query.
759 The Publisher can publish Topics.



760

761 **Figure 12 - Subscriber/Publish Streaming Use Cases**

762 The communications between a Publisher and Consumer are not direct, but through a Broker. The
763 Broker is responsible for the distribution of Topics with respective Messages to the set of Con-
764 sumers that have subscribed to the specific Topic.

765 ### 13.2.1 Retrieve Topic by Identifier Use Case

Field	Description
Use Case Number	41
Use Case Name	Retrieve Topic by Identifier
Description	A request is initiated by the Buyer/Client (Subscriber) to retrieve a Topic that match the provided filter criteria.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to perform a Topic query.
Process Steps	1. The Buyer/Client submits a Retrieve Topic by Topic Identifier request that includes the Topic Identifier. **[R122]** The Buyer/Client's Retrieve Topic by Topic Identifier **MUST** contain the Topic Identifier. **[R123]** The Topic Identifier supplied by the Seller/Server **MUST** be unique within the Seller/Server's network. 2. The Seller/Server validates the Buyer/Client's Retrieve Topic by Topic Identifier and returns the attributes in Topics Attribute table.
Post - Conditions	1. The Buyer/Client receives a Topic that match the Topic Identifier specified in the request.
Alternative Paths	1. If errors are encountered, the Seller/Server returns all identified errors in a reject response. 2. If the quantity of records exceeds a Seller/Server's policy, the Seller/Server must choose to respond with either: a. An empty list and message that indicates the result set is too large and submit a new more specific query b. A response that indicates the result is too large and includes a subset of the matching Topics. 3. If the query does not find any matching records, then the Seller/Server responds with an indication of this result by sending an empty list with a success code.

766 **Table 61 - Get Subscriber Topic Use Case**

Field Name	Field Value	Field Format	Field Description
Topic Identifier	The Seller/Server assigned Topic Identifier	String	Set by the Seller/Server
Topic Category	A description of the area that the Topic covers.	One of: Layer 1 Ethernet IP SD - WAN Computing Storage Memory	Agreed to by the Buyer/Client and Seller/Server during on - boarding. The enumeration may include additional items as agreed to by the Buyer/Client and Seller/Server.

Field Name	Field Value	Field Format	Field Description
Service Specific Configuration	Defined per the Service Specification		Set by the Seller/Server Describes the Topic Attributes that are returned for the Topic.

767 **Table 62 - Topic Attributes**

768 ### 13.2.2 Retrieve Available Topic List Use Case

Field	Description
Use Case Number	42
Use Case Name	Retrieve Available Topic List
Description	A request is initiated by the Buyer/Client (Subscriber) to retrieve a Topic list.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve a list of available Topics that the Seller/Server supports.
Process Steps	1. The Buyer/Client submits a Retrieve Available Topic List request with that contain any filter criteria. **[O21]** The Buyer's/Client's Retrieve Available Topic List request **MAY** contain filter criteria of the Topic Category. 2. The Seller/Server validates the Buyer's/Client's request and responds with a list of Topics that the Buyer/Client are available and that match the filter criteria. **[R124]** If there are no Topics that match the filter criteria, the Seller/Server **MUST** return an empty list.
Post - Conditions	1. The Buyer/Client receives a Response with the list of or Available Topics.
Alternative Paths	1. If errors are encountered, the Seller/Server returns all identified errors in a reject response. 2. If the quantity of records exceeds a Seller/Server's policy, the Seller/Server must choose to respond with either: a. An empty list and message that indicates the result set is too large and submit a new more specific query. b. A response that indicates the result is too large and includes a subset of the matching Topics. 3. If the query does not find any matching records, then the Seller/Server responds with an indication of this result by sending an empty list with a success code.

769 **Table 63 - Retrieve Available Topic List Use Case**

13.2.3 Retrieve Subscribed Topic List Use Case

Field	Description
Use Case Number	43
Use Case Name	Retrieve Subscribed Topic List
Description	A request is initiated by the Buyer/Seller (Subscriber) to retrieve a Topic list which the Subscriber is currently subscribed.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve a Subscriber Topic List in the Seller/Server system.
Process Steps	1. The Buyer/Client submits a Get Subscriber Topic List request with that contain any filter criteria. **[O22]** The Client's Retrieve Subscribed Topic List request **MAY** contain filter criteria of the Topic Category. 2. The Seller/Server validates the Buyer's/Client's request and responds with a list of Topics that the Buyer/Client has subscribed to and that match the filter criteria. **[R125]** The Seller/Server's response **MUST** include a list of Topics that the Client has subscribed to and match the filter criteria. **[R126]** If there are no Topic Identifiers that match the filter criteria, the Seller/Server **MUST** return an empty list.
Post - Conditions	1. The Buyer/Client receives a Response with the list of Subscriber Topics currently subscribed to as in Table 66.
Alternative Paths	1. If errors are encountered, the Seller/Server returns all identified errors in a reject response. 2. If the quantity of records exceeds a Seller/Server's policy, the Seller/Server must choose to respond with either: a. An empty list and message that indicates the result set is too large and submit a new more specific query. b. A response that indicates the result is too large and includes a subset of the matching Topics. 3. If the query does not find any matching records, then the Seller/Server responds with an indication of this result by sending an empty list with a success code.

Table 64 - Get Subscribed Topic List Use Case

13.2.4 Subscribe to Topic Use Case

Field	Description
Use Case Number	44
Use Case Name	Subscribe to Topic

Field	Description
Description	A request is initiated by the Buyer/Client (Subscriber) to subscribe to a Topic.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to request an Available Topic List in the Seller/Server system.
Process Steps	1. The Buyer/Client requests a subscribe to a specific Topic. **[R127]** The Buyer/Client's Subscribe to Topic request **MUST** include the attributes (with exception of those set by Seller/Server) shown in Subscribe Topic Attributes Table 66. **[R128]** The Seller/Server validates the Buyer/Client's request and responds with an indication of whether the request was accepted or declined. 2. If accepted the response includes the Stream Identifier as shown in Subscribe Topic Attributes table. **[R129]** The Seller/Server's response to the Buyer/Client's Subscribe to Topic request **MUST** indicate if the request was accepted or declined. **[R130]** If declined, the Seller/Server **MUST** include the reason the request was declined. **[R131]** If accepted, the Seller/Server **MUST** include the Stream Identifier in their response and start streaming the PM reports to the Buyer/Client.
Post - Conditions	1. The Buyer/Client receives subscription confirmation that includes all necessary details that will allow for consumption of message from the topic.
Alternative Paths	1. If errors are encountered, the Seller/Server returns all identified errors in a reject response.

773 **Table 65 - Subscribe to Topic Use Case**

Field Name	Field Value	Field Format	Field Description
Topic Identifier		String	Set by the Seller/Server. The Seller/Server assigned Topic Identifier
Stream Identifier		String	Set by Seller/Server. Unique identifier for each stream.

Field Name	Field Value	Field Format	Field Description
Description		String	An explanatory of the stream.
Title		String	The title of the stream.
Priority		String	Priority of stream.
ipAddress		String	IP Address for callback.
Port		String	Port for callback.
Protocol		String	Protocol for callback.

774 **Table 66 - Subscribed or Available to Topic Attributes**

775 ### 13.2.5 Unsubscribe from Topic Use Case

Field	Description
Use Case Number	45
Use Case Name	Unsubscribe from a Topic
Description	A request is initiated by the Buyer/Client (Subscriber) to unsubscribe from a Topic.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to unsubscribe from a Topic in the Seller/Server system.
Process Steps	1. The Client submits an Unsubscribe to Topic request that includes the Subscription Name. **[R132]** The Client's Unsubscribe to Topic request **MUST** contain the Subscription Name that is to be unsubscribed. 2. The Seller/Server Validates the Client's request and responds with an indication whether the request was accepted or declined. **[R133]** The Seller/Server's response to the Client's Unsubscribe to Topic request **MUST** indicate if the request was accepted or declined. **[R134]** If declined, the Seller/Server **MUST** include the reason the request was declined. **[R135]** If accepted, the Seller/Server **MUST** stop streaming the PM reports to the Client.
Post - Conditions	1. The Client receives a Response indicating a Topic has been unsubscribed from. 2. The Client will no longer receive any Messages from the specified Topic.

Field	Description
Alternative Paths	1. The Seller/Server will return an error message if an error is encountered during processing. 2. The Seller/Server returns an error message if any mandatory attributes are missing.

776 **Table 67 - Unsubscribe from a Topic Use Case**

777 ### 13.2.6 Publish Topic Message Use Case

Field	Description
Use Case Number	46
Use Case Name	Publish Topic Message
Description	A Seller/Server (Publisher) publishes a Topic/Message to Buyers/Sellers (Subscriber(s)).
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to subscribe to Topics in the Seller/Server system.
Process Steps	**[R136]** The Seller/Server **MUST** publish Topic Messages to Buyer/Clients who have subscribed to the Topic. **[R137]** The Topic Message **MUST** contain the attributes shown in Publish Topic Attributes table. **[R138]** The Seller/Server **MUST NOT** publish Topic Messages to Buyer/Clients who have not subscribed to the Topic. **[R139]** The Seller/Server **MAY** stop publishing Topic Messages to a Buyer/Client if no acknowledgement is received from the Buyer/Client. 1. It is recommended that if the Seller/Server opts to stop publishing Topic Messages to a Buyer/Client, that they make this decision based on multiple messages that receive no acknowledgement rather than a single message. **[R140]** The Buyer/Client receives the Topic Message.
Post - Conditions	1. The Client receives a Topic/Message with all attributes.

778 **Table 68 - Publish Topic Use Case**

Attribute Name	Description	Value	Comments
Stream Identifier	The Seller/Server assigned unique identifier.	String	Set by the Seller/Server

Attribute Name	Description	Value	Comments
Event ID	The identifier of the Notification.	String	Set by Seller/Server
Event Time	Time of the Event occurrence.	Date - Time	Set by Seller/Server
Event Type	The type of Notification.	String	Set by Seller/Server
Correlation ID	The correlation ID for this Event.	String	Set by Seller/Server
Priority	A priority.	String	Set by Seller/Server
Message	Actual event		

779 **Table 69 - Publish Topic Message Attributes**

780 ### 13.2.7 Retrieve Topic Message Use Case

Field	Description
Use Case Number	47
Use Case Name	Retrieve Topic/Messages
Description	A Buyer/Client retrieves the Topic/Message that it is subscribed to.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Client is authorized to request a Topic in the Seller/Server system.
Process Steps	1. The Buyer/Client submits a Retrieve Topic Message request that includes the Stream Identifier and a range of Event Dates. **[R141]** The Buyer/Client's Retrieve Topic Message **MUST** include the Stream Identifier and a range of Event Dates. **[O23]** The Buyer/Client's Retrieve Topic Message **MAY** include other attributes from Table 69. 2. The Seller/Server returns a list of Topic Messages that match the filter criteria provided by the Buyer/Client. **[R142]** The Seller/Server's response **MUST** include a list of Topic Messages including all attributes that are shown in Table 69 that match the filter criteria. **[R143]** If the Seller/Server finds no Topic Messages that match the filter criteria, they **MUST** return an empty list.
Post - Conditions	1. The Client receives a Message with all attributes.

781 **Table 70 - Retrieve Messages from a Topic Use Case**

14 Alarm Management Use Cases

An alarm is defined in ITU - T X.733 [3] as a notification of a specific event. An alarm may or may not represent an error. Not all alarms are an indication of a failure.

Alarms are specific types of notifications concerning detected faults or abnormal conditions. An important criterion by which failures of communications resources are to be reported is the level to which the fault degrades the quality of the service that was originally requested by (or promised to) the service user. Malfunctions will range in severity from Warning, where there is no impact upon the quality of service offered to the user, to Critical, where it is no longer possible to provide the service requested by (or promised to) the service user. The level of severity can be described generically, and criteria specified based upon the level of degradation that the fault causes to the service: Critical, Major, Minor or Warning.

This section provides a set of Use Cases needed to support Alarm Management.

These Use Cases are based on business process standards of interactivity between Buyer/Client and Seller/Server of Alarm management. The Alarm resource should be represented by the information model defined in ITU - T X.733 [3].

14.1 Alarm Management Use Cases

This section defines the use cases that support Alarm Management Use Cases. Alarms are used to inform the listening client that a Threshold Crossing Alert or other fault has occurred. The alarm indicates a TCA has been crossed, which is independent of the state of the service. The service will have its own operational state.

NOTE: Given the interaction between a TCA and an Alarm there is likely an interaction between intra - SOF functional components. For example, a TCA is a combination of a Performance Management functional component and Fault Management functional component where thresholds can be provisioned.

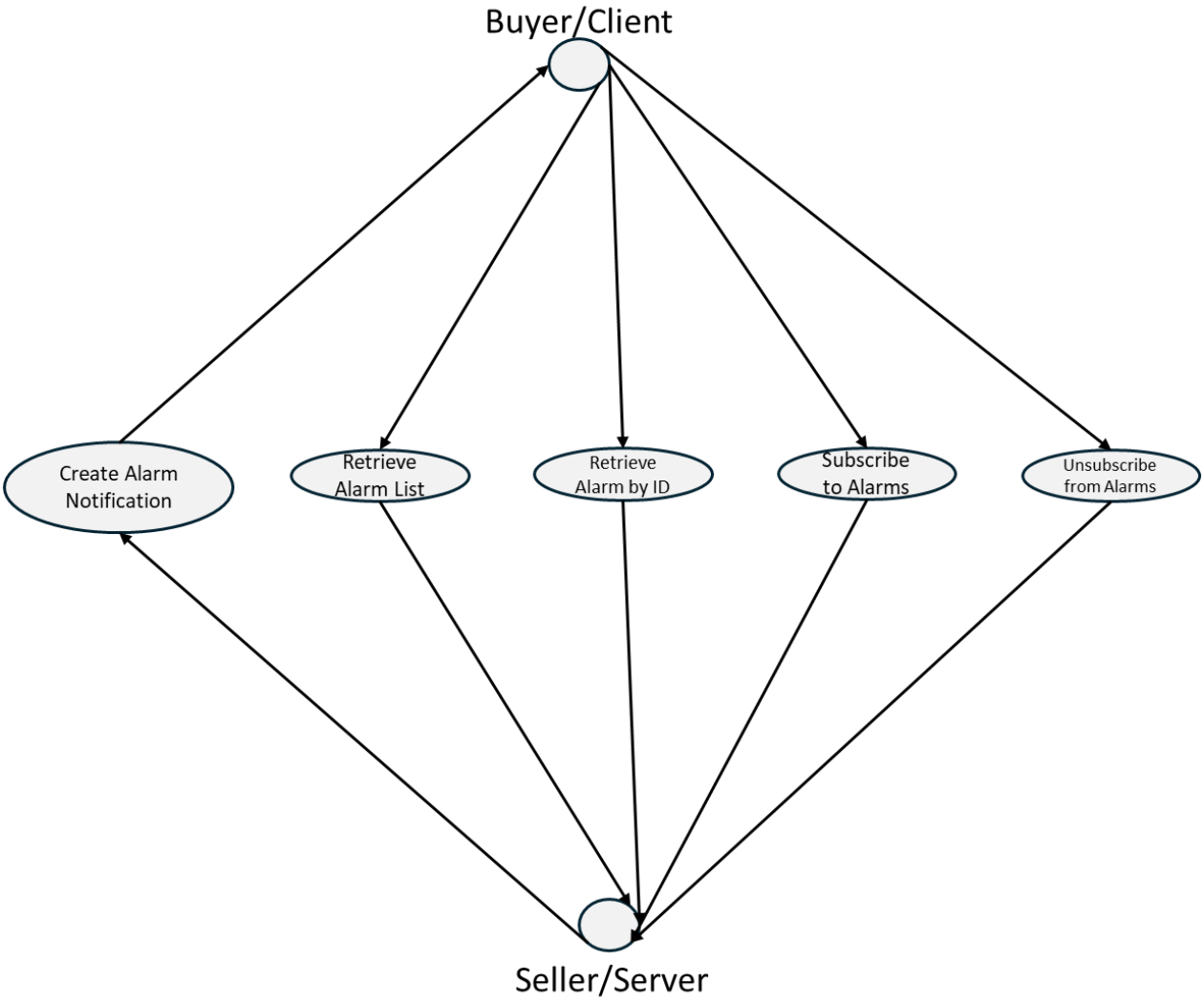


Figure 13 - Alarm Management Use Cases

The Client can retrieve and subscribe to alarms. The Seller/Server will send Create Alarm Notifications to the Buyer/Client.

14.1.1 Send Alarm Notification

Field	Description
Use Case Number	48
Use Case Name	Send Alarm Notification
Description	A Seller/Server sends an Alarm Notification to the Buyer/Client based on an event that has occurred.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Seller/Server has determined that an Event (i.e., TCA) has occurred and can be mapped and communicated to subscribers with an Alarm.

Field	Description
Process Steps	1. The Seller/Server determines the set of Clients (Subscribers) that are listening for Alarms. 2. The Seller/Server generates and communicates the Alarm to all Buyer/Clients who have subscribed to Alarm Notifications.
Post - Conditions	1. The Client(s) receives an Alarm indicating the event has occurred. 2. The Client will take up action upon the Alarm.
Alternative Paths	

813 **Table 71 - Create Alarm Use Case**

Attributes	Description	Type	Comments
Description	This resource represents an alarm supporting the information model defined in ITU - T X.733.	String	
Alarm Identifier	Provides the identifier of the alarm.	String	
Alarm Changed Time	Indicates the last date and time when the alarm is changed on the alarm - owning system. Any change to the alarm whether coming from the alarmed resource is changing this time.	Date - Time	
Alarm Cleared Time	Indicates the time (as a date + time) at which the alarm is cleared at the source.	Date - Time	

Attributes	Description	Type	Comments
Alarm Reporting Time	Indicates the time (as a date + time) at which the alarm was reported by the owning OSS. It might be different from the alarm-RaisedTime. For in-stance, if the alarm list is maintained by an EMS, the alarmRaisedtime would be the time the alarm was detected by the NE, while the alarmRe-portingTime would be the time this alarm was stored in the alarm list of the EMS.	Date - Time	
Alarm Raised Time	The time that an alarm was raised. This time may differ from the Alarm Reported Time	Date - Time	
Alarm Type	Categorize the alarm. Should be one of the val-ues defined in X.733 8.1.1 or 3GPP TS 32.111 - 2 Annex A: Communications Alarm Processing Error Alarm Environmental Alarm Quality of Service Alarm Equipment Alarm Integrity Violation Operational Violation Physical Violation Security Service or Mechanism Violation Time Domain Violation	String	
Alarmed Object Type	The type (class) of the managed object associ-ated with the event.	String	The Alarmed Object Type will change based on the type of service.
External Alarm Identifier	An identifier of the alarm in the source system.	String	

Attributes	Description	Type	Comments
Is Root Cause	Indicates whether the alarm is a root cause alarm.	Boolean	
Perceived Severity	Lists the possible severities that can be allocated to an Alarm. The values are consistent with ITU - T Recommendation X.733. Once an alarm has been cleared, its perceived severity is set to 'cleared' and can no longer be set.	One of: Critical Major Minor Warning	
Planned Outage Indicator	Indicates that the Managed Object (related to this alarm) is in planned outage (in planned maintenance, or out - of - service).	String	
Probable Cause	Provides the probable cause of the alarm. The values are consistent with ITU - T Recommendation X.733 or 3GPP TS 32.111 - 2 Annex B.	One of values from X.733	
Reporting System Identifier	Reporting system identity.	String	The Reporting System Identifier could be the Seller or could be a system within the Seller
Service Affecting	Indicates whether the alarm affects service or not.	Boolean	
Source System Identifier	Source system identity.	String	The Source System Identifier could be the Seller or could be a system within the Seller

Attributes	Description	Type	Comments
State	Defines the alarm state during its life cycle	One of: Unacknowledged Acknowledged Cleared	
Affected Service	Affected services. (An array of Service unique identifiers.	Identifier []	
Alarmed Object	Identifies the managed object instance associated with the alarm.	Identifier	
Comment	Indicates the comments entered on the alarm.	See Table 73.	Comments are sent to the Buyer via the API. How comments are entered by the Seller is beyond the scope of this document
Correlated Alarm	Correlated alarms.	Identifier []	
Parent Alarm	Unique identifier of a related entity.	Identifier	

814 **Table 72 - Alarm Create and Alarm Attributes**

815 **[R144]** An Alarm **MUST** contain the following:

816 • Alarm Identifier

817 • Alarm Reporting Time

818 • Alarm type

819 • State

820 • Perceived Severity

821

Attributes	Description	Type	Comments
Comment	Indicates the text of the comment.	String []	
System Identifier	Indicates the system identifier on which the Seller/Server set the comment.	String	

Attributes	Description	Type	Comments
Time	Indicates the time commenting the alarm.	Date - Time	
User Identifier	Indicates the user commenting the alarm.	String	

822 **Table 73 - Comment Attributes**

823 ### 14.1.2 Retrieve Alarm List

Field	Description
Use Case Number	49
Use Case Name	Retrieve Alarm List
Description	A request is initiated by the Buyer/Client to retrieve a list of Alarms.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve alarms from the Seller/Server system. 2. The Seller/Server is supporting the retrieval of alarms.
Process Steps	1. The Buyer/Client determines the filter criteria for the Retrieve Alarm List request. **[R145]** The Buyer request MUST contain 0 or more of the attributes shown in Table 75. 2. The Buyer/Client communicates a Retrieve Alarm List request to the Seller/Server. **[R146]** The Seller/Server **MUST** support the Retrieve Alarm List Use Case. **[R147]** The Buyer/Client **MUST** support the Retrieve Alarm List Use Case.
Post - Conditions	1. The Buyer/Client has a list of alarms
Alternative Paths	1. The Seller/Server will return an error message if an error is encountered during processing.

824 **Table 74 - Retrieve Alarm List Use Case**

Attributes	Description	Type	Comments
Alarm Identifier	The unique identifier of the Alarm	String	
Description	This resource represents an alarm supporting the information model defined in ITU - T X.733.	String	

Attributes	Description	Type	Comments
Alarm Changed Start Time	Indicates the last date and time when the alarm is changed on the alarm - owning system. Any change to the alarm whether coming from the alarmed resource or triggered by a change from the client is changing this time.	Date - Time	
Alarm Changed End Time	Indicates the last date and time when the alarm is changed on the alarm - owning system. Any change to the alarm whether coming from the alarmed resource or triggered by a change from the client is changing this time.	Date - Time	
Alarm Cleared Start Time	Indicates the time (as a date + time) at which the alarm is cleared at the source.	Date - Time	
Alarm Cleared End Time	Indicates the time (as a date + time) at which the alarm is cleared at the source.	Date - Time	
Alarm Reporting Start Time	Indicates the time (as a date + time) at which the alarm was reported by the owning OSS. It might be different from the time that the alarm is raised. For instance, if the alarm list is maintained by an EMS, the alarmRaised-time would be the time the alarm was detected by the NE, while the alarmReportingTime would be the time this alarm was stored in the alarm list of the EMS.	Date - Time	

Attributes	Description	Type	Comments
Alarm Reporting End Time	Indicates the time (as a date + time) at which the alarm was reported by the owning OSS. It might be different from the alarm-RaisedTime. For in-stance, if the alarm list is maintained by an EMS, the alarmRaisedtime would be the time the alarm was detected by the NE, while the alarmRe-portingTime would be the time this alarm was stored in the alarm list of the EMS.	Date - Time	
Alarm Type	Categorize the alarm. Should be one of the val-ues defined in X.733 8.1.1 or 3GPP TS 32.111 - 2 Annex A: Communications Alarm Processing Error Alarm Environmental Alarm Quality of Service Alarm Equipment Alarm Integrity Violation Operational Violation Physical Violation Security Service or Mechanism Violation Time Domain Violation	String	
Alarmed Object Type	The type (class) of the managed object associ-ated with the event.	String	

Attributes	Description	Type	Comments
Perceived Severity	Lists the possible severities that can be allocated to an Alarm. The values are consistent with ITU - T Recommendation X.733. Once an alarm has been cleared, its perceived severity is set to 'cleared' and can no longer be set.	String	
Planned Outage Indicator	Indicates that the Managed Object (related to this alarm) is in planned outage (in planned maintenance, or out - of - service).	String	
Reporting System Identifier	Reporting system identity.	String	
Service Affecting	Indicates whether the alarm affects service or not.	Boolean	
State	Defines the alarm state during its life cycle	String	
Affected Service	Affected services. (An array of Service unique identifiers.	Identifier []	
Correlated Alarm	Correlated alarms.	Identifier []	

Table 75 - Retrieve Alarm List Filter Criteria

[R148] If the request is successful, the Seller response **MUST** contain the following:

- Alarm Identifier
- Description
- Alarm Reporting Time
- Alarm Type
- Alarm Severity
- State

[O24] The Seller response **MAY** contain any of the remaining attributes in Table 75.

834 ### 14.1.3 Retrieve Alarm by Identifier

Field	Description
Use Case Number	50
Use Case Name	Retrieve Alarm by Identifier
Description	A request is initiated by the Buyer/Client to retrieve an identified Alarm.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve alarms from the Seller/Server system. 2. The Seller/Server is supporting the retrieval of alarms.
Process Steps	1. The Buyer/Client determines the identifier of the Alarm to retrieve detailed information on. 2. The Buyer/Client communicates a Retrieve Alarm by Identifier request to the Seller/Server. **[R149]** The Seller/Server **MUST** support the Retrieve Alarm by Identifier Use Case. **[R150]** The Buyer/Client **MUST** support the Retrieve Alarm by Identifier Use Case. **[R151]** The Buyer/Client Retrieve Alarm by Identifier **MUST** include the Alarm Identifier. **[R152]** The Buyer/Client Retrieve Alarm by Identifier **MUST NOT** include any other attributes.
Post - Conditions	2. The Buyer/Client has a list of alarms
Alternative Paths	2. The Seller/Server will return an error message if an error is encountered during processing.

835 **Table 76 - Retrieve Alarm List Use Case**

836

Attributes	Description	Type	Comments
Description	This resource represents an alarm supporting the information model defined in ITU - T X.733.	String	
Alarm Identifier	Provides the identifier of the alarm	String	

Attributes	Description	Type	Comments
Alarm Changed Time	Indicates the last date and time when the alarm is changed on the alarm - owning system. Any change to the alarm whether coming from the alarmed resource or triggered by a change from the client is changing this time.	Date - Time	
Alarm Cleared Time	Indicates the time (as a date + time) at which the alarm is cleared at the source.	Date - Time	
Alarm Reporting Time	Indicates the time (as a date + time) at which the alarm was reported by the owning OSS. It might be different from the alarmRaisedTime. For instance, if the alarm list is maintained by an EMS, the alarmRaisedtime would be the time the alarm was detected by the NE, while the alarmReportingTime would be the time this alarm was stored in the alarm list of the EMS.	Date - Time	
Alarm Raised Time	The time that an alarm was raised. This may differ from the Alarm Reported Time.	Date - time	

Attributes	Description	Type	Comments
Alarm Type	Categorize the alarm. Should be one of the values defined in X.733 8.1.1 or 3GPP TS 32.111 - 2 Annex A: Communications Alarm Processing Error Alarm Environmental Alarm Quality of Service Alarm Equipment Alarm Integrity Violation Operational Violation Physical Violation Security Service or Mechanism Violation Time Domain Violation	String	
Alarmed Object Type	The type (class) of the managed object associated with the event.	String	
External Alarm Identifier	An identifier of the alarm in the source system.	String	
Is Root Cause	Indicates whether the alarm is a root cause alarm.	Boolean	
Perceived Severity	Lists the possible severities that can be allocated to an Alarm. The values are consistent with ITU - T Recommendation X.733. Once an alarm has been cleared, its perceived severity is set to 'cleared' and can no longer be set.	One of: Critical Major Minor Warning	
Planned Outage Indicator	Indicates that the Managed Object (related to this alarm) is in planned outage (in planned maintenance, or out - of - service).	String	

Attributes	Description	Type	Comments
Probable Cause	Provides the probable cause of the alarm. The values are consistent with ITU - T Recommendation X.733 or 3GPP TS 32.111 - 2 Annex B.	One of values from X.733	
Reporting System Identifier	Reporting system identity.	String	
Service Affecting	Indicates whether the alarm affects service or not.	Boolean	
Source System Identifier	Source system identity.	String	
Specific Problem	Provides more specific information about the alarm.	String	
State	Defines the alarm state during its life cycle	One of: Unacknowledged Acknowledged Cleared	
Affected Service	Affected services. (An array of Service unique identifiers.	Identifier	
Alarmed Object	Identifies the managed object instance associated with the alarm.	Identifier	
Comment	Indicates the comments entered on the alarm.	See Table 73.	
Correlated Alarm	Correlated alarms.	Identifier	
Parent Alarm	Unique identifier of a related entity.	Identifier	

837 **Table 77 - Retrieve Alarm by Identifier Alarm Attributes**

838 ### 14.1.4 Subscribe to Alarms Use Case

Field	Description
Use Case Number	51
Use Case Name	Subscribe to Alarms
Description	A request initiated by the Buyer/Client to the Seller/Server to subscribe to Alarms.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to subscribe to Alarms in the Seller/Server system. 2. The Seller/Server support Alarms.

Field	Description
Process Steps	1. The Buyer/Client sends the Subscribe for Alarms as shown in table below to the Seller/Server specifying where to send Alarm notifications and which Alarm Notification Types to include in notifications. **[R153]** The Buyer/Client's Subscribe to Alarm Notifications request **MUST** include the Notification Target Attribute. 3. The Seller/Server receives the Subscribe request for Alarm Notifications. 4. The Seller/Server records which Alarm Notifications to send, where to send such notifications for this Client. 5. The Seller/Server returns an acknowledgement to the Client that includes a Register Notification Identifier.
Post - Conditions	1. The Seller/Server is aware of where to send Alarm Notifications.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

839 **Table 78 - Subscribe to Alarm Notifications**

Attribute Name	Description	Value	Comments
Notification Target Information	The detailed information on the technical API end - point address specifying where the Seller/Server is to send any PM Job Notifications. There can be multiple locations for one Buyer/Client.	String	This is the Callback target in the API
List of Notification Types	The types of notifications that the Buyer/Client wishes to receive.	List of one or more of: • Alarm Create Event • Alarm State Change Event • Alarm Delete Event • Alarm Attribute Event	This is a list of attributes. The entire alarm is sent for each Notification Type

840 **Table 79 - Subscribe to Alarms Attributes**

841 ### 14.1.5 Unsubscribe from Alarms Use Case

Field	Description
Use Case Number	52
Use Case Name	Unsubscribe from Alarms

Field	Description
Description	A request initiated by the Client to unsubscribe from Alarms.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client has previously subscribed to Alarm Notifications. 2. The Buyer/Client is authorized to unsubscribe from Alarm Notifications in the Seller/Server system. 3. The Seller/Server support Alarm Notifications.
Process Steps	1. The Buyer/Client sends the Unsubscribe from Alarm Notifications to the Seller/Server specifying which Alarm Notification Types the Buyer/Client is unsubscribing from listening. 2. The Seller/Server receives the Unsubscribe request for Alarm Notifications. 3. The Seller/Server discontinues Alarm Notification Types to Buyer/Client specific to Unsubscribe request. 4. The Seller/Server returns an acknowledgement to the Buyer/Client.
Post - Conditions	1. The Seller/Server discontinues sending Alarm Notification Types to Client specific to Buyer/Client Unsubscribe request.
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

842 **Table 80 - Unsubscribe from Alarms Use Case**

843 ### 14.1.6 Stateful TCA Alarm

Field	Description
Use Case Number	53
Use Case Name	Stateful TCA Alarm
Description	A Stateful TCA Alarm is initiated by the Seller/Server to a subscribed Client.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Seller/Server supports Stateful TCA Alarms. 2. The Client has subscribed to Stateful TCA Alarms.

Field	Description
Process Steps	1. For a Stateful TCA alarm, the Seller/Server generates a Stateful TCA Alarm to a Buyer/Client that include the attributes shown in Stateful TCA Alarm table. **[R154]** When sending an alarm for a TCA Reporting Type of Stateful, the Seller/Server alarm **MUST** include the attributes in Stateful TCA Alarm table. **[R155]** When sending an alarm for a TCA Reporting Type of Stateful, the TCA Type **MUST** be STATEFUL - SET when the alarm is for a TCA - SET event. **[R156]** When sending an alarm for a TCA Reporting Type of Stateful, the TCA Type **MUST** be STATEFUL - CLEAR when the alarm is for a TCA - CLEAR event.
Post - Conditions	1. The Seller/Server has sent related Stateful TCA Notification.

844 **Table 81 - Stateful TCA Notification (Alarm) Use Case**

845 The Stateful TCA notification includes a STATEFUL-SET or a STATEFUL-CLEAR in addition
846 to the State of Unacknowledged, Acknowledged, and Cleared shown previously in the document.
847

Field Name	Field Value	Field Format	Field Description
Alarm Raised Time	Date and Time in UTC	Date - Time	Time of the event, in UTC. For Stateful SET - TCA and CLEAR - TCA this is the time of the completion of the PM Metric Calculation Interval for which the PM Metric Value triggered the TCA to be generated.
Performance Metric Name	Payload Specific Attributes	String	Human readable text for the Performance Metric for which the TCA Function was configured.
TCA Performance Threshold Value	Numeric value	Integer	The configured TCA Performance Threshold Value for the Performance Metric.
SET - TCA Window Threshold Value	Numeric value	Integer	The value of the SET - TCA Window Threshold. Only used for SET - TCA notification messages.
CLEAR - TCA Window Threshold Value	Numeric value	Integer	The value of the CLEAR - TCA Window Threshold. Only used for CLEAR - TCA notification messages.

Field Name	Field Value	Field Format	Field Description
TCA Window Size Value	Numeric value	Integer	The number of PM Metric Calculation Intervals included in the sliding window for the SET - TCA or CLEAR - TCA process.
PM Metric Value	Numeric values for PM Metric Calculation Interval	Number []	
TCA Type	STATEFUL - SET, or STATEFUL - CLEAR	String	The type of TCA, i.e., STATEFUL - SET or STATEFUL - CLEAR

848 **Table 82 - Stateful TCA Notification (Alarm) Attributes**

849 ### 14.1.7 Stateless TCA Alarm

Field	Description
Use Case Number	54
Use Case Name	Stateless TCA Alarm
Description	A Stateless TCA lifecycle alarm is initiated by the Seller/Server to a subscribed Client.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Seller/Server supports Stateless TCA alarms. 2. The Client has subscribed to alarms.
Process Steps	1. For a Stateless TCA alarm, the Seller/Server generates a TCA Alarm to a Buyer/Client who has subscribed to TCA Alarms that include the attributes shown in TCA Stateless Reporting Attributes table. **[R157]** When sending an alarm for a TCA Reporting Type of Stateless, the Seller/Server notification **MUST** include the attributes in TCA Stateless Reporting Attributes table. **[R158]** If the Damping Factor is included, the TCA Alarm **MUST** include the attributes shown in Damping Factor TCA Reporting Attributes table.
Post - Conditions	1. The Seller/Server has sent related Stateless TCA Notification.

850 **Table 83 - Stateless TCA Notification Use Case**

Field Name	Field Value	Field Format	Field Description
Alarm Raised time	Date and Time in UTC	Date - Time	Time of the event, in UTC. This is the time of the end of the PM Metric Calculation Interval for which the TCA is generated.
Performance Metric Name	Service Payload Specific Attributes	String	Human readable text for Performance Metric for which the TCA Function was configured.
TCA Performance Threshold Value	Numeric value	Number	The TCA Performance Threshold Value
Performance Metric Value	Numeric value	Number	The PM Metric Value for the PM Metric Calculation
Damping Factor	Numeric value	Integer	The value that identifies the number of PM Metric Calculation Intervals included in the Damping Factor process.
Number of PM Metric Calculation Intervals	Numeric value	Integer	The number of PM Metric Calculation Intervals in the hopping window in which the PM Metric Value ≥ the TCA Performance Threshold Value

851 **Table 84 - Stateless TCA Notification Attributes**

852

15 Retrieve PM from a PM Database

Field	Description
Use Case Number	55
Use Case Name	Retrieve PM data from a PM database
Description	A request initiated by the Buyer/Client to retrieve PM data from a PM database.
Actors	Buyer/Client, Seller/Server
Pre - Conditions	1. The Buyer/Client is authorized to retrieve PM data from a database in the Seller/Server system. 2. The Seller/Server supports retrieval from a PM database.
Process Steps	1. The Buyer/Client sends the Retrieve PM data from a PM database request to the Seller/Server specifying the Service ID, Service Pair, or Entity Reference, the PM Metrics to retrieve, and the time period of the PM data that is being retrieved. 2. The Seller/Server receives the Retrieve PM data from a PM database request. 3. The Seller/Server returns the requested PM data to the Buyer/Client.
Post - Conditions	1. The Buyer/Client has the PM data that they requested
Alternative Paths	1. The Seller/Server returns an error message if an error is encountered while processing that prevents the Seller/Server from completing the request.

Table 85 - Retrieve PM Data from a PM Database Use Case

Attribute Name	Description	Value	Comments
Service ID	The Service ID at the To side of the Service.	List	
Service Pair	The Service ID at the To and From side of the Service.	List	
Entity Reference	The reference to the entity for which PM data is being retrieved	List	
Granularity	The sampling rate of the collection of fault indicators.	See Table 27	Set by Buyer/Client
Service Specific Configuration Data	A list of one or more PM metrics that the Buyer/Client wish to retrieve	List of PM metrics	These are service or entity specific
Output Format	The format of the output report	One of the following: *JSON* *XML* *AVRO*	Set by Buyer/Client

Attribute Name	Description	Value	Comments
		CSV	
Result Format	List of possible result formats that define how Seller/Server will deliver PM Report to the Buyer/Client	One of the following: JSON	Payload Output Format for *Payload* is always *JSON*
Start Time	The earliest time period for which PM data is requested	Date/time	
End Time	The latest time-period for which PM data is requested	Date/time	

Table 86 - Retrieve PM Data from a PM Database Attributes

[R159] If the Buyer/Client desires to retrieve PM data for a service they **MUST** include the Service ID or Service Pair in the Retrieve PM Data from a PM Database request.

[R160] If the Buyer/Client desires to retrieve PM data for an entity they **MUST** include the Entity Reference in the Retrieve PM Data from a PM Database request.

[R161] The Retrieve PM from a PM Database **MUST** contain only one type, Service ID, Service Pair, or Entity Reference, of identifier.

[R162] In addition to the Service ID, Service Pair, or Entity Reference, a Retrieve PM Data from a PM Database request **MUST** contain the following:

- Service Specific Configuration
- Start Time
- End Time
- Granularity
- Output Format
- Result Format

[R163] The Service Specification Configuration **MUST** use the same PM Metrics for all identifiers in the list.

16 Process Flows

This section of the document defines the process flows and states within the Fault Management Job and Performance Monitoring Job process flows.

16.1 Fault Management Job

The Fault Management Job Process Flow and states are shown in this section.

16.1.1 Fault Management Job Process Flow

The Fault Management Job Process Flow is shown in Figure 14.

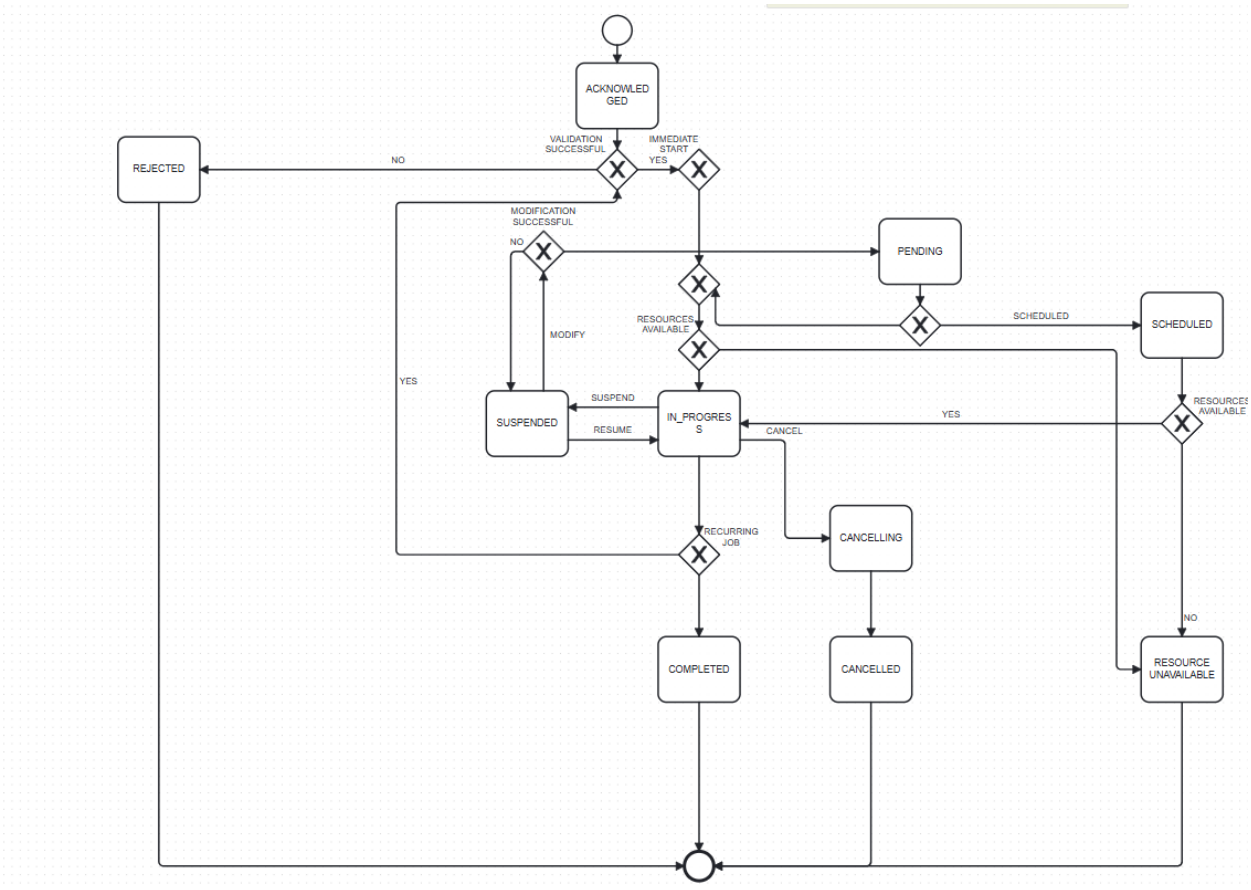


Figure 14 - Fault Management Job Process Flow

16.1.2 Fault Management Job States

The Fault Management Job states are defined in Table 87.

State	Description
Acknowledged	A FM Job request has been received by the Seller/Server and has passed basic validation. FM Job Identifier is assigned in the

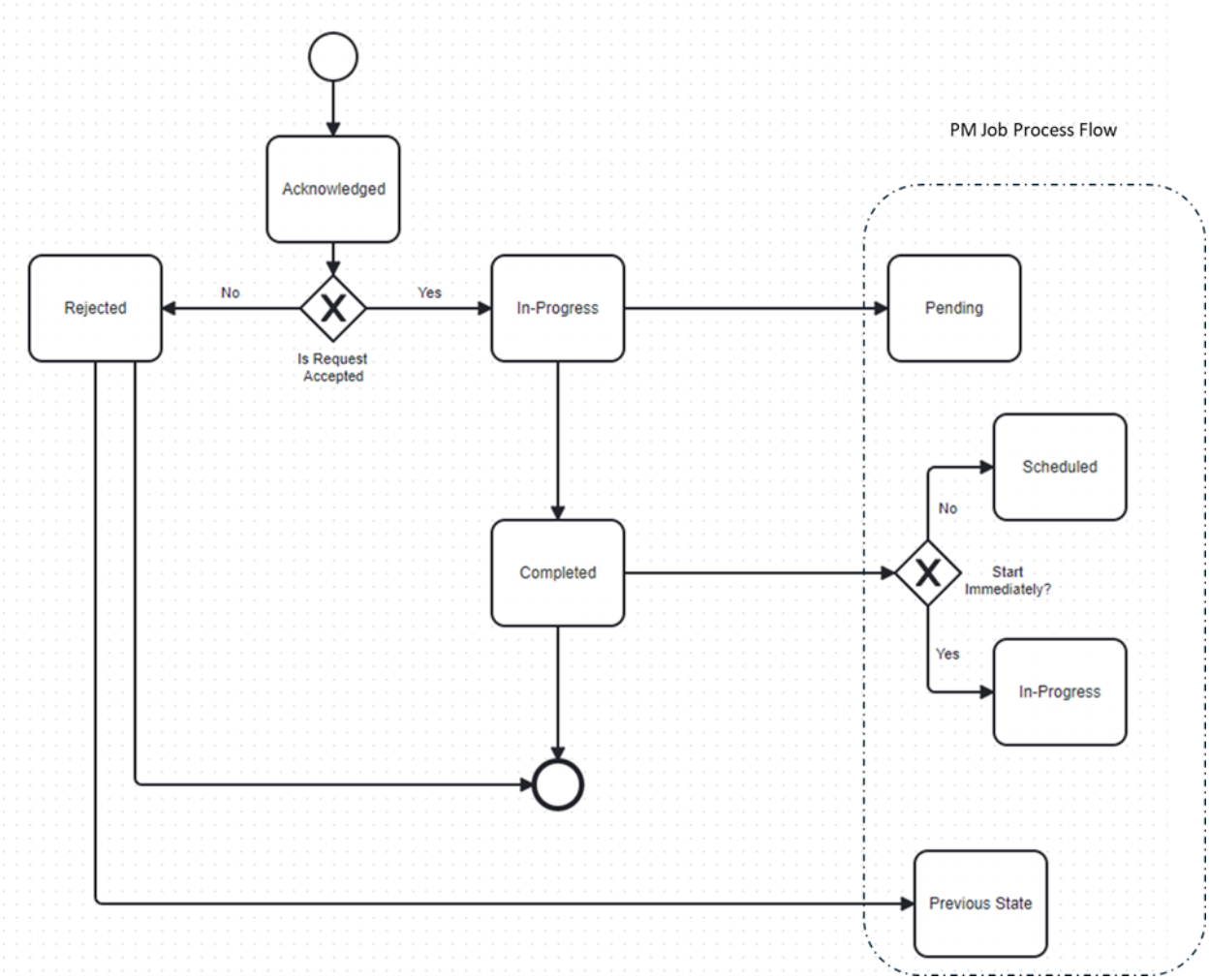
	Acknowledged state. The request remains in the Acknowledged state until all validations as applicable are completed. If the attributes are validated the request determines if the start time is immediate or scheduled. If immediate, the FM Job moves to the In - Progress state. If scheduled, the FM Job moves to the Scheduled state. If all attributes are not validated, the request moves to the Rejected state.
Cancelled	A FM Job that is In - Progress, Scheduled or Suspended is canceled.
Completed	A FM Job is Completed. NOTE: All results from FM Job must persist in order for a collection of results.
In - Progress	A FM Job is running. Upon completion of the Job, a determination if the FM Job is a one - time Job or is recurring. If the FM Job is a one - time Job, the state of the FM Job moves to the Completed state. If the PM Job is recurring, the FM Job circles back to determine if it has an immediate start time or a scheduled start time. If a Suspend FM Job request is accepted, the Job moves to the Suspended state. If a Modify FM Job request is accepted, the Job moves to the Pending state. If a Cancel FM Job request is accepted, the Job moves to the Cancelled state.
Pending	A Modify FM Job request has been accepted by the Seller/Server. The FM Job remains in the Pending state while updates to the Job are completed. Once updates are complete, the Job returns to the In - Progress or Scheduled state if modified.
Resources Unavailable	A state representing that FM Job resources are currently unavailable.
Rejected	A create FM Job fails validation and is rejected with error indications by the Seller/Server.
Scheduled	A FM Job is created that does not have an immediate start time. The FM Job stays in the Scheduled state until the start time is reached. The FM Job then moves to In - Progress.
Suspended	A Suspend FM Job request is accepted by the Seller/Server. The Job remains in the Suspended state until a Resume FM Job request

	is accepted by the Seller/Server at which time the Job returns to the In - Progress state.

888 **Table 87 - Fault Management Job States**

889 16.1.3 Modify Fault Management Job Process Flow

890 The Modify Fault Management Job process flow is described in this section.



891

892 **Figure 15 - Modify Fault Management Job Process Flow**

893 16.1.4 Modify Fault Management Job States

894 The Modify Fault Management Job states are defined in this section.

895

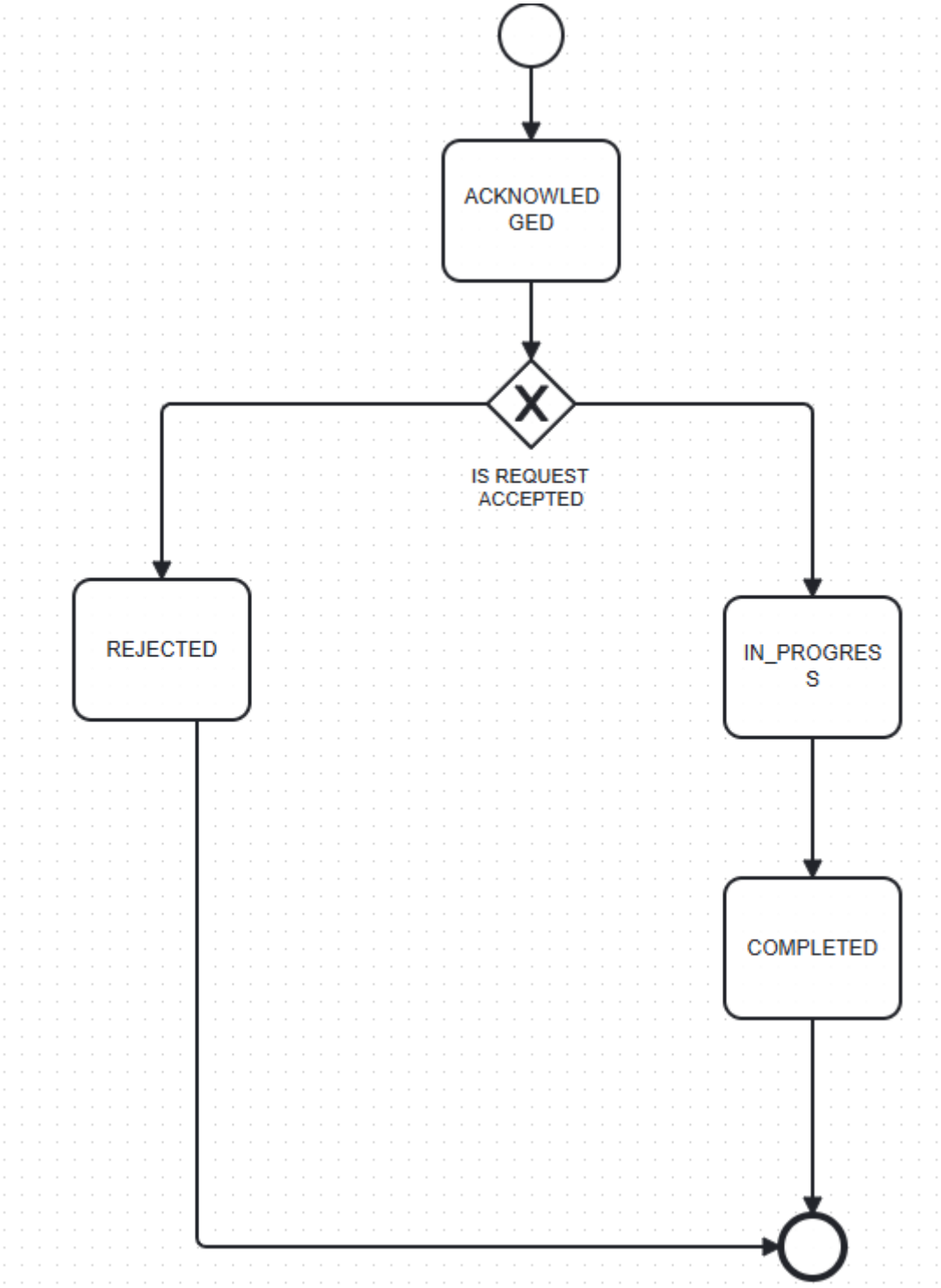
State	Description
Acknowledged	A Modify FM Job request has been received by the Seller/Server and has passed basic validation. The request remains in the Acknowledged state until all validations as applicable

	are completed. If the attributes are validated the request moves to the In-Progress state. If not all attributes are valid, the request moves to the Rejected state.
Completed	The Modify FM Job is Completed.
In-Progress	The Modify FM Job request has been validated and accepted by the Seller/Server and is in-progress.
Rejected	The Modify FM Job has failed validation and been rejected by the Seller/Server.

Table 88 - Modify Fault Monitoring Job States

16.1.5 Cancel Fault Management Job Process Flow

The Cancel Fault Management Job process flow is described in this section.



899

900 **Figure 16 - Cancel Fault Management Job Process Flow**

901 ### 16.1.6 Cancel Fault Management Job States

902 The Cancel FM Job states are defined in this section.

State	Description
Acknowledged	A Cancel PM Job request has been received by the Seller/Server and has passed basic validation.
Completed	The Cancel PM Job request has been completed by the Seller/Server.
In-Progress	The Cancel PM Job request has been validated and accepted by the Seller/Server.
Rejected	The Cancel PM Job has failed validation and been Rejected by the Seller/Server.

Table 89 - Cancel - Cancel Fault Management Job States

16.2 Performance Monitoring Job

The Performance Monitoring Job Process Flow and states are shown in this section. The general flow for the PM Process is show in Figure 17 - Performance - Performance Monitoring Overall Process Flow.

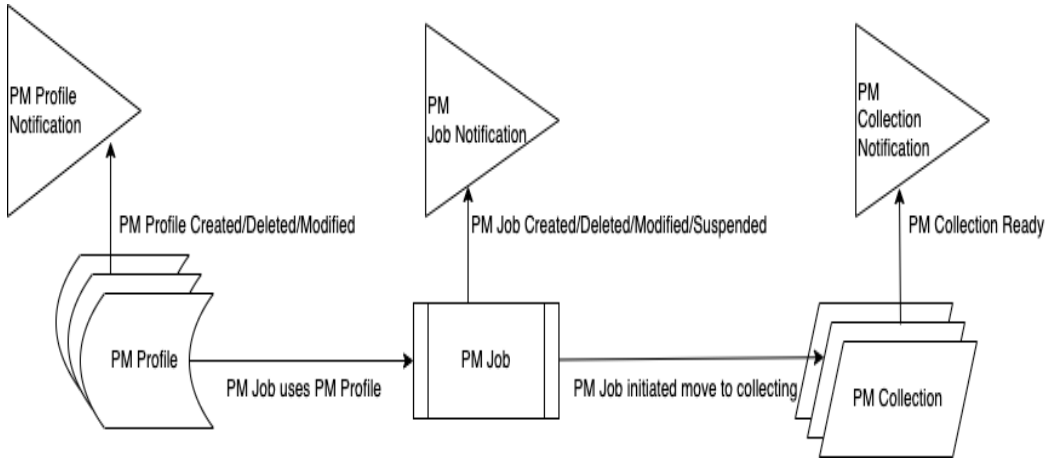


Figure 17 - Performance - Performance Monitoring Overall Process Flow

16.2.1 Performance Monitoring Job Process Flow

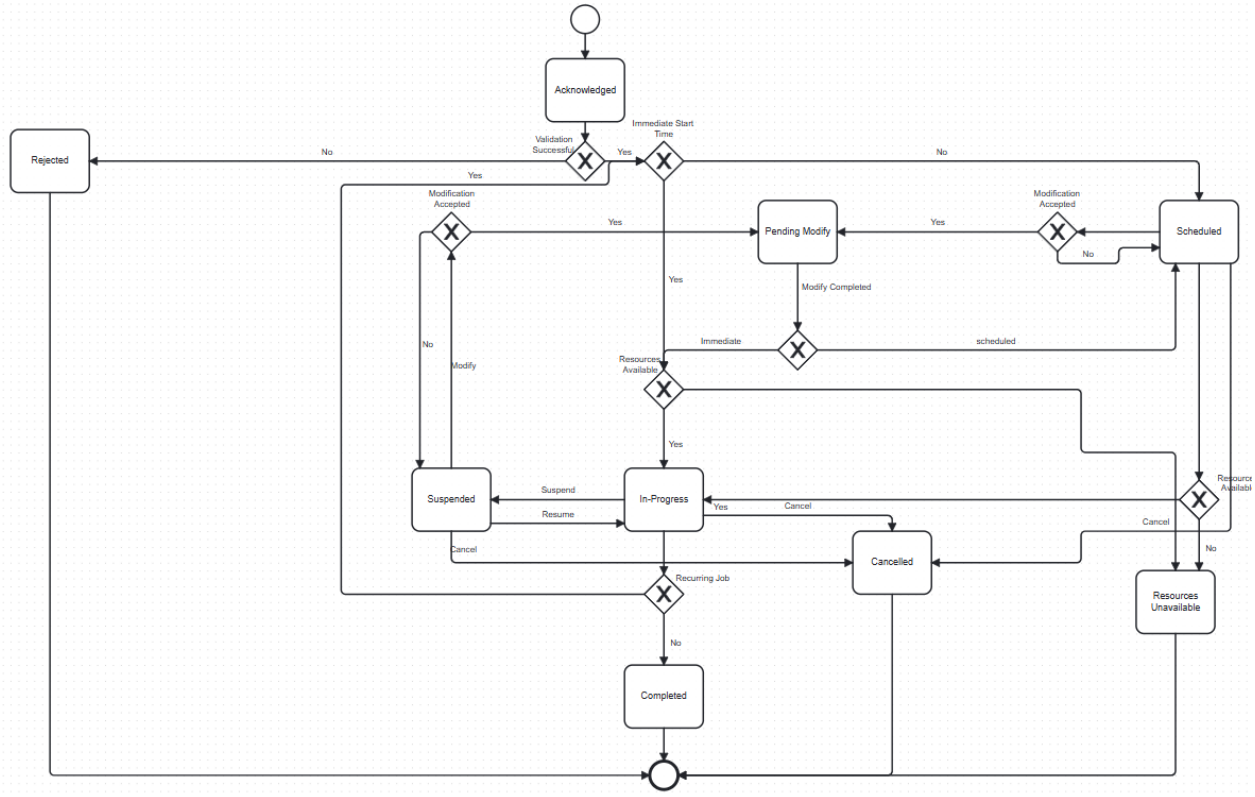


Figure 18 - Performance Monitoring Job Lifecycle Process Flow

[O25] In case job is running e.g., once a day for a short period of time, it may be difficult to change its state. If action arrives when PM job is running, it is recommended to run until the end and only afterwards action should be applied.

16.2.2 Performance Monitoring Job States

The PM Job states are defined in Table 87.

State	Description
Acknowledged	A PM Job request has been received by the Seller/Server and has passed basic validation. PM Job Identifier is assigned in the Acknowledged state. The request remains in the Acknowledged state until all validations as applicable are completed. If the attributes are validated the request determines if the start time is immediate or scheduled. If immediate, the PM Job moves to the In - Progress state. If scheduled, the PM Job moves to the Scheduled state. If not all attributes are not

	validated, the request moves to the Rejected state.
Cancelled	A Performance Monitoring Job that was In-Progress, Suspended, or Scheduled is cancelled.
Completed	A PM Job is Completed. NOTE: All results from PM Job must persist for a collection of results.
In - Progress	A PM Job is running. Upon completion of the Job, a determination if the PM Job is a one - time Job or is recurring. If the PM Job is a one - time Job, the state of the PM Job moves to the Completed state. If the PM Job is recurring, the PM Job circles back into In - Progress to determine if it has an immediate start time or a Scheduled if it has a scheduled start time. If the PM Job has a scheduled start time, it moves back to the Scheduled state. If not, it returns to In-Progress. If a Suspend PM Job request is accepted, the Job moves to the Suspended state. If a Modify PM Job request is accepted, the Job moves to the Pending state. If a Cancel PM Job request is accepted, the Job moves to the Cancelled state.
Pending	A Modify PM Job request has been accepted by the Seller/Server. The PM Job remains in the Pending state while updates to the Job are completed. Once updates are complete, the Job returns to the In – Progress or Scheduled, state.
Pending Cancel	A Cancel Performance Monitoring Job request has been accepted by the Seller/Server. The Performance Monitoring Job remains Pending Cancel while resources used by the Job are being released. Once updates are complete, the Job moves to the Cancelled status.
Resources Unavailable	A PM Job state where adequate resources are currently unavailable.
Rejected	A Create PM Job fails validation and is rejected with Rejection Indicators by the Seller/Server.
Scheduled	A PM Job is created that does not have an immediate start time. The PM Job stays in the Scheduled state until the start time is reached. The PM Job then moves to In - Progress.

Suspended	A Suspend PM Job request is accepted by the Seller/Server. The Job remains in the Suspended state until a Resume PM Job request is accepted by the Seller/Server at which time the Job returns to the In - Progress state.

Table 90 - Performance Monitoring Profile/Job States

16.2.3 Modify Performance Monitoring Job Process Flow

The Modify PM Job process flow is described in this section.

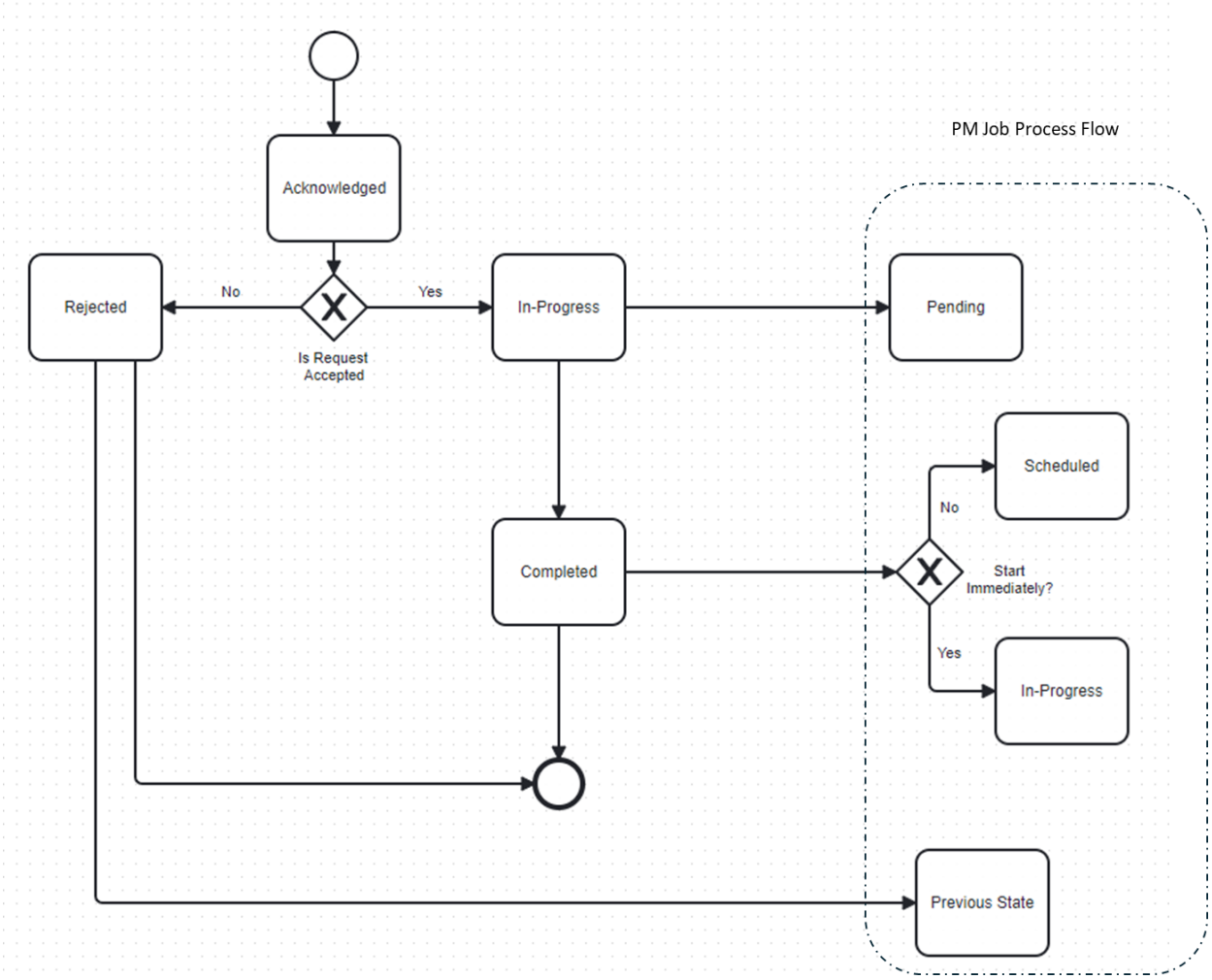


Figure 19 - Modify Performance Monitoring Job Process Flow

16.2.4 Modify Performance Monitoring Job States

The Modify PM Job states are defined in this section.

State	Description
Acknowledged	A Modify PM Job request has been received by the Seller/Server and has passed basic validation. The request remains in the Acknowledged state until all validations as applicable are completed. If the attributes are validated the request moves to the Accepted state. If not all attributes are valid, the request moves to the Rejected state.
Completed	The Modify PM Job is Completed.
In-Progress	The Modify PM Job request has been validated and accepted by the Seller/Server and is in-progress.
Rejected	The Modify PM Job has failed validation and been rejected by the Seller/Server.

928 **Table 91 - Modify Performance Monitoring Job States**

929 ### 16.2.5 Cancel Performance Monitoring Job Process Flow

930 The Cancel PM Job process flow is described in this section.

931

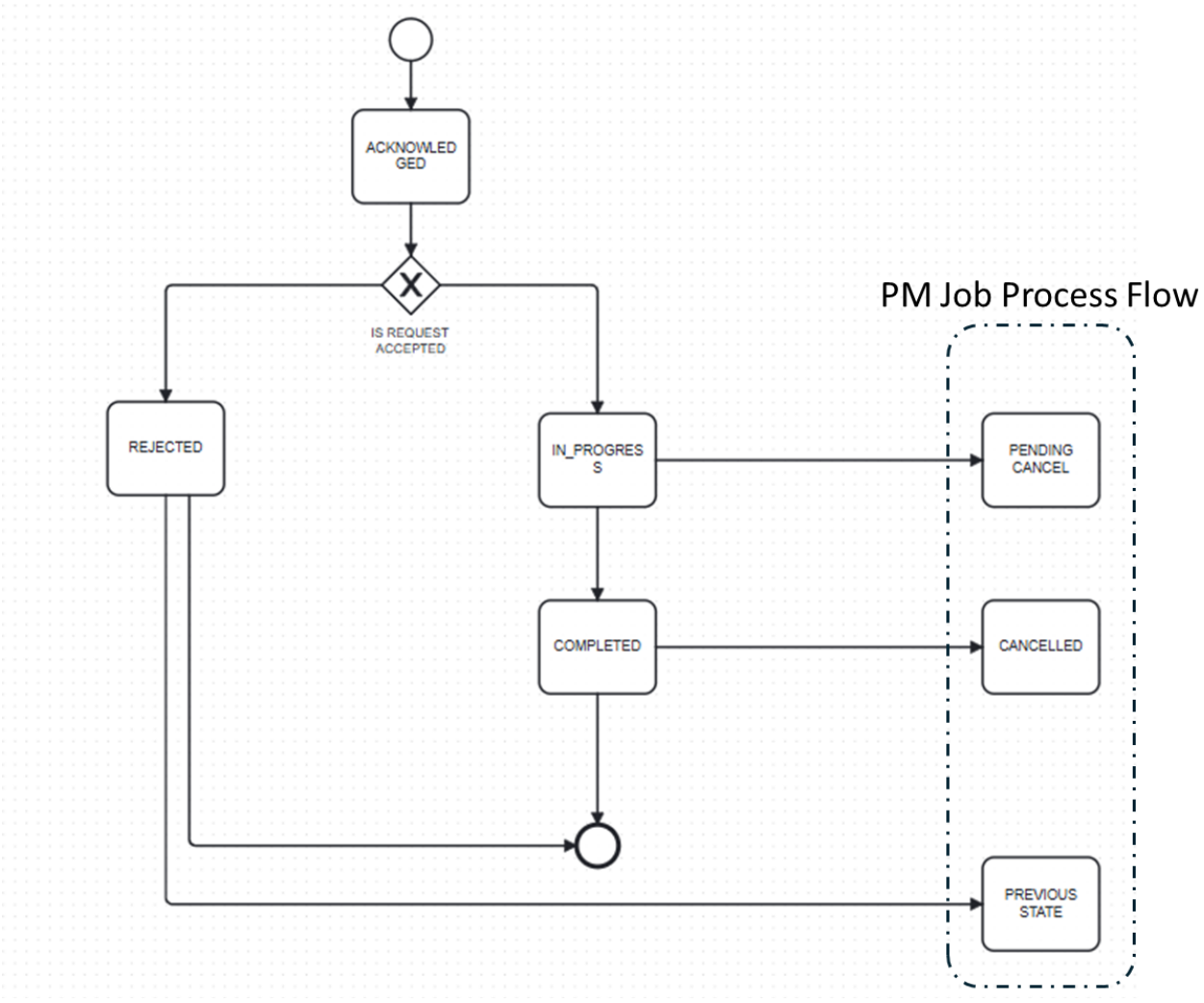


Figure 20 - Cancel Performance Monitoring Job Process Flow

State	Description
Acknowledged	A Cancel PM Job request has been received by the Seller/Server and has passed basic validation.
Completed	The Cancel PM Job request has been completed by the Seller/Server.
In-Progress	The Cancel PM Job request has been validated and accepted by the Seller/Server.
Rejected	The Cancel PM Job has failed validation and been Rejected by the Seller/Server.

Table 92 - Cancel Performance Monitoring Job States

16.3 Performance Report

The process flow for the Performance Report is shown below.

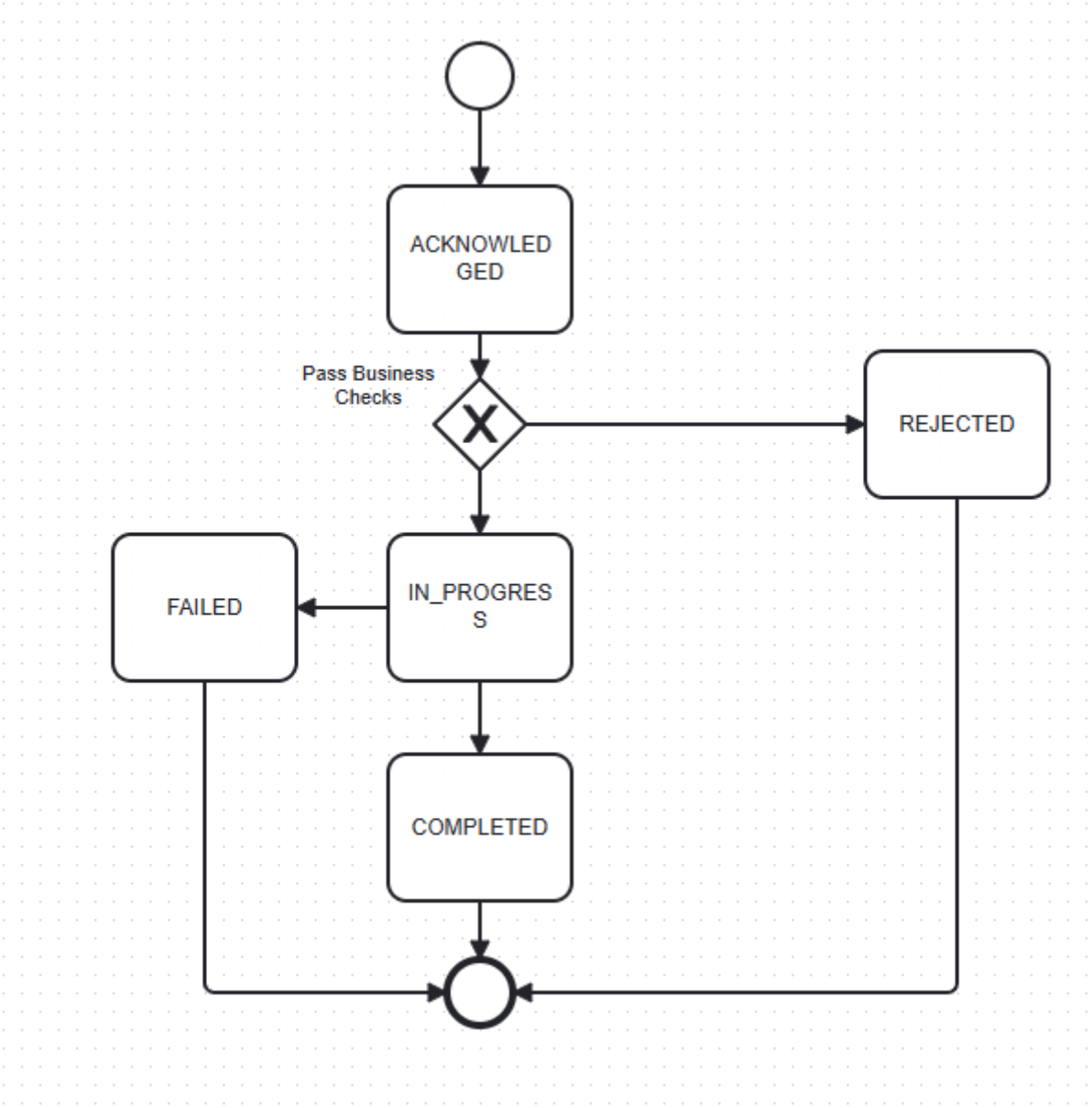
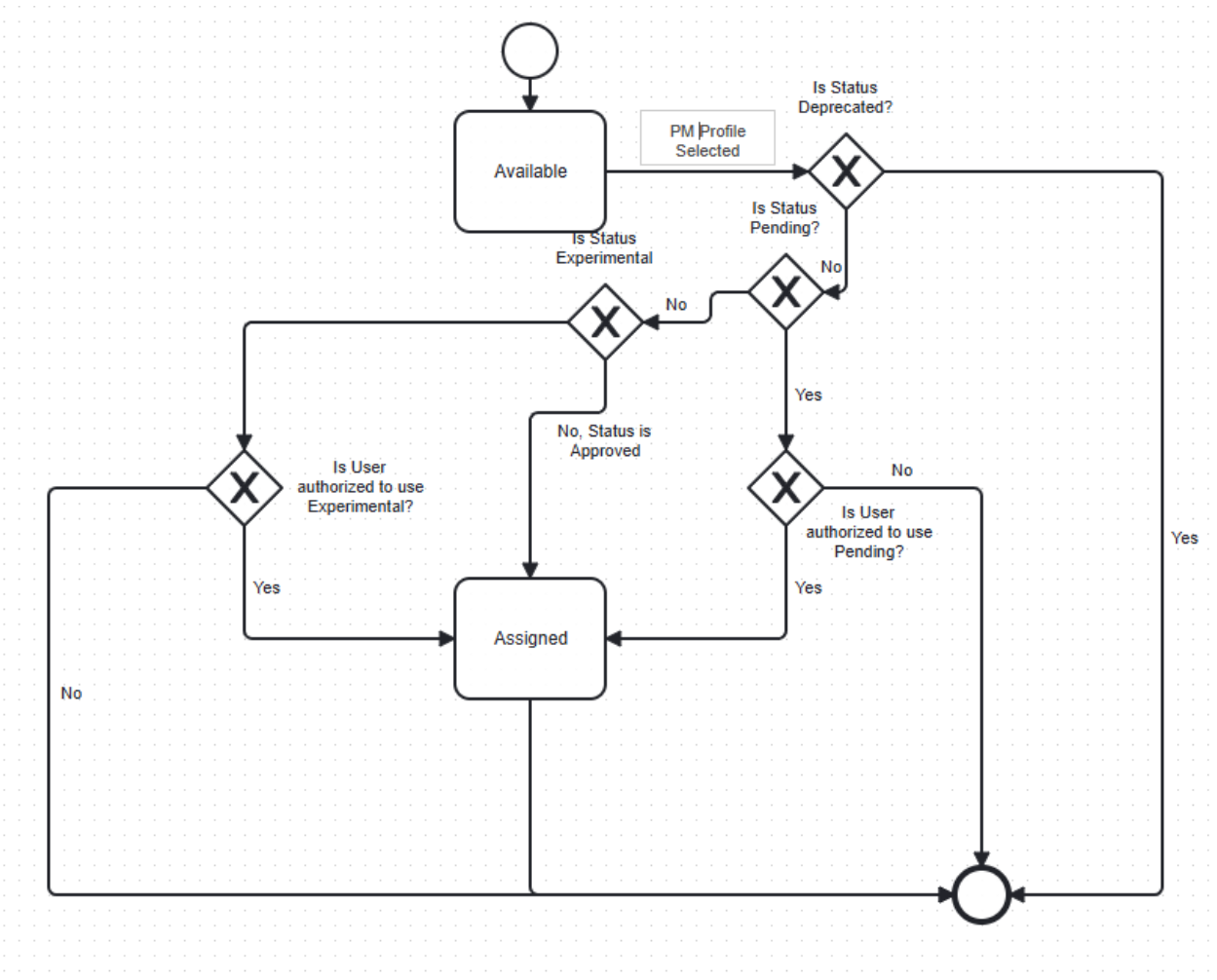


Figure 21 - Performance Report Process Flow

16.4 PM Profile Lifecycle Flow

The Lifecycle flow for the PM Profile is shown in this section.



944

945 **Figure 22 - PM Profile Lifecycle Flow**

17 References

[1] IETF RFC 2119, *Key words for use in RFCs to Indicate Requirement Levels*, by S. Bradner, March 1997.

[2] IETF RFC 8174, *Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words*, by B. Leiba, Copyright © 2017 IETF Trust and the persons identified as the document authors. All rights reserved. May 2017.

[3] ITU - T X.733 Information Technology - Open Systems Interconnection - Systems Management: Alarm Reporting Function, February 1994.

[4] MEF 35.1, Service OAM Performance Monitoring Implementation Agreement, May 2015.

[5] MEF 50.1, *MEF Services Lifecycle Process Flows*, August 2017.

[6] MEF 55.1, *LSO Reference Architecture and Framework*, January 2021.

[7] MEF 105, *Performance Monitoring and Service Readiness Testing for SD-WAN*, April 2024.

[8] Object Management Group (OMG) Unified Modelling Language, Version 2.5, May 2015.

[9] ONF *TR - 548 Streaming TAPI v2.1.3 Reference Implementation Agreement*, Version 1.0 Draft, March 2021.

[10] International Telecommunication Union. (1992). *ITU - T Rec. X.734 (09/92) Information technology – Open Systems Interconnection – Systems Management: Event report management function*. Retrieved from https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.734-199209-I!!PDF-E&type=items

Appendix A Performance Management Options for Proactive Provisioning

The following section discusses the two use case paths for SLS provisioning over the Legato interface. The information provided is to assist in the future API design and development. The first option is the SLS is provisioning with the Legato Service Order request given it is embedded as an attribute within the service request. An example of this is with Mplify Carrier Ethernet Services. In this case the EVC or OVC has an attribute for Service Level Specification.

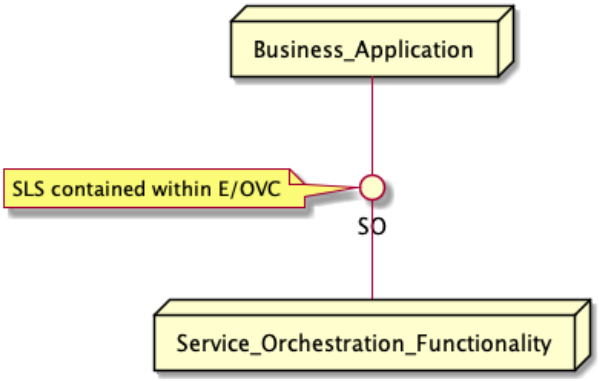


Figure 23 - SLS Activation via E/OVC Service Ordering Example

The second option for SLS activation is where the Business Application is responsible for making the SLS request as a Performance Management activation outside of the earlier mention Service Management activation.

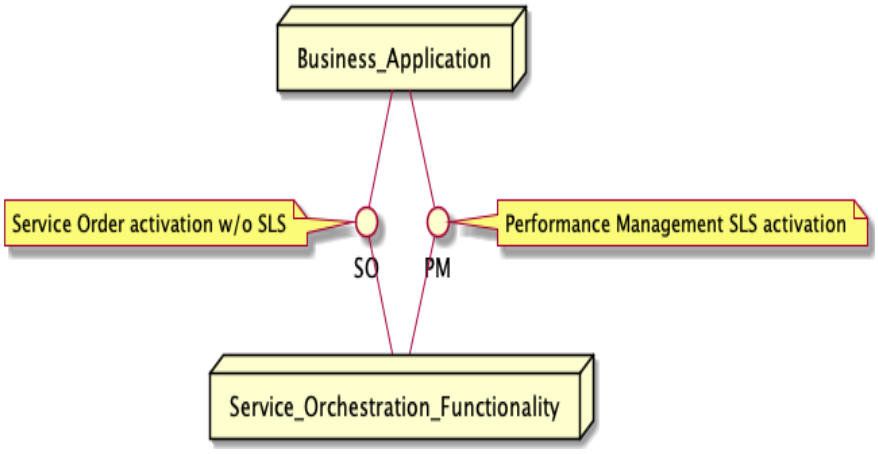


Figure 24 - SLS Activation via Legato Example

Appendix B Event Streaming – Events, Notifications, TCAs and Streams

As defined in the terminology section an event is a significant occurrence or change in system state that is important from the perspective of system administration. Other systems might be informed about these events using notifications.

From the data modeling perspective, a notification is a representation of an event that is exchanged between interested parties. A specific type of notification is Threshold Crossing Alert that is used to notify that a specific threshold or performance limit was crossed or exceeded.

The information about various types of events is available through classical pull model or using event streaming paradigm. It is worth noting that in context of pull model the term notification has a specific meaning. In essence a Notification is a certain synchronous push communication pattern that is associated with certain event that are related to the lifecycle of the object exposed via Mplify APIs. It is worth noting that the volume of notifications in this context is rather low. In this document, an example of such object which uses Notifications to inform about lifecycle events is PM Job. In the reminder of this section, we will use term Message to indicate event notification exchanged through event streaming mechanisms.

An Event Streaming is a data integration and processing paradigm that deals with the ordered stream of events in real time. Event streaming platforms typically use publish and subscribe pattern. A published message (created by producer) is broadcasted to all registered subscribers (clients). Event streaming can be realized by centralized (for example Apache Kafka) or decentralized platforms. In the first case, the message exchange depends on central broker system that decouples producers and consumers, ensures reliable delivery, fault tolerance, and scalability of the solution. Broker centric architectures allow for temporal decoupling. In other words, client consumes messages asynchronously on its own pace and do not need to be active when producer pushes new messages. Certain platforms support event stream rewind that allows for subsequent processing of already consumed messages. In the latter case the communicating parties communicates directly instead of relying on central entity. This might result in simpler architectures or performance improvements. However, depending on a specific solution this might also lead to a data loss in case notification client is not available.

The choice of a particular technical solution to support event streaming might be dictated by various internal or external factors like for example a technical capability of interacting parties or security constraints. Important factors are the data volume patterns and required delivery guarantees.

Appendix C Data Formats

The collection of performance measurements because of a Performance Management Job must support multiple formats. There are reasons for different formatting of collected performance data. One reason is that the amount of collected data may be large whereby compressing the information is required. The following data formats are listed as examples – *JSON, Avro* and *Protobuf.*

C.1 JSON Formatted Data

JSON (JavaScript Object Notation, is an open standard file format and data interchange format that uses human - readable text to store and transmit data objects consisting of attribute–value pairs and arrays (or other serializable values). It is a common data format with diverse uses in electronic data interchange, including that of web applications with Seller/Servers.

C.2 Avro Formatted Data

Avro is an open - source data serialization system that helps with data exchange between systems, programming languages, and processing frameworks. Avro helps define a binary format for your data, as well as map it to the programming language of your choice.

C.3 Protobuf Formatted Data

Protocol Buffers (Protobuf) is a free and open - source cross - platform data format used to serialize structured data. It is useful in developing programs to communicate with each other over a network or for storing data. The method involves an interface description language that describes the structure of some data and a program that generates source code from that description for generating or parsing a stream of bytes that represents the structured data.

Appendix D Performance Metrics, Statistics and Reporting

This document discusses various types of performance and fault measurement techniques. An important distinction is performance and fault measurements configured and collected versus general statistics configuration and collection.

Performance measurements configured and collected for supporting Service Level Specifications are typically done using synthetic or test frames/packets injected into the bearer plane and used to measure performance metrics such as frame/packet loss, frame/packet transfer delay and inter - frame/packet delay variation.

Appendix E Streaming Additional Attributes

The following section provides additional streaming attributes that should be considered by the Buyer/Client and Seller/Server. The attributes are specific to the system or technology solution and therefore are not called out in the business requirements and use cases. These set of attributes could be part of a pre - configuration discussion or an on - boarding process. See

Field Name	Field Format	Field Description
loadInterval	Integer	Measurement interval in milliseconds.
segmentSize	<Integer,Units>	Size of substructure log.
recordRetention[9]	TimePeriod	Time period to persist the records for retrieval. The Seller/Server provides a period to persistently retain records.
recordContent[9]	String	Identifies the structure of the content. Defines the streaming type – i.e., WebSockets.
logRecordStrategy[9]	LogRecordStrategy Enum: • WHOLE_ENTITY_ON_CHANGE, • CHANGE_ONLY, • WHOLE_ENTITY_PERIODIC	Defines how the log records will be implemented by the Seller/Server or requested by the Buyer/Client. The Seller/Server provides a log record strategy for logging. The Buyer/Client can also request a methodology.
logStorageStrategy[9]	LogStorageStrategy Enum: • COMPACTED, • TRUNCATED, • FULL_HISTORY, • FULL_HISTORY_WITH_PERIODIC_BASELINE.	Defines how the log storage will be implemented by the Seller/Server or requested by Buyer/Client. The Seller/Server provides a log storage strategy for logging. The Buyer/Client can also request a methodology.

Table 93 - Streaming On - boarding Attributes

Appendix F Acknowledgements