



Draft Standard MEF 113 Draft (R1)

Trouble Ticketing Requirements and Use Cases

May 2021

**This draft represents MEF work in progress and is
subject to change.**

This draft document represents MEF work in progress, has not achieved full MEF standardization and is subject to change. There are known unresolved issues that are likely to result in changes before this becomes a fully endorsed MEF Standard. The reader is strongly encouraged to review the Release Notes when making a decision on adoption. Additionally, because this document has not been adopted as a Final Specification in accordance with MEF's Bylaws, Members are not obligated to license patent claims that are essential to implementation of this document under MEF's Bylaws.

Disclaimer

© MEF Forum 2021. All Rights Reserved.

The information in this publication is freely available for reproduction and use by any recipient and is believed to be accurate as of its publication date. Such information is subject to change without notice and MEF Forum (MEF) is not responsible for any errors. MEF does not assume responsibility to update or correct any information in this publication. No representation or warranty, expressed or implied, is made by MEF concerning the completeness, accuracy, or applicability of any information contained herein and no liability of any kind shall be assumed by MEF as a result of reliance upon such information.

The information contained herein is intended to be used without modification by the recipient or user of this specification. MEF is not responsible or liable for any modifications to this specification made by any other party.

The receipt or any use of this specification or its contents does not in any way create, by implication or otherwise:

- a) any express or implied license or right to or under any patent, copyright, trademark or trade secret rights held or claimed by any MEF member which are or may be associated with the ideas, techniques, concepts or expressions contained herein; nor
- b) any warranty or representation that any MEF members will announce any product(s) and/or service(s) related thereto, or if such announcements are made, that such announced product(s) and/or service(s) embody any or all of the ideas, technologies, or concepts contained herein; nor
- c) any form of relationship between any MEF member and the recipient or user of this specification.

Implementation or use of specific MEF standards, specifications, or recommendations will be voluntary, and no Member shall be obliged to implement them by virtue of participation in MEF Forum. MEF is a non-profit international organization to enable the development and worldwide adoption of agile, assured and orchestrated network services. MEF does not, expressly or otherwise, endorse or promote any specific products or services.

Table of Contents

1	List of Contributing Members	1
2	Abstract.....	1
3	Release Notes	1
4	Terminology and Acronyms.....	2
5	Scope.....	3
6	Compliance Levels	4
7	Introduction.....	5
8	Trouble Ticketing Use Cases and Business Process Definitions	7
8.1	High-Level Use Cases	7
8.2	Trouble Ticketing Use Cases	8
9	Trouble Ticketing Operation Attributes	24
9.1	Attribute Tables	24
9.1.1	Buyer and Seller Attributes.....	24
9.1.2	Ticket Attributes	25
9.1.3	Note Attributes.....	28
9.1.4	Attachment Attributes.....	29
9.1.5	Contact Information Attributes	30
9.1.6	Related Object Attributes.....	31
9.1.7	Workorder Attributes	32
9.1.8	Timeslot Attributes	34
9.1.9	Appointment Attributes	34
9.1.10	Search Appointment Timeslot Attribute	35
9.1.11	Related Entity Attributes.....	36
9.1.12	Incident Attributes	37
9.1.13	Respond to Ticket Clearance Notification Attributes	39
9.1.14	Register for Event Notifications Attributes	40
9.1.15	Send Ticket Notification Attributes	41
9.1.16	Send Incident Notification Attributes	41
9.2	Create Ticket Request.....	41
9.2.1	Create Ticket Request - Buyer Request	41
9.2.2	Create Ticket Request - Seller Response	42
9.2.3	Seller Ticket Lifecycle Updates.....	43
9.3	Retrieve Ticket List	44
9.3.1	Retrieve Ticket List - Buyer Request.....	44
9.3.2	Retrieve Ticket List - Seller Response.....	45
9.4	Retrieve Ticket by Ticket Identifier	46
9.4.1	Retrieve Ticket by Ticket Identifier - Buyer Request.....	46
9.4.2	Retrieve Ticket by Ticket Identifier - Seller Response.....	46
9.5	Patch Ticket by Ticket Identifier	47
9.5.1	Patch Ticket by Ticket Identifier - Buyer Request	47
9.5.2	Patch Ticket by Ticket Identifier - Seller Response	49
9.6	Cancel Ticket by Ticket Identifier	50
9.6.1	Cancel Ticket by Ticket Identifier - Buyer Request	50

9.6.2	Cancel Ticket by Ticket Identifier - Seller Response	50
9.7	Respond to Ticket Clearance Notification.....	51
9.7.1	Respond to Ticket Clearance Notification - Buyer Request	51
9.7.2	Respond to Ticket Clearance Notification - Seller Response	51
9.8	Search Appointment Timeslot	52
9.8.1	Search Appointment Timeslot - Buyer Request	52
9.8.2	Search Appointment Timeslot - Seller Response	52
9.8.3	Appointment Lifecycle	53
9.9	Create Appointment.....	53
9.9.1	Create Appointment - Buyer Request.....	54
9.9.2	Create Appointment - Seller Response	54
9.10	Patch Appointment	55
9.10.1	Patch Appointment - Buyer Request.....	55
9.10.2	Patch Appointment - Seller Response.....	55
9.11	Cancel Appointment	56
9.11.1	Cancel Appointment - Buyer Request	56
9.11.2	Cancel Appointment - Seller Response	56
9.12	Retrieve Incident List	57
9.12.1	Retrieve Incident List - Buyer Request.....	57
9.12.2	Retrieve Incident List - Seller Response.....	57
9.13	Retrieve Incident by Incident Identifier.....	58
9.13.1	Retrieve Incident by Incident Identifier - Buyer Request.....	58
9.13.2	Retrieve Incident by Incident Identifier - Seller Response	58
9.14	Register for Event Notifications	59
9.14.1	Register for Event Notifications - Buyer Request	60
9.14.2	Register for Event Notifications - Seller Response	60
9.15	Send Ticket Notification.....	60
9.16	Send Incident Notification	61
10	State Diagrams	63
10.1	Ticket Process Flow.....	63
10.2	Incident Process Flow.....	66
11	References	69

List of Figures

Figure 1 - LSO Reference Architecture Diagram	5
Figure 2 - Sonata Interface Focus	7
Figure 3 - Trouble Ticketing Use Cases	9
Figure 4 - Ticket Process Flow	63
Figure 5 - Incident Process Flow	67

List of Tables

Table 1 - Contributing Member Companies	1
Table 2 - Terminology and Abbreviations	2
Table 3 - Use Case Table	11
Table 4 - Create Ticket Request.....	12
Table 5 - Retrieve Ticket List	12
Table 6 - Retrieve Ticket by Ticket Identifier	13
Table 7 - Patch Ticket by Ticket Identifier	14
Table 8 - Cancel Ticket by Ticket Identifier	15
Table 9 - Respond to Ticket Clearance Notification	16
Table 10 - Search Appointment Timeslot	17
Table 11 - Create Appointment.....	17
Table 12 - Patch Appointment	18
Table 13 - Cancel Appointment.....	19
Table 14 - Retrieve Incident List	20
Table 15 - Retrieve Incident by Incident Identifier	20
Table 16 - Register for Event Notifications	21
Table 17 - Send Ticket Notification.....	22
Table 18 - Send Incident Notification.....	23
Table 19 - Buyer and Seller Attributes	24
Table 20 - Ticket Attributes	28
Table 21 - Note Attributes	28
Table 22 - Attachment Attributes	30
Table 23 - Contact Information Attributes.....	31
Table 24 - Related Object Attributes	32
Table 25 - Workorder Attributes.....	33
Table 26 - Timeslot Attributes	34
Table 27 - Appointment Attributes	35
Table 28 - Search Appointment Timeslot Attributes	36
Table 29 - Related Entity Attributes	37
Table 30 - Incident Attributes	39
Table 31 - Respond to Ticket Clearance Notification Attributes	40
Table 32 - Register for Event Notifications Attributes	40
Table 33 - Send Ticket Notification Attributes.....	41
Table 34 - Send Incident Notification Attributes.....	41
Table 35 - Ticket State Values	64
Table 36 - Workorder State Values	65
Table 37 - Appointment State Values	65
Table 38 - Ticket Notification Event Type Values	66
Table 39 - Incident State Values	67
Table 40 - Incident Notification Event Type Values	68

1 List of Contributing Members

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

Member Company

Table 1 - Contributing Member Companies

2 Abstract

This specification identifies the common Use Cases and attributes needed to support inter-carrier Trouble Ticketing Management.

It supports the requirements defined in the MEF Lifecycle Service Orchestration (LSO) Reference Architecture and Framework (MEF 55.1, “LSO RA”) requirements for Trouble Ticketing over the Sonata Interface Reference Point (interactions between a Service Provider and a Partner). Information contained within this specification will be utilized by both the Service Provider (Buyer) and associated Partner (Seller) for the development of automated API based interaction.

3 Release Notes

This document is currently undergoing its second Call for Comments Ballot. Comments that are received in the Call for Comments Ballot will be addressed in the next working draft of the document. Because of the on-going Call for Comment Ballot, the contents of this document are subject to change.

4 Terminology and Acronyms

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

In addition, terms that are defined in MEF 10.3 [3], MEF 12.2 [4], MEF 26.2 [5], MEF 50.1 [6], MEF 51.1 [7], MEF 55.1 [8], and MEF 79 [10] are included in this document by reference and are not repeated in the table below.

Term	Definition	Reference
Buyer	In the context of this document, denotes the organization acting as the customer in a transaction over a Sonata Interface Reference Point.	MEF 80 [11]
DateTime	Date and time format.	ISO 8601
Incident	In the context of this document, denotes a situation that is not part of normal operation in the Seller's network that has a possible negative impact on the operability of the network on one or more Buyers.	This document
Issue	In the context of this document, denotes a problem with a Product as experienced by the Buyer that is not part of normal operation.	This document
Notification	A message sent from the Seller to the Buyer to inform about an event that has occurred in regard to a specific instance of a Ticket or an Incident.	This document
Ticket	An entry contained within a tracking system which contains information about an Issue, along with support interventions made by technical support staff, or third parties, on behalf of an end user who has reported the Issue.	This document
Seller	In the context of this document, denotes the organization acting as the supplier in a transaction over a Sonata Interface Reference Point.	MEF 80 [11]

Table 2 - Terminology and Abbreviations

5 Scope

This specification defines the process for MEF Trouble Ticketing between a Seller and Buyer. This specification is limited to the business process requirements depicted as Use Cases and attribute definitions needed for Trouble Ticketing Management.

Note: The Appointment and Workorder Management business process requirements for use with Trouble Ticketing Management have been incorporated into this specification for time to market reasons and may get moved into a separate MEF specification in a future revision.

6 Compliance Levels

The key words "**MUST**", "**MUST NOT**", "**REQUIRED**", "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**NOT RECOMMENDED**", "**MAY**", and "**OPTIONAL**" in this specification are to be interpreted as described in BCP 14 (RFC 2119, RFC 8174) 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.

7 Introduction

This specification defines the business requirements and process-related guidelines for Trouble Ticketing over the Sonata Interface Reference Point. The Sonata Interface Reference Point is defined in MEF 55.1 [8] as the Management Interface Reference Point supporting the management and operations interactions (e.g., ordering, billing, trouble ticketing, etc.) between two network providers (e.g., Service Provider Domain and Partner Domain). The scope of this specification is limited to interactions between these parties; within this specification, they are referred to as the “Buyer” and the “Seller”.

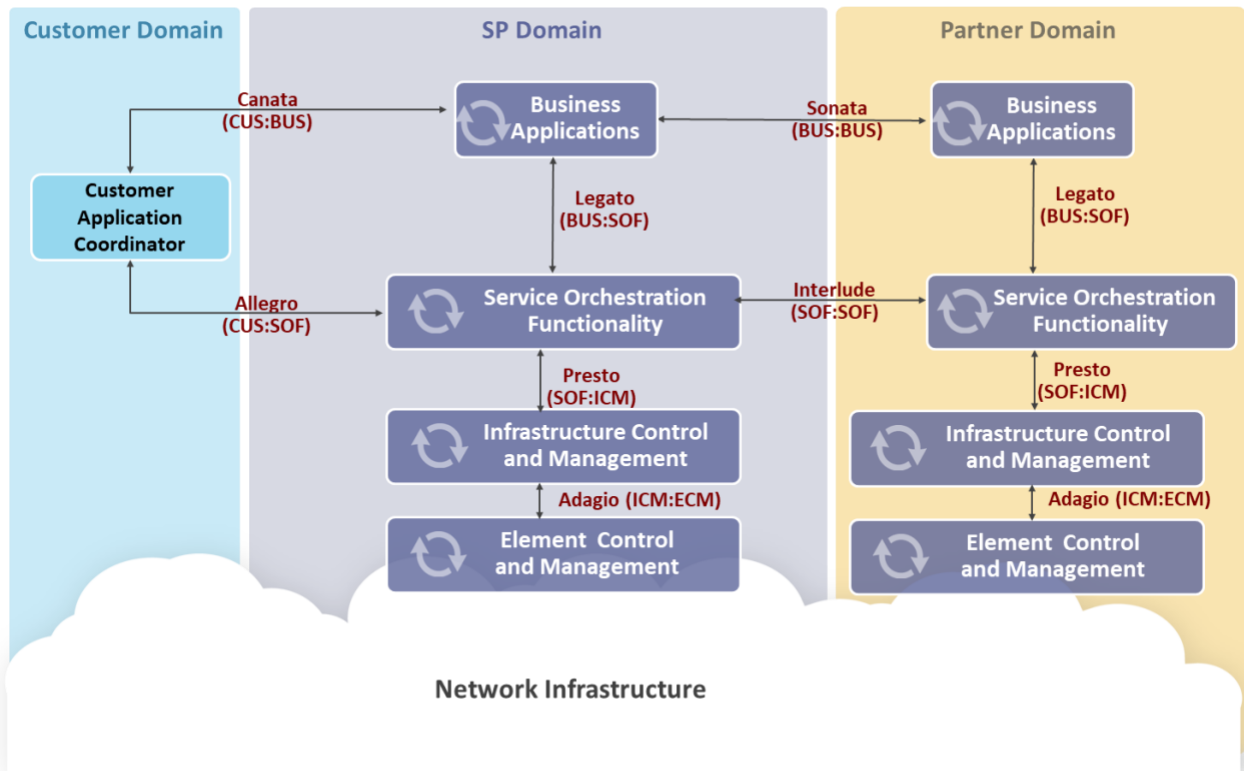


Figure 1 - LSO Reference Architecture Diagram

Figure 1 depicts the LSO Reference Architecture, per MEF 55.1 [8]. This document addresses the interactions between the business applications of the Service Provider (“Buyer”) and Partner domains (“Seller”) required to support MEF Trouble Ticketing Management.

There are 2 associated “patterns” to the interactivity between the Buyer and Seller when the Buyer submits a Ticket request:

1. The Seller may respond immediately with the results of the request.
2. The Seller may acknowledge that the request has been received, but will not complete processing it immediately, and send notifications to update the Buyer on the Ticket State.

Note: The Buyer may retrieve a Ticket or Incident at any time to obtain the status and details.

To fully define the business interactions associated with inter-carrier Trouble Ticketing, this specification is focused on the following key areas:

- Trouble Ticketing Use Cases and Business Process Definitions
- Specific Ticket and Incident Attributes supported in this specification
- Notifications of events that occur during processing of Tickets and Incidents
- Ticket and Incident State Diagrams

8 Trouble Ticketing Use Cases and Business Process Definitions

8.1 High-Level Use Cases

This section provides a comprehensive set of Use Cases needed to support Trouble Ticketing Management and expands on the Problem Reporting process defined in MEF 50.1 (MEF Services Lifecycle Process Flows). These Use Cases are based on business process standards of interactivity between Buyers and Sellers of Products. The specific attributes associated with each Use Case are defined in section 9. Prior arrangements for Buyer authentication, security verification, and system interface requirements are not addressed within these use cases. All onboarding requirements must be defined and negotiated between the Buyer and Seller prior to applying the Trouble Ticketing Use Cases defined in this section.

Trouble Ticketing is part of a broader End-to-End Sonata flow. Figure 2 below shows a high-level diagram to get a good understanding of the entire process and Trouble Ticketing Management's position within it.

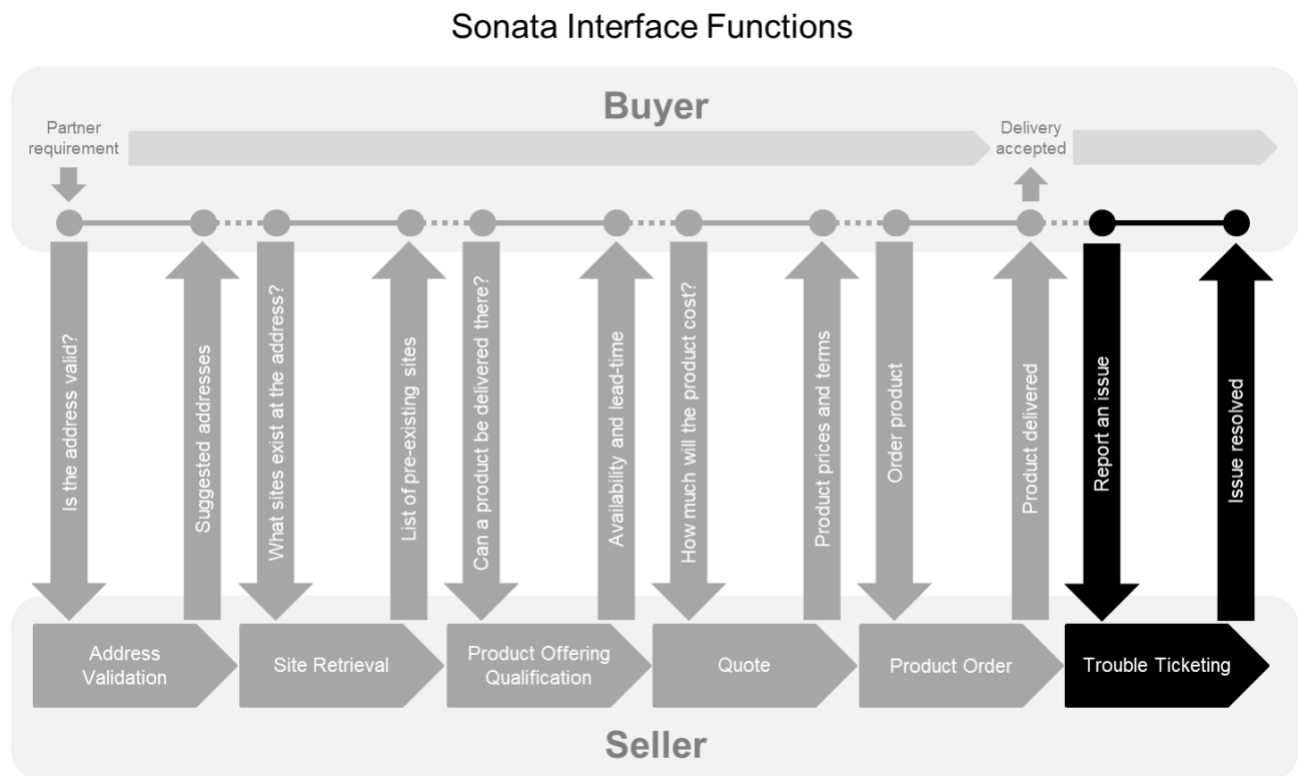


Figure 2 - Sonata Interface Focus

Sonata Interface Overview:

- **Address Validation:** Allows the Buyer to validate their address information for Places known to the Seller, including exact formats.

- **Site Query:** Allows the Buyer to retrieve Service Site information including exact formats for Service Sites known to the Seller.
- **Product Offering Qualification:** Enables the Buyer to determine whether it is feasible for the Seller to deliver a particular Product with a given configuration to a particular Place.
- **Quote:** Allows the Buyer to submit a request to find out how much the installation of an instance of a Product Offering, an update to an existing Product, or a disconnect of an existing Product will cost.
- **Product Order:** Allows the Buyer to request the Seller to initiate and complete the fulfilment process of an installation of a Product Offering, an update to an existing Product, or a disconnect of an existing Product at the Place defined by the Buyer.
- **Trouble Ticketing:** Supports creating, retrieving, notifications and closure for Tickets and Incidents between a Buyer and Seller as a result of an issue or situation that is not part of normal operations of the Product provided by the Seller.

The Trouble Ticketing Use Cases and Requirements are not defined in regard to any particular Product specifications, and thus the Buyer will be able to submit and manage Tickets on any of the Product Offerings supported by the Seller using the Use Cases defined in this specification.

8.2 Trouble Ticketing Use Cases

This section defines the use cases that support Trouble Ticketing.

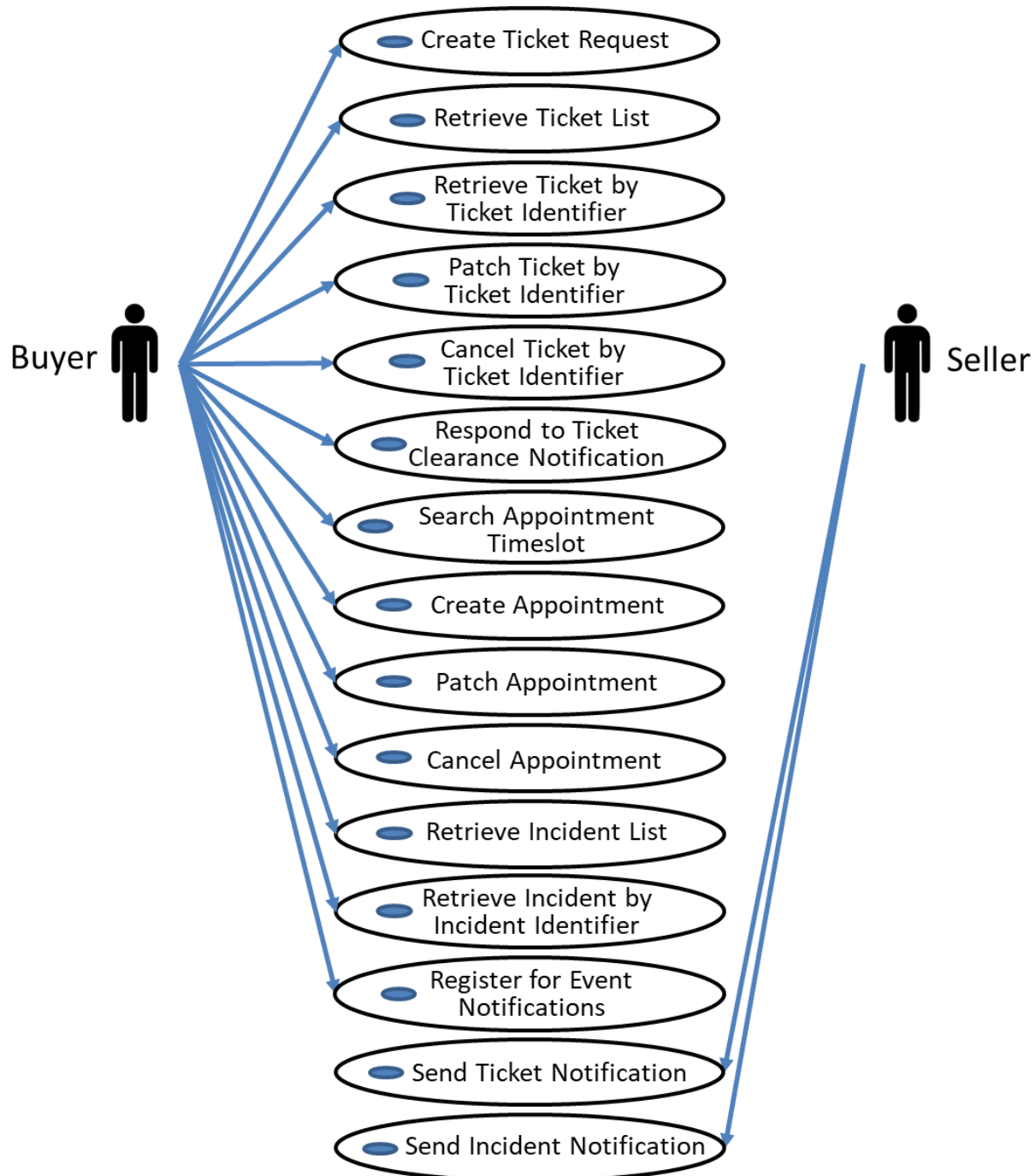


Figure 3 - Trouble Ticketing Use Cases

Figure 3 shows the Use Cases defined in this specification and indicates whether the Use Case is initiated by the Buyer or Seller.

Use Case #	Use Case Name	Use Case Description
1	Create Ticket Request	A request initiated by the Buyer to create a Ticket in the Seller's system to report an Issue experienced by the Buyer.

Use Case #	Use Case Name	Use Case Description
2	Retrieve Ticket List	The Buyer requests a list of Tickets from the Seller based on a set of specified filter criteria. The Seller returns a summarized list of Tickets.
3	Retrieve Ticket by Ticket Identifier	The Buyer requests detailed information about a single Ticket based on a Ticket Identifier.
4	Patch Ticket by Ticket Identifier	A request by the Buyer to patch/partial update a Ticket created by the Buyer in the Seller's system.
5	Cancel Ticket by Ticket Identifier	A request by the Buyer to cancel a Ticket created by the Buyer in the Seller's system.
6	Respond to Ticket Clearance Notification	A request from the Buyer confirming that a Ticket created by the Buyer in the Seller's system can be closed, since the reported Issue is no longer observed. This request is the action taken by a Buyer after receiving a Ticket Notification from the Seller with Ticket Notification Event Type <code>CLEARANCE_REQUEST</code> .
7	Search Appointment Timeslot	A request by the Buyer to identify an available time slot for scheduling or rescheduling an appointment with the Seller.
8	Create Appointment	A request by the Buyer to create an Appointment in the Seller's system.
9	Patch Appointment	A request by the Buyer to patch/update an Appointment created by the Buyer in the Seller's system.
10	Cancel Appointment	A request by the Buyer to cancel an Appointment created by the Buyer in the Seller's system.
11	Retrieve Incident List	The Buyer requests a list of Incidents from the Seller based on a set of specified filter criteria. The Seller returns a summarized list of Incidents.
12	Retrieve Incident by Incident Identifier	The Buyer requests detailed information about a single Incident based on an Incident Identifier.
13	Register for Event Notifications	The Buyer requests to subscribe to Ticket Notifications and optionally Incident Notifications.

Use Case #	Use Case Name	Use Case Description
14	Send Ticket Notification	<p>The Seller sends a notification regarding a Ticket to the Buyer (if registered) indicating one of the following Ticket Notification Event Type has occurred:</p> <ul style="list-style-type: none"> • UPDATE • STATE_CHANGE • INFO_REQUIRED • CLEARANCE_REQUEST
15	Send Incident Notification	<p>The Seller sends a notification to one or more registered Buyers about an Incident that they want to proactively communicate that may impact Tickets indicating one of the following Incident Notification Event Type has occurred:</p> <ul style="list-style-type: none"> • CREATED • IN_PROGRESS • UPDATE • RESOLVED

Table 3 - Use Case Table

Table 4 defines the details for Trouble Ticketing Use Case 1.

Field	Description
Use Case Number	1
Use Case Name	Create Ticket Request
Description	A request initiated by the Buyer to create a Ticket in the Seller's system to report an Issue experienced by the Buyer.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Buyer is authorized to create Tickets in the Seller's system. 2. The Buyer has experienced an Issue for which they would like to open a Ticket in the Seller's system.
Process Steps	<ol style="list-style-type: none"> 1. The Buyer initiates and submits a Create Ticket Request as specified in section 9.2.1. 2. The Seller validates the request based on business rules. 3. The Seller creates the new Ticket, sets the state to ACKNOWLEDGED and provides a response as specified in section 9.2.2.
Post-Conditions	The Buyer receives a Ticket, including a Ticket Identifier. The Seller will take up the Ticket for action.

Field	Description
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller returns an error message if any mandatory attributes are missing.
Business Process	MEF 50.1 Problem-to-Resolution

Table 4 - Create Ticket Request

Table 5 defines the details for Trouble Ticketing Use Case 2.

Field	Description
Use Case Number	2
Use Case Name	Retrieve Ticket List
Description	The Buyer requests a list of Tickets from the Seller based on a set of specified filter criteria. The Seller returns a summarized list of Tickets.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. Buyer is authorized to create Tickets in the Seller's system. 2. The Buyer knows which filter criteria can be used to find a specific set of Tickets (filtering is allowed on specific attributes of a Ticket as specified in section 9.3.1).
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a Retrieve Ticket List request as specified in section 9.3.1 based on the desired filter criteria options. 2. The Seller validates that the filter is well formulated. 3. The Seller determines if there are any Tickets that match the filter criteria in the request. 4. The Seller returns a summarized list of Tickets as specified in section 9.3.2.
Post-Conditions	The Buyer has received a summarized list of Tickets.
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller returns an empty list if there are no Tickets that meet the filter criteria. 3. The Seller returns an error if the number of responses exceeds the Seller specified limit. This error indicates that the requested filter criteria matches too many Tickets, and no results are returned. In this case, the Buyer would likely reinitiate the Retrieve Ticket List request using more specific filter criteria to obtain a summarized list containing fewer matching Tickets.
Business Process	MEF 50.1 Problem-to-Resolution

Table 5 - Retrieve Ticket List

Note: The Seller specified limit of the maximum number of Tickets to be returned per request will be determined by the Seller.

Table 6 defines the details for Trouble Ticketing Use Case 3.

Field	Description
Use Case Number	3
Use Case Name	Retrieve Ticket by Ticket Identifier
Description	The Buyer requests detailed information about a single Ticket based on a Ticket Identifier.
Actors	Buyer/Seller
Pre-Conditions	1. The Buyer knows the identifier of the Ticket to retrieve details for.
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a Retrieve Ticket by Ticket Identifier request with a single Ticket Identifier as specified in section 9.4.1. 2. The Seller receives and validates the request. 3. The Seller determines if there is a Ticket instance that matches the Ticket Identifier. 4. The Seller returns the matching Ticket instance with all the attributes as specified in section 9.4.2.
Post-Conditions	Buyer has detailed information on the Ticket identified by the Ticket Identifier.
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller will return an error if the Ticket with the Ticket Identifier is not found.
Business Process	MEF 50.1 Problem-to-Resolution

Table 6 - Retrieve Ticket by Ticket Identifier

Note: The timeframe that a Ticket in a final state remains able to be retrieved will be determined by the Seller.

Table 7 defines the details for Trouble Ticketing Use Case 4.

Field	Description
Use Case Number	4
Use Case Name	Patch Ticket by Ticket Identifier
Description	A request by the Buyer to patch/partial update a Ticket created by the Buyer in the Seller's system.
Actors	Buyer/Seller

Field	Description
Pre-Conditions	<ol style="list-style-type: none"> 1. The Seller's system contains Tickets created by the Buyer. 2. The Buyer knows the identifier of the Ticket to patch. 3. The Buyer has the list of attributes to patch. The attributes that can be changed are specified in section 9.5.1. 4. The Ticket can be patched if it is in any of the following states: ACKNOWLEDGED, IN_PROGRESS, PENDING, REOPENED or RESOLVED.
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a Patch Ticket by Ticket Identifier request with all attributes to be patched as specified in section 9.5.1. 2. The Seller verifies the Ticket Identifier exists, that the referenced Ticket may be patched and validates the intended updates. 3. The Seller patches the Ticket in the system. 4. The Seller provides a response as specified in section 9.5.2.
Post-Conditions	<ol style="list-style-type: none"> 1. The Ticket attributes are patched as requested by the Buyer. 2. The Ticket State is updated if needed, as specified in section 9.5.2 .
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller will return an error if the Ticket with the Ticket Identifier is not found. 3. The Seller will return an error if the Ticket was not created by the Buyer. 4. The Seller will return an error if all attributes requested to be changed cannot be updated. 5. The Seller will return an error if unable to patch the Ticket because it is in a state that may not be changed as specified in section 9.5.2.
Business Process	MEF 50.1 Problem-to-Resolution

Table 7 - Patch Ticket by Ticket Identifier

Table 8 defines the details for Trouble Ticketing Use Case 5.

Field	Description
Use Case Number	5
Use Case Name	Cancel Ticket by Ticket Identifier
Description	A request by the Buyer to cancel a Ticket created by the Buyer in the Seller's system.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Seller's system contains Tickets created by the Buyer. 2. The Buyer knows the identifier of the Ticket to cancel. 3. The Ticket can be cancelled if it is in any of the following states: ACKNOWLEDGED, IN_PROGRESS or PENDING.

Field	Description
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a Cancel Ticket by Ticket Identifier Request with a Ticket Identifier as specified in section 9.6.1 2. The Seller verifies the Ticket Identifier exists and that the Ticket State of the referenced Ticket allows a transition as specified in section 9.6.2. 3. The Seller sets the Ticket State to ASSESSING_CANCELLATION and starts the assessing cancellation process. 4. The Seller provides a response as specified in section 9.6.2.
Post-Conditions	The Seller has started the assessing cancellation process.
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller will return an error if the Ticket with the Ticket Identifier is not found. 3. The Seller will return an error if the Ticket was not created by the Buyer. 4. The Seller will return an error if unable to cancel the Ticket because it is in a state that may not be cancelled as specified in section 9.6.2.
Business Process	MEF 50.1 Problem-to-Resolution

Table 8 - Cancel Ticket by Ticket Identifier

Table 9 defines the details for Trouble Ticketing Use Case 6.

Field	Description
Use Case Number	6
Use Case Name	Respond to Ticket Clearance Notification
Description	A request from the Buyer confirming that a Ticket created by the Buyer in the Seller's system can be closed, since the reported Issue is no longer observed. This request is the action taken by a Buyer after receiving a Ticket Notification from the Seller with Ticket Notification Event Type CLEARANCE_REQUEST.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Seller's system contains Tickets created by the Buyer. 2. The Buyer knows the identifier of the Ticket to close. 3. The state of the Ticket to close is RESOLVED. 4. The Buyer has verified that the Issue on which the Ticket was based has been resolved satisfactorily.

Field	Description
Process Steps	<ol style="list-style-type: none"> 1. The Buyer requests closure of the Ticket using “Closure Acceptance Indicator” set as specified in section 9.7.1. 2. The Seller verifies the Ticket Identifier exists and that the Ticket State of the referenced Ticket is RESOLVED (indicating ready to be closed). 3. The Seller sets the Ticket State to CLOSED. 4. The Seller provides a response as specified in section 9.7.2.
Post-Conditions	The Ticket State is changed to CLOSED.
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller will return an error if the Ticket with the Ticket Identifier is not found. 3. The Seller will return an error if the Ticket was not created by the Buyer. 4. The Buyer rejects closing of the Ticket using “Closure Acceptance Indicator” set to FALSE if the Issue on which the Ticket was based has not been resolved in a satisfactory manner to the Buyer. The Seller will then set the Ticket State to REOPENED. (Note: this is instead of process step #1 thru #3 above).
Business Process	MEF 50.1 Problem-to-Resolution

Table 9 - Respond to Ticket Clearance Notification

Table 10 defines the details for Trouble Ticketing Use Case 7.

Field	Description
Use Case Number	7
Use Case Name	Search Appointment Timeslot
Description	A request by the Buyer to identify an available time slot for scheduling or rescheduling an appointment with the Seller.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Buyer has identified one or more time slots to request the Seller to search for availability of a Technician for an appointment.
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a list of requested time slots as specified in section 9.8.1. 2. The Seller verifies if a Technician is available for an appointment at the Buyer’s location for the requested time slots. 3. The Seller returns a list of available time slots for an appointment as specified in section 9.8.2.
Post-Conditions	The Buyer has a list of available time slots for an appointment.
Alternative Paths	The Seller returns an empty list of available time slots, if no Technician is available for an appointment at the Buyer’s location during any of the requested time slots.

Field	Description
Business Process	MEF 50.1 Problem-to-Resolution

Table 10 - Search Appointment Timeslot

Table 12 defines the details for Trouble Ticketing Use Case 8.

Field	Description
Use Case Number	8
Use Case Name	Create Appointment
Description	A request by the Buyer to create an Appointment in the Seller's system.
Actors	Buyer/Seller
Pre-Conditions	1. The Buyer has done a Search Appointment Timeslot request to identify an available time slot for the Appointment to create.
Process Steps	1. The Buyer submits Create Appointment as specified in section 9.9.1. 2. The Seller creates the Appointment in the system. 3. The Seller provides a response as specified in section 9.9.2.
Post-Conditions	The Appointment is created as requested by the Buyer.
Alternative Paths	1. The Seller will return an error message if an error is encountered during the processing. 2. The Seller will return an error message if any mandatory attributes are missing. 3. The Seller will return an error if the related Ticket for the Appointment to create is not found. 4. The Seller will return an error if the related Ticket was not created by the Buyer. 5. The Seller will return an error if a Technician is not available for an appointment at the Buyer's location for the Appointment Timeslot.
Business Process	MEF 50.1 Problem-to-Resolution

Table 11 - Create Appointment

Table 12 defines the details for Trouble Ticketing Use Case 9.

Field	Description
Use Case Number	9
Use Case Name	Patch Appointment
Description	A request by the Buyer to patch/update an Appointment created by the Buyer in the Seller's system.
Actors	Buyer/Seller

Field	Description
Pre-Conditions	<ol style="list-style-type: none"> 1. The Buyer knows the identifier for the Appointment to patch/update. 2. The Buyer has the list of attributes to patch. The attributes that can be changed are specified in section 9.10.1. 3. The Appointment can be patched if the state is SCHEDULED.
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits Patch Appointment as specified in section 9.10.1. 2. The Seller verifies that the Appointment Identifier exists and that the Appointment State allows updating as specified in section 9.10.2. 3. The Seller patches the Appointment in the system. 4. The Seller provides a response as specified in section 9.10.2.
Post-Conditions	The Appointment attributes are patched as requested by the Buyer.
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during the processing. 2. The Seller will return an error if the Appointment with the Appointment Identifier is not found. 3. The Seller will return an error if the Ticket corresponding to the Appointment was not created by the Buyer. 4. The Seller will return an error if unable to patch the Appointment because it is in a state that may not be updated as specified in section 9.10.2. 5. The Seller will return an error if the Appointment Timeslot is being updated and a Technician is not available for an appointment at the Buyer's location for the specified timeslot.
Business Process	MEF 50.1 Problem-to-Resolution

Table 12 - Patch Appointment

Table 13 defines the details for Trouble Ticketing Use Case 10.

Field	Description
Use Case Number	10
Use Case Name	Cancel Appointment
Description	A request by the Buyer to cancel an Appointment created by the Buyer in the Seller's system.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Buyer the knows the identifier for the Appointment to cancel. 2. The Appointment can be cancelled if the state is SCHEDULED.

Field	Description
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a Cancel Appointment as specified in section 9.11.1. 2. The Seller verifies that the Appointment Identifier exists and that the Appointment State allows cancelling as specified in section 9.11.2. 3. The Seller sets the Appointment State to CANCELLED. 4. The Seller provides a response as specified in section 9.11.2.
Post-Conditions	The Seller has cancelled the Appointment identified by the Appointment Identifier.
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during the processing. 2. The Seller will return an error if the Appointment with the Appointment Identifier is not found. 3. The Seller will return an error if the Ticket corresponding to the Appointment was not created by the Buyer. 4. The Seller will return an error if unable to cancel the Appointment because it is in a state that may not be cancelled as specified in section 9.11.2.
Business Process	MEF 50.1 Problem-to-Resolution

Table 13 - Cancel Appointment

Table 14 defines the details for Trouble Ticketing Use Case 11.

Field	Description
Use Case Number	11
Use Case Name	Retrieve Incident List
Description	The Buyer requests a list of Incidents from the Seller based on a set of specified filter criteria. The Seller returns a summarized list of Incidents.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Buyer knows which filter criteria can be used to find a specific set of Incidents (filtering is allowed on specific attributes of an Incident as specified in section 9.12.1).
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a Retrieve Incident List request as specified in section 9.12.1 based on the desired filter criteria options. 2. The Seller validates that the filter is well formulated. 3. The Seller determines if there are any Incidents that match the filter criteria in the request. 4. The Seller returns a summarized list of Incidents as specified in section 9.12.2.
Post-Conditions	The Buyer has received a summarized list of Incidents.

Field	Description
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller returns an empty list if there are no Incidents that meet the filter criteria. 3. The Seller returns an error if the number of responses exceeds the Seller specified limit. This error indicates that the requested filter criteria matches too many Incidents, and no results are returned. In this case, the Buyer would likely reinitiate the Retrieve Incident List request using more specific filter criteria to obtain a summarized list containing fewer matching Incidents.
Business Process	MEF 50.1 Problem-to-Resolution

Table 14 - Retrieve Incident List

Note: The Seller specified limit of the maximum number of Incidents to be returned per request will be determined by the Seller.

Table 15 defines the details for Trouble Ticketing Use Case 12.

Field	Description
Use Case Number	12
Use Case Name	Retrieve Incident by Incident Identifier
Description	The Buyer requests detailed information about a single Incident based on an Incident Identifier.
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Buyer knows the identifier of the Incident to retrieve details for.
Process Steps	<ol style="list-style-type: none"> 1. The Buyer submits a Retrieve Incident by Incident Identifier request with a single Incident Identifier as specified in section 9.13.1. 2. The Seller receives and validates the request. 3. The Seller determines if there is an Incident instance that matches the Incident Identifier. 4. The Seller returns the matching Incident instance with all the attributes as specified in section 9.13.2.
Post-Conditions	Buyer has detailed information on the Incident identified by the Incident Identifier.
Alternative Paths	<ol style="list-style-type: none"> 1. The Seller will return an error message if an error is encountered during processing. 2. The Seller will return an error if the Incident with the Incident Identifier is not found.
Business Process	MEF 50.1 Problem-to-Resolution

Table 15 - Retrieve Incident by Incident Identifier

Table 16 defines the details for Trouble Ticketing Use Case 13.

Field	Description
Use Case Number	13
Use Case Name	Register for Event Notifications
Description	The Buyer requests to subscribe to Ticket Notifications and optionally Incident Notifications.
Actors	Buyer/Seller
Pre-Conditions	1. Buyer is authorized to create Tickets in the Seller's system.
Process Steps	<ol style="list-style-type: none"> 1. The Buyer sends the Register for Event Notifications requests as shown in section 9.14.1 to the Seller specifying where to send such notifications and which Notification Event Types to include in notifications. 2. The Seller receives this request, records which Notification Event Types to send, where to send such notifications for this Buyer, and returns an acknowledgement to the Buyer as specified in section 9.14.2.
Post-Conditions	The Seller is aware of where to send Ticket and Incident Notifications described in Use Case 14 (see Table 17) and Use Case 15 (see Table 18).
Alternative Paths	The Seller returns an error message if an error is encountered while processing that prevents the Seller from completing the request.
Business Process	MEF 50.1 Problem-to-Resolution

Table 16 - Register for Event Notifications

Table 17 defines the details for Trouble Ticketing Use Case 14.

Field	Description
Use Case Number	14
Use Case Name	Send Ticket Notification
Description	<p>The Seller sends a Notification regarding a Ticket to the Buyer (if registered) indicating one of the following Notification Event Type has occurred:</p> <ul style="list-style-type: none"> • UPDATE • STATE_CHANGE • INFO_REQUIRED • CLEARANCE_REQUEST
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> 1. The Seller's system contains Tickets created by the Buyer. 2. The Buyer has registered to receive Ticket Notifications. 3. A Ticket in the Seller's system has gone through one of the qualifying state changes.

Field	Description
Process Steps	<ol style="list-style-type: none"> The Seller prepares the notification message with the appropriate Notification Event Type and Ticket Identifier. The Seller sends the notification to the location(s) registered by the Buyer, as specified in section 9.15.
Post-Conditions	The Seller has sent the appropriate Ticket Notification.
Alternative Paths	None
Business Process	MEF 50.1 Problem-to-Resolution

Table 17 - Send Ticket Notification

If the Buyer Ticket Notification endpoint is unreachable an error is returned to the Seller. The Seller may, at the Seller's discretion, continue to try to send notifications to the endpoint or may mark that endpoint as failed and stop sending notifications to that endpoint.

Table 18 defines the details for Trouble Ticketing Use Case 15.

Field	Description
Use Case Number	15
Use Case Name	Send Incident Notification
Description	<p>The Seller sends a notification to one or more registered Buyers about an Incident that they want to proactively communicate that may impact Tickets indicating one of the following Notification Event Type has occurred:</p> <ul style="list-style-type: none"> • CREATED • IN_PROGRESS • UPDATE • RESOLVED
Actors	Buyer/Seller
Pre-Conditions	<ol style="list-style-type: none"> The Buyer has registered to receive Incident Notifications. The Buyer may have created one or more Tickets directly related to or caused by a given Incident, prior to the Seller sending the corresponding Incident notification.
Process Steps	<ol style="list-style-type: none"> The Seller determines which Buyer(s) are impacted by an Incident. For each impacted Buyer, the Seller determines if the Incident requires a notification. The Seller prepares the notification message with the appropriate Notification Event Type, Incident Identifier and Incident Notification Subject description. The Seller may include any Tickets related to the Buyer and this Incident as Related Objects in the Incident. The Seller sends the notification(s) to the location(s) registered by the Buyer(s), as specified in section 9.16.

Field	Description
Post-Conditions	<ol style="list-style-type: none">1. The Seller has sent the appropriate Incident Notification.2. The Buyer may use this Incident to create a new Ticket, or to defer creating new Tickets (e.g. wait for the Incident to be resolved by Seller) or update one or more existing Tickets related to this specific Incident.
Alternative Paths	None
Business Process	MEF 50.1 Problem-to-Resolution

Table 18 - Send Incident Notification

If the Buyer Incident Notification endpoint is unreachable an error is returned to the Seller. The Seller may, at the Seller's discretion, continue to try to send notifications to the endpoint or may mark that endpoint as failed and stop sending notifications to that endpoint.

9 Trouble Ticketing Operation Attributes

This section identifies the attributes needed for each of the Trouble Ticketing Use Cases defined previously. It is important to note that this section defines the superset of all MEF-defined attributes needed to support Trouble Ticketing Management for the Use Cases defined in this document.

The columns in the tables are as follows:

- **Attribute** The name of the attribute
- **Description** A short description of the attribute
- **Type** String, List, DateTime, or Reference to another entry in the table
- **Comments** Additional information about the attribute

Note: The comments in the tables below describing if an attribute is optional or mandatory are informational to assist with ease of understanding. While these comments are intended to be accurate; in the case of discrepancies, the requirements in this document shall take precedence.

9.1 Attribute Tables

The tables below identify and describe all attributes related to Trouble Ticketing. The “Comments” column indicates which attributes the Buyer may set and which the Seller may set.

9.1.1 Buyer and Seller Attributes

Table 19 lists the Buyer and Seller attributes.

Attributes	Description	Type	Comments
Buyer	The mutually agreed unique name of the organization that is acting as the customer in this transaction.	String	See section MEF 79 [10] section 8.8 for rules on use of Buyer.
Seller	The mutually agreed unique name of the organization that is acting as the supplier in this transaction.	String	See section MEF 79 [10] section 8.8 for rules on use of Seller.
Seller Response Code	A response identifier, indicating if the Seller was able to successfully accept the request. The detailed response options are for further study but include: Success and Failure.	String	Set by the Seller. For further study.

Table 19 - Buyer and Seller Attributes

9.1.2 Ticket Attributes

Table 20 lists the Ticket attributes.

Attributes	Description	Type	Comments
Seller Ticket Identifier	Unique (within the Seller Ticket domain) identifier for the Ticket.	String	Created by the Seller when the Ticket instance is created.
Buyer Ticket Identifier	Identifier provided by the Buyer to allow the Buyer to use as a search attribute in Retrieve Ticket List.	String	Optional attribute set by the Buyer.
Product Identifier	Unique identifier provided by the Seller during activation to refer to the Product where the Issue occurred and this Ticket is generated for.	String	Set by the Buyer
Description	Description of the Issue.	String	Set by the Buyer
Severity	The severity or impact (ITIL) of the Ticket as evaluated by the Buyer.	One of: <ul style="list-style-type: none"> • EXTENSIVE • SIGNIFICANT • MODERATE • MINOR 	Set by the Buyer
Seller Severity	The severity or impact (ITIL) of the Ticket on the Buyer as evaluated by the Seller.	One of: <ul style="list-style-type: none"> • EXTENSIVE • SIGNIFICANT • MODERATE • MINOR 	Set by the Seller
Priority	The priority (ITIL) is based on the assessment of the impact and urgency of how quickly the Ticket should be resolved as evaluated by the Buyer. The Priority is used by the Seller to determine the order in which Tickets get resolved across Buyers.	One of: <ul style="list-style-type: none"> • CRITICAL • HIGH • MEDIUM • LOW 	Set by the Buyer

Attributes	Description	Type	Comments
Seller Priority	The priority (ITIL) is based on the assessment of the impact and urgency of how quickly the Ticket should be resolved after evaluation by the Seller of the impact of the Issue on the Buyer.	One of: <ul style="list-style-type: none"> • CRITICAL • HIGH • MEDIUM • LOW 	Set by the Seller
Type	The presumed cause of the Issue as evaluated by the Buyer.	One of: <ul style="list-style-type: none"> • INSTALLATION • MAINTENANCE • DEGRADED • FAILURE • DOWN • ASSISTANCE 	Set by the Buyer INSTALLATION: Related to installation of Product, provisioning is complete, but Product is not operational. MAINTENANCE: Any scheduled or non-scheduled maintenance related Issue. DEGRADED: When the Product is impacted and not meeting the Product specifications. FAILURE: When the Product is not operational as intended, including backup and load-balancing failures. ASSISTANCE: Requesting help for a situation (not a failure) requiring attention that is not categorized.
Ticket Creation Date	The date the Ticket was created in the Seller's system.	DateTime	Set by the Seller
Issue Start Date	Date indicating when the Buyer first observed the Issue, to provide the Seller with additional insight.	DateTime	Optional attribute set by the Buyer

Attributes	Description	Type	Comments
Target Resolved Date	The date provided by the Seller to indicate when the Ticket is expected to be RESOLVED.	DateTime	Optional attribute set by the Seller
Resolved Date	The date the Ticket State was set to RESOLVED by the Seller.	DateTime	Set by the Seller
Ticket State	The current state of the Ticket (see Table 35).	One of: <ul style="list-style-type: none"> • ACKNOWLEDGED • IN_PROGRESS • RESOLVED • CLOSED • REOPENED • PENDING • ASSESSING_CANCELLATION • CANCELLED 	Set by the Seller
Notes	A set of unstructured comments or information associated to the Ticket. This list can be empty.	List of Note (see Table 21)	Optional list of attributes added by the Buyer and Seller. Notes may be added but may not be modified or deleted (for historical reasons).
Attachments	Attachments to the Ticket, such as a file, screen shot or embedded content.	List of Attachment (see Table 22)	Optional list of attributes added by the Buyer and Seller. Attachments may be added but may not be modified or deleted (for historical reasons).
Reporter Contact	The contact information for the person, team or organization representing the Buyer that reported the Issue.	Contact Information (see Table 23)	Set by the Buyer
Buyer Technical Contacts	The contact information for the person, team or organization representing the Buyer that has technical knowledge about the Issue.	List of Contact Information (see Table 23)	Optional attribute set by the Buyer

Attributes	Description	Type	Comments
Seller Ticket Contact	The contact information for the person, team or organization representing the Seller assigned to the Ticket.	Contact Information (see Table 23)	Set by the Seller
Seller Technical Contacts	The contact information for the person, team or organization representing the Seller that has technical knowledge about the installation and/or Seller's network.	List of Contact Information (see Table 23)	Optional attribute set by the Seller
Related Objects	The related object(s) allows correlating related Tickets and/or related Incidents with the Ticket.	List of Related Object (see Table 24)	Optional list of attributes, with a specific Related Object in the list set by either the Buyer or Seller, as indicated by the Relation Source.
Workorders	A set of workorders to be performed under the responsibility of Seller technician(s) to resolve the Ticket.	List of Workorder (see Table 25)	Optional list of attributes set by the Seller.

Table 20 - Ticket Attributes

9.1.3 Note Attributes

Table 21 lists the Note attributes.

Attributes	Description	Type	Comments
Note Source	Indicates if this Note was added by the Buyer or Seller.	One of: <ul style="list-style-type: none"> • BUYER • SELLER 	Set by the Buyer or Seller
Note Date	The date the Note was created.	DateTime	Set by the Note Source
Note Author	The author of the Note.	String	Set by the Note Source
Note Text	The text of the Note.	String	Set by the Note Source

Table 21 - Note Attributes

[R1] If Note Source is BUYER, then all Note attributes **MUST** only be settable by the Buyer.

[R2] If Note Source is SELLER, then all Note attributes **MUST** only be settable by the Seller.

[R3] A Note **MUST** contain the following attributes defined in Table 21:

- Note Source
- Note Date
- Note Author
- Note Text

9.1.4 Attachment Attributes

Table 22 lists the Attachment attributes.

Attributes	Description	Type	Comments
Attachment Source	Indicates if the Attachment was added by the Buyer or Seller.	One of: <ul style="list-style-type: none"> • BUYER • SELLER 	Set by the Buyer or Seller
Attachment Date	The date the Attachment was added.	DateTime	Set by the Attachment Source
Attachment Author	The Author of the Attachment.	String	Set by the Attachment Source
Attachment Name	The name of the attachment to a Ticket.	String	Set by the Attachment Source
Description	Description of the attachment.	String	Optional attribute set by the Attachment Source
URL	URL where the attachment is located.	String	Set by the Attachment Source
Content	The actual contents of the attachment.	Base64binary	Set by the Attachment Source
Mime Type	Attachment mime type such as extension for video, picture, and document.	String	Set by the Attachment Source
Size	Size of the attachment.	Size: <ul style="list-style-type: none"> • Unit • Value 	Optional attribute set by the Attachment Source. A visual indicator to a user of how long the file transfer may take.

Table 22 - Attachment Attributes

- [R4] If Attachment Source is BUYER, then all Attachment attributes **MUST** only be settable by the Buyer.
- [R5] If Attachment Source is SELLER, then all Attachment attributes **MUST** only be settable by the Seller.
- [R6] An Attachment **MUST** contain the following attributes defined in Table 22:
- Attachment Source
 - Attachment Date
 - Attachment Author
 - Attachment Name
- [R7] If the attachment type is URL, the URL attribute defined in Table 22 **MUST** be provided.
- [R8] If the attachment type is content, the following attributes defined in Table 22 **MUST** be provided.
- Content
 - Mime Type
- [O1] An Attachment **MAY** contain the following attribute as defined in Table 22:
- Description
 - Size

9.1.5 Contact Information Attributes

Table 23 lists the Contact Information attributes.

Attributes	Description	Type	Comments
Contact Name	The person or organization to be contacted.	String	Set by the Buyer or Seller
Contact Phone Number	The telephone number for this contact.	String	Set by the Buyer or Seller
Contact Phone Number Extension	The telephone number extension for this contact.	String	Optional attribute set by the Buyer or Seller

Attributes	Description	Type	Comments
Contact Email Address	The email address for this contact.	String	Set by the Buyer or Seller
Contact Organization	The organization or company that the contact belongs to	String	Optional attribute set by the Buyer or Seller
Contact Postal Address	Identifies the postal address of the person or office to be contacted.	Postal address that includes all attributes of the Fielded Address (see MEF 79 [8] section 8.9.2)	Optional attribute set by the Buyer or Seller

Table 23 - Contact Information Attributes

[R9] A Contact Information **MUST** contain the following attributes defined in Table 23:

- Contact Name
- Contact Phone Number
- Contact Email Address

[O2] A Contact Information **MAY** contain a Contact Phone Number Extension and Contact Organization attribute as defined in Table 23.

9.1.6 Related Object Attributes

Table 24 lists the Related Object attributes.

Attributes	Description	Type	Comments
Relation Source	Indicates if this Related Object was added by the Buyer or Seller.	One of: <ul style="list-style-type: none"> • BUYER • SELLER 	Set by the Buyer or Seller
Related Object Type	The type of related object to the Ticket.	One of: <ul style="list-style-type: none"> • TICKET • INCIDENT 	Set by the Relation Source
Related Object Identifier	Reference to Related Object.	String	Set by the Relation Source
Relation Date	The date the Related Object was linked to the Ticket.	DateTime	Set by the Relation Source
Relation Description	A description of the reason for the Relation Source linking the Related Object to the Ticket.	String	Set by the Relation Source

Table 24 - Related Object Attributes

- [R10]** If a Related Object is added by the Buyer, then the Buyer **MUST** set the Relation Source to BUYER.
- [R11]** If a Related Object is added by the Seller, then the Seller **MUST** set the Relation Source to SELLER.
- [R12]** If Relation Source is BUYER, then all Related Object attributes **MUST** only be settable by the Buyer.
- [R13]** If Relation Source is SELLER, then all Related Object attributes **MUST** only be settable by the Seller.
- [R14]** If a relationship is added between a Ticket and another object, the following attributes defined in Table 24 **MUST** be included in the Related Object:
 - Relation Source
 - Related Object Type
 - Related Object Identifier
 - Relation Date
 - Relation Description

9.1.7 Workorder Attributes

Table 25 lists the Workorder attributes.

Attributes	Description	Type	Comments
Workorder Identifier	Unique (within the Seller domain) identifier for the Workorder.	Identifier	Created by the Seller when the Workorder instance is created.
Tasks	A set of tasks to be performed under the responsibility of the Technician to resolve the Ticket.	List of String	Set by the Seller Each String is a description of a specific task to be performed under the responsibility of the Technician.
Workorder Notes	Description of the result of the workorder, or the inability to complete some of the Tasks.	List of Note (see Table 21)	Set by the Seller

Technician	The Seller technician assigned to the Workorder and responsible for performing a set of tasks.	Contact Information (see Table 23)	Set by the Seller
Workorder State	The state of the Workorder (see Table 36).	One of: <ul style="list-style-type: none"> • OPEN • IN_PROGRESS • UNABLE_TO_COMPLETE • COMPLETED 	Set by the Seller
Appointment Required	The Seller requires the Buyer to schedule an Appointment.	Boolean	Set by the Seller If set to TRUE, the Seller is Requesting the Buyer to schedule an Appointment.
Appointment Place	The location of the Appointment. This includes the site contact which the Seller technician may need to get access to the Buyer's site during the Appointment. This could be an end user, security personnel or any authorized person.	Place Relationship attribute as defined in MEF 57.2 [9] Section 10.14	Set by the Seller
Appointments	The appointments for the Workorder.	List of Reference to Appointment (see Table 27)	Optional attribute set by the Seller. A Workorder may contain only one open Appointment at a time (e.g. with Appointment State of SCHEDULED).

Table 25 - Workorder Attributes

[R15] A Workorder **MUST** contain the following attributes defined in Table 25:

- Workorder Identifier
- Technician

- Workorder State

[R16] A Workorder **MUST** contain one or more Tasks as defined in Table 25.

[O3] A Workorder **MAY** contain Appointments as defined in Table 25.

9.1.8 Timeslot Attributes

Table 26 lists the Timeslot attributes.

Attributes	Description	Type	Comments
Start Time	The starting Date and Time of the Timeslot.	Date/Time	Set by the Buyer or Seller
End Time	The ending Date and Time of the Timeslot.	Date/Time	Set by the Buyer or Seller

Table 26 - Timeslot Attributes

[R17] The End Time **MUST** be chronologically later than Start Time.

9.1.9 Appointment Attributes

Table 27 lists the Appointment attributes.

Attributes	Description	Type	Comments
Appointment Identifier	Unique (within the Seller domain) identifier for the Appointment.	String	Created by the Seller when the Appointment instance is created.
Related Entities	A reference to a set of attributes to provide context for the purpose of the Appointment.	List of Related Entity (see section 9.8.3 for usage details)	Set by the Buyer
Appointment Timeslot	The Date and Time of the Appointment.	Timeslot (see Table 26)	Set by the Buyer. This needs to be one of the Available Timeslots returned by the Seller in a Search Appointment Timeslot response.

Appointment State	The state of the Appointment (see Table 37).	One of: <ul style="list-style-type: none"> • ACKNOWLEDGED • SCHEDULED • CANCELLED • FAILED • COMPLETED 	Set by the Seller
Appointment Place	The location of the Appointment. This includes the site contact which the Seller technician may need to get access to the Buyer's site during the Appointment. This could be an end user, security personnel or any authorized person.	Place Relationship attribute as defined in MEF 57.2 [9] Section 10.14	Set by the Buyer. Derived from the location in the related entity (e.g. Workorder), with the site contact updated as need for the Appointment Timeslot.
Buyer Appointment Contact	The Buyer contact assigned to and responsible for the Appointment.	Contact Information (see Table 23)	Set by the Buyer
Seller Appointment Contact	The Seller contact assigned to and responsible for the Appointment.	Contact Information (see Table 23)	Set by the Seller
Appointment Notes	Notes describing the purpose of and the results of the Appointment.	List of Note (see Table 21)	Optional attribute added by the Buyer and Seller. Notes may be added but may not be modified or deleted (for historical reasons).

Table 27 - Appointment Attributes

9.1.10 Search Appointment Timeslot Attribute

Table 28 lists the Search Appointment Timeslot attributes used by the Buyer to identify an available time slot for scheduling or rescheduling an appointment with the Seller.

Attributes	Description	Type	Comments
Search Appointment Identifier	Unique identifier (within the Seller domain).	String	Set by the Seller

Related Entities	A reference to a set of attributes to provide context for the purpose of the Appointment.	List of Related Entity (see section 9.8.3 for usage details)	Set by the Buyer
Appointment Place	The location of the Appointment. This includes the site contact which the Seller technician may need to get access to the Buyer's site during the appointment. This could be an end user, security personnel or any authorized person.	Place Relationship attribute as defined in MEF 57.2 [9] Section 9.14	Set by the Buyer. Derived from the location in the related entity (e.g. Workorder), with the site contact updated as need for the Appointment Timeslot.
Requested Timeslots	A set of time slots for which the Buyer is interested in the availability for an appointment by a Seller's Technician at the Buyer's location. For example Monday thru Friday, or a set of specific time slots.	List of Timeslot	Set by the Buyer
Available Timeslots	A set of time slots with availability of a Technician returned by the Seller, which the Buyer may select for creating or rescheduling an appointment at the Buyer's location.	List of Timeslot	Set by the Seller

Table 28 - Search Appointment Timeslot Attributes

9.1.11 Related Entity Attributes

Table 29 lists the Related Entity attributes used for referencing an entity, where the type of the entity is not known in advance to support appointments in a generic manner.

Attributes	Description	Type	Comments
Entity Role	The role of the Related Entity.	String	Set by the Buyer
Entity Type	The type of Related Entity.	String	Set by the Buyer

Entity Identifier	Reference to Related Entity.	String	Set by the Buyer
-------------------	------------------------------	--------	------------------

Table 29 - Related Entity Attributes

9.1.12 Incident Attributes

Table 30 lists the Incident attributes.

Attributes	Description	Type	Comments
Incident Identifier	Unique (within the Seller Ticket domain) identifier for the Incident.	String	Created by the Seller when the Incident instance is created.
Product Identifiers	A set of unique identifiers provided by the Seller during activation to refer to the Product where the Incident occurred and is generated for.	List of String	Set by the Seller
Incident Description	Description of the Incident.	String	Set by the Seller
Incident Severity	The severity or impact (ITIL) of the Incident as evaluated by the Seller.	One of: <ul style="list-style-type: none"> • EXTENSIVE • SIGNIFICANT • MODERATE • MINOR 	Set by the Seller
Incident Priority	The priority (ITIL) is based on the assessment of the impact and urgency of how quickly the Incident should be resolved after evaluation by the Seller of the impact of the Incident.	One of: <ul style="list-style-type: none"> • CRITICAL • HIGH • MEDIUM • LOW 	Set by the Seller
Incident Type	The presumed cause of the Incident as evaluated by the Seller.	One of: <ul style="list-style-type: none"> • MAINTENANCE • DEGRADED • FAILURE • DOWN 	Set by the Seller MAINTENANCE: Any scheduled or non-scheduled maintenance related Incident. DEGRADED: When the Product is impacted and not meeting the Product specifications.

Attributes	Description	Type	Comments
			FAILURE: When the Product is not operational as intended, including backup and load-balancing failures. DOWN: When the Product is non-operational.
Incident Creation Date	The date the Incident was created in the Seller's system.	DateTime	Set by the Seller
Incident Start Date	The date when the Incident was first identified, for example via error logs.	DateTime	Optional attribute set by the Seller
Incident Target Resolved Date	The date provided by the Seller to indicate when the Incident is expected to be RESOLVED.	DateTime	Optional attribute set by the Seller
Incident Resolved Date	The date the Incident State was set to RESOLVED by the Seller.	DateTime	Set by the Seller
Incident State	The current state of the Incident (see Table 39).	One of: <ul style="list-style-type: none"> • CREATED • IN_PROGRESS • RESOLVED 	Set by the Seller
Incident Notes	A set of unstructured comments or information associated to the Incident, with optional file attachments. This list can be empty.	List of Note (see Table 21)	Optional list of attributes added by the Seller. Notes may be added but may not be modified or deleted (for historical reasons).
Incident Attachments	Attachments to the Incident, such as a file, screen shot or embedded content.	List of Attachment (see Table 22)	Optional list of attributes added by the Seller. Attachments may be added but may not be modified or deleted (for historical reasons).
Seller Incident Contact	The contact information for the person, team or organization representing the Seller assigned to the Ticket.	Contact Information (see Table 23)	Set by the Seller

Attributes	Description	Type	Comments
Incident Related Objects	The related object(s) allows correlating related Tickets and/or related Incidents with the Incident.	List of Related Objects (see Table 24)	Optional list of attributes set by the Seller.

Table 30 - Incident Attributes

9.1.13 Respond to Ticket Clearance Notification Attributes

Table 31 lists the Buyer's attributes for the Respond to Ticket Clearance Notification.

Attributes	Description	Type	Comments
Seller Ticket Identifier	Unique (within the Seller Ticket domain) identifier for the Ticket.	String	Set by the Buyer to specify Ticket to close.
Closure Acceptance Indicator	Indicates if the Buyer has accepted the Seller's Ticket Clearance Notification and that the Ticket can be closed or needs to be reopened.	Boolean	Set by the Buyer If set to TRUE, Buyer confirms the Issue has been resolved satisfactorily. If set to FALSE, Buyer confirms the Issue has not been resolved satisfactorily and the Ticket needs to be reopened.
Closure Rejection Reason	Unstructured comment describing the reason the Buyer doesn't agree on the resolution and needs the Ticket to be reopened.	String	Set by the Buyer if Ticket has not been resolved satisfactorily. If the Buyer wants this Closure Rejection Reason to be included in the Ticket Notes for historical reasons, the Buyer needs to patch the Ticket.

Table 31 - Respond to Ticket Clearance Notification Attributes
9.1.14 Register for Event Notifications Attributes

Table 32 lists the Register for Event Notifications attributes.

Attributes	Description	Type	Comments
Notification Target Information	The detailed information on the technical API endpoint address specifying where the Seller is to send any Ticket or Incident Notifications. There can be multiple locations for one Buyer.		This is the Callback target in the API.
Notification Type	The type of notification to register for.	One of: <ul style="list-style-type: none"> • TICKET • INCIDENT 	Set by the Buyer
List of Notification Event Types	A list of the Notification Event Types the Buyer wishes to receive.	If Resource Type is TICKET, then a list of one or more of: <ul style="list-style-type: none"> • UPDATE • STATE_CHANGE • INFO_REQUIRED • CLEARANCE_REQUEST If Resource Type is INCIDENT, then a list of one or more of: <ul style="list-style-type: none"> • CREATED • IN_PROGRESS • UPDATE • RESOLVED 	Set by the Buyer
Action	Request to start or stop receiving Ticket Notifications.	One of: <ul style="list-style-type: none"> • START • STOP 	Set by the Buyer

Table 32 - Register for Event Notifications Attributes

Note: See Table 38 - Ticket Notification Event Type Values for detailed descriptions for Notification Event Types descriptions.

9.1.15 Send Ticket Notification Attributes

Table 33 lists the Send Ticket Notification attributes used by the Seller in the Send Ticket Notification to registered Buyers.

Attributes	Description	Type	Comments
Ticket Notification Event Type	The Notification Event Type triggering the Send Ticket notification (see Table 38).	One of: <ul style="list-style-type: none"> • UPDATE • STATE_CHANGE • INFO_REQUIRED • CLEARANCE_REQUEST 	Set by the Seller
Seller Ticket Identifier	Unique (within the Seller Ticket domain) identifier for the Ticket.	String	Set by the Seller

Table 33 - Send Ticket Notification Attributes

9.1.16 Send Incident Notification Attributes

Table 34 lists the Send Incident Notification attributes used by the Seller in the Send Incident Notification to registered Buyers.

Attributes	Description	Type	Comments
Incident Notification Event Type	The Notification Event Type triggering the Incident notification (see Table 40).	One of: <ul style="list-style-type: none"> • CREATED • IN_PROGRESS • UPDATE • RESOLVED 	Set by the Seller
Incident Identifier	Unique (within the Seller domain) identifier for the Incident.	String	Set by the Seller
Incident Notification Subject	Summary description of the Incident Notification (similar as a news feed headline or email subject).	String	Set by the Seller

Table 34 - Send Incident Notification Attributes

9.2 Create Ticket Request

This section lists the attributes and requirements for Use Case 1.

9.2.1 Create Ticket Request - Buyer Request

The following are the requirements on the Buyer for the Create Ticket Request.

- [R18] The Buyer's Create Ticket Request **MUST** include the following attributes defined in Table 20 - Ticket Attributes:
- Product Identifier
 - Description
 - Severity
 - Priority
 - Type
 - Reporter Contact
- [O4] The Buyer's Create Ticket Request **MAY** include the following attributes defined in Table 20 - Ticket Attributes:
- Buyer Identifier
 - Issue Start Date
 - Notes
 - Attachments
 - Buyer Technical Contacts
 - Related Objects
- [R19] If the Buyer's Create Ticket Request includes Attachments, the Buyer **MUST** specify either the URL or Content for the Attachments.

9.2.2 Create Ticket Request - Seller Response

The following are the requirements on the Seller's response to a Create Ticket Request.

- [R20] When providing a response to a Create Ticket Request, the Seller **MUST** specify the Seller Response Code attribute defined in Table 19 - Buyer and Seller Attributes.
- [R21] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 20 - Ticket Attributes.

The following requirements apply when the Seller Response Code indicates success.

- [R22] The Seller's response **MUST** echo back all attributes and values set by the Buyer in the Create Ticket Request.

- [R23] The Seller **MUST** set the Ticket State to ACKNOWLEDGED.
- [R24] The Seller's response to a Create Ticket Request **MUST** include the following attributes defined in Table 20 - Ticket Attributes:
- Seller Ticket Identifier
 - Product Identifier
 - Seller Severity
 - Seller Priority
 - Ticket Creation Date
 - Ticket State
 - Seller Ticket Contact
- [O5] The Seller's response to a Create Ticket Request **MAY** include the following attributes defined in Table 20 - Ticket Attributes:
- Target Resolved Date
 - Notes
 - Attachments
 - Seller Technical Contacts
 - Related Objects
 - Workorders

9.2.3 Seller Ticket Lifecycle Updates

The following are the requirements for subsequent updates performed by the Seller on a Ticket during the lifecycle of the Ticket.

- [O6] The Seller **MAY** add a Note as specified in section 9.1.3.
- [R25] The Seller **MUST** add a Note as specified in section 9.1.3 when any of the following Ticket attributes are updated:
- Target Resolved Date
 - Related Objects
- [R26] The Seller **MUST NOT** modify or delete any existing Notes.

- [O7] The Seller **MAY** add an Attachment as specified in section 9.1.4.
- [R27] The Seller **MUST NOT** modify or delete any existing Attachments.
- [O8] The Seller **MAY** add, modify or delete Seller Technical Contacts as specified in section 9.1.5.
- [O9] The Seller **MAY** add a Related Object as specified in section 9.1.6.
- [R28] The Seller **MUST NOT** modify or delete any Related Objects.
- [O10] The Seller **MAY** add, modify or delete Workorders as specified in section 9.1.7.

Note: The method for a Seller to add Notes, Attachments or Related Objects to a Ticket and to add, modify or delete Seller Technical Contacts and Workorders to a Ticket are outside the scope of this document. If a Seller modifies a Ticket, the Seller sends an UPDATE notification to the Buyer.

9.3 Retrieve Ticket List

This section lists the attributes and requirements for Use Case 2.

9.3.1 Retrieve Ticket List - Buyer Request

The following are the requirements on the Buyer for the Retrieve Ticket List request.

- [O11] The Buyer **MAY** use any of the following filter criteria specified in Table 20 - Ticket Attributes for a Retrieve Ticket List request:
 - Buyer Ticket Identifier
 - Product Identifier
 - Severity
 - Seller Severity
 - Priority
 - Seller Priority
 - Type
 - Ticket Creation Date (range of dates)
 - Target Resolved Date (range of dates)
 - Resolved Date (range of dates)

- Ticket State

[O12] The Buyer **MAY** use a combination of filter criteria to avoid getting a Too Many Records response code.

9.3.2 Retrieve Ticket List - Seller Response

The following are the requirements on the Seller for the Retrieve Ticket List response.

[R29] When providing a response to a Retrieve Ticket List request, the Seller **MUST** specify the Seller Response Code attribute defined in Table 19 - Buyer and Seller Attributes.

[R30] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 20 - Ticket Attributes.

[R31] If the Seller Response Code indicates success, the Seller **MUST** respond to a Retrieve Ticket List request with a summarized list of instances containing the following attributes defined in Table 20 - Ticket Attributes or an empty list if no Tickets matching the filter criteria are found:

- Seller Ticket Identifier
- Buyer Ticket Identifier
- Product Identifier
- Description
- Severity
- Seller Severity
- Priority
- Seller Priority
- Type
- Ticket Creation Date
- Target Resolved Date
- Resolved Date
- Ticket State

9.4 Retrieve Ticket by Ticket Identifier

This section lists the attributes and requirements for Use Case 3.

9.4.1 Retrieve Ticket by Ticket Identifier - Buyer Request

The following are the requirements on the Buyer for the Retrieve Ticket by Ticket Identifier request.

- [R32] The Buyer **MUST** include the Seller Ticket Identifier defined in Table 20 - Ticket Attributes.

9.4.2 Retrieve Ticket by Ticket Identifier - Seller Response

The following are the requirements on the Seller for the Retrieve Ticket by Ticket Identifier response.

- [R33] The Seller's response **MUST** specify the Seller Response Code attribute defined in Table 19 - Buyer and Seller Attributes.
- [R34] The Seller Response Code **MUST** return an error if the Ticket with the Ticket Identifier is not found.
- [R35] The Seller Response Code **MUST** return an error if the Ticket was not created by the Buyer.
- [R36] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 20 - Ticket Attributes.

The following requirements apply when the Seller Response Code indicates success.

- [R37] The Seller's response to a Retrieve Ticket by Ticket Identifier request **MUST** include the following attributes defined in Table 20 - Ticket Attributes:
 - Seller Ticket Identifier
 - Product Identifier
 - Description
 - Severity
 - Seller Severity
 - Priority
 - Seller Priority
 - Type

- Ticket Creation Date
- Ticket State
- Reporter Contact
- Seller Ticket Contact

[R38] The Seller's response to a Retrieve Ticket by Ticket Identifier request **MUST** include all of the following optional attributes defined in Table 20 - Ticket Attributes, if they were set by the Buyer or the Seller:

- Buyer Ticket Identifier
- Issue Start Date
- Target Resolved Date
- Notes
- Attachments
- Buyer Technical Contacts
- Seller Technical Contacts
- Related Objects
- Workorders

[R39] The Seller's response to a Retrieve Ticket by Ticket Identifier request **MUST** include the Resolved Date and a Note by the Seller describing how the Ticket was resolved if the Ticket State is CLOSED or RESOLVED.

9.5 Patch Ticket by Ticket Identifier

This section lists the attributes and requirements for Use Case 4.

9.5.1 Patch Ticket by Ticket Identifier - Buyer Request

The following are the requirements on the Buyer for the Patch Ticket by Ticket Identifier request.

[R40] The Buyer **MUST** include the Seller Ticket Identifier defined in Table 20 - Ticket Attributes.

[R41] The Buyer **MUST** include at least one of the following attributes defined in Table 20 - Ticket Attributes:

- Buyer Ticket Identifier

- Severity
- Priority
- Issue Start Date
- Notes
- Buyer Technical Contacts
- Related Objects

[R42] The Buyer **MUST** add a Note to a Ticket as specified in section 9.1.3 when any of the following Ticket attributes is patched:

- Severity
- Priority
- Issue Start Date
- Related Objects

[O13] The Buyer's Patch Ticket by Ticket Identifier request **MAY** contain any of the following attributes defined in Table 20 - Ticket Attributes:

- Buyer Ticket Identifier
- Severity
- Priority
- Issue Start Date
- Notes
- Attachments
- Buyer Technical Contacts
- Related Objects

[R43] If the Buyer's Patch Ticket by Ticket Identifier request includes Attachments, the Buyer **MUST** specify either the URL or Content for the Attachments.

Note: Existing Notes, Attachments and Related Objects cannot be modified or deleted. Notes, Attachments or Related Objects, if included by the Buyer are appended to the existing lists, as specified in the Seller Response below.

Note: Patching the Buyer Technical Contacts requires sending the complete list and replaces the existing list, as specified in the Seller Response section below.

9.5.2 Patch Ticket by Ticket Identifier - Seller Response

The following are the requirements on the Seller for the Patch Ticket by Ticket Identifier response.

- [R44] The Seller's response **MUST** include the Seller Response Code defined in Table 19 - Buyer and Seller Attributes.
- [R45] The Seller Response Code **MUST** return an error if the Ticket with the Ticket Identifier is not found.
- [R46] The Seller Response Code **MUST** return an error if the Ticket was not created by the Buyer.
- [R47] The Seller Response Code **MUST** return an error if all attributes requested to be changed by the Buyer cannot be updated.
- [R48] The Seller Response Code **MUST** return an error if the Ticket State is CLOSED, ASSESSING_CANCELLATION or CANCELLED.

The following requirements are to be performed by the Seller on the Ticket when the Seller Response Code indicates success.

- [R49] If the Buyer's request contains Notes, the Seller **MUST** add that to the existing Notes.
- [R50] If the Buyer's request contains Attachments, the Seller **MUST** add that to the existing Attachments.
- [R51] If the Buyer's request contains Related Objects, the Seller **MUST** add that to the existing Related Objects.
- [R52] If the Buyer's request contains Buyer Technical Contacts, the Seller **MUST** use that to replace the existing Buyer Technical Contacts.
- [R53] If contained in the Buyer's request, the Seller **MUST** update the following attributes as requested by the Buyer:
 - Buyer Ticket Identifier
 - Severity
 - Priority
 - Issue Start Date

- [R54] If the Ticket State is PENDING, the Seller **MUST** update the Ticket State to IN_PROGRESS.

9.6 Cancel Ticket by Ticket Identifier

This section lists the attributes and requirements for Use Case 5.

The Buyer may cancel a Ticket that is in progress by sending a Cancel Ticket by Ticket Identifier request. If the request is formulated properly, the Seller updates the Ticket State to ASSESSING_CANCELLATION, starts the assessing cancellation process and immediately respond with success.

During the assessing cancellation process the Seller determines whether to just close the Ticket, or may also choose to resolve the Issue to prevent similar Create Ticket requests from other Buyers. If the Seller chooses to resolve the Issue, the Seller might create an Incident or an internal Ticket for the Issue, but that is outside the scope of this document. After the Seller has completed the assessment, the Seller updates the Ticket State to CANCELLED (see section 10.1 for details on the Ticket Process Flow).

9.6.1 Cancel Ticket by Ticket Identifier - Buyer Request

The following are the requirements on the Buyer for the Cancel Ticket by Ticket Identifier request.

- [R55] The Buyer **MUST** include the Seller Ticket Identifier defined in Table 20 - Ticket Attributes.

9.6.2 Cancel Ticket by Ticket Identifier - Seller Response

The following are the requirements on the Seller for the Cancel Ticket by Ticket Identifier response.

- [R56] The Seller's response **MUST** include the Seller Response Code defined in Table 19 - Buyer and Seller Attributes.
- [R57] The Seller Response Code **MUST** return an error if the Ticket with the Ticket Identifier is not found.
- [R58] The Seller Response Code **MUST** return an error if the Ticket was not created by the Buyer.
- [R59] The Seller Response Code **MUST** return an error if the Ticket State is RESOLVED, CLOSED, REOPENED, ASSESSING_CANCELLATION or CANCELLED.
- [R60] If the Seller Response Code indicates success, the Seller **MUST** update the Ticket State to ASSESSING_CANCELLATION.

9.7 Respond to Ticket Clearance Notification

This section lists the attributes and requirements for Use Case 6.

9.7.1 Respond to Ticket Clearance Notification - Buyer Request

The following are the requirements on the Buyer for the Respond to Ticket Clearance Notification request.

- [R61] The Buyer **MUST** include the Seller Ticket Identifier and Closure Acceptance Indicator defined in Table 31 - Respond to Ticket Clearance Notification Attributes.
- [R62] The Buyer **MUST** respond with Closure Acceptance Indicator set to FALSE if the Issue on which the Ticket was based has not been resolved in a satisfactory manner to the Buyer.
- [R63] If the Closure Acceptance Indicator is FALSE, the Buyer **MUST** include a Closure Rejection Reason describing why the Buyer doesn't agree that the Ticket has been resolved in a satisfactory manner and is requesting the Ticket to be reopened.
- [R64] The Buyer **MUST** respond with Closure Acceptance Indicator set to TRUE if the Issue on which the Ticket was based has been resolved in a satisfactory manner to the Buyer.

9.7.2 Respond to Ticket Clearance Notification - Seller Response

The following are the requirements on the Seller for the Respond to Ticket Clearance Notification response.

- [R65] The Seller's response **MUST** include the Seller Response Code defined in Table 19 - Buyer and Seller Attributes.
- [R66] The Seller Response Code **MUST** return an error if the Ticket with the Ticket Identifier is not found.
- [R67] The Seller Response Code **MUST** return an error if the Ticket was not created by the Buyer.

The following requirements apply when the Seller Response Code indicates success.

- [R68] If Buyer Closure Acceptance Indicator is FALSE, the Seller **MUST** change the Ticket State to REOPENED.
- [R69] If Buyer Closure Acceptance Indicator is TRUE, the Seller **MUST** change the Ticket State to CLOSED.

9.8 Search Appointment Timeslot

This section lists the attributes and requirements for Use Case 7.

The Search Appointment Timeslot use case is used by the Buyer to identify an available time slot for scheduling an appointment with the Seller. The Buyer provides the Seller a list of Requested Timeslots. The Seller verifies if a Technician is available for an appointment at the Buyer's location for all the Requested Timeslots and returns a list of Available Timeslots. The Buyer must select one of the returned Available Timeslots for the Create Appointment request when creating a new appointment and for the Patch Appointment request when rescheduling an existing appointment.

If no Available Timeslots are returned by the Seller, the Buyer needs to initiate another Search Appointment Timeslot request with a different set of Requested Timeslots.

9.8.1 Search Appointment Timeslot - Buyer Request

The following are the requirements on the Buyer for the Search Appointment Timeslot request.

[R70] The Buyer's request **MUST** include the following attributes as defined in Table 28 - Search Appointment Timeslot Attributes:

- Related Entities
- Appointment Place
- Requested Timeslots

9.8.2 Search Appointment Timeslot - Seller Response

The following are the Seller requirements for the Search Appointment Timeslot response.

[R71] When providing a response to a Search Appointment Timeslot request, the Seller **MUST** specify the Seller Response Code attribute defined in Table 19 - Buyer and Seller Attributes.

[R72] The Seller Response Code **MUST** return an error if any of the included attributes in the Buyer's request are invalid or not properly formatted.

[R73] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 28 - Search Appointment Timeslot Attributes.

The following requirements apply when the Seller Response Code indicates success.

[R74] The Seller's response **MUST** echo back all attributes and values set by the Buyer in the Search Appointment Timeslot request.

- [R75] The Seller's response **MUST** return an empty list of Available Timeslots if no Seller Technician is available for an appointment at the Buyer's location for any of the Requested Timeslots.
- [R76] The Seller's response **MUST** include one or more Available Timeslots as defined in Table 28 - Search Appointment Timeslot Attributes, if a Seller Technician is available for an appointment at the Buyer's location that falls within the Requested Timeslots.

9.8.3 Appointment Lifecycle

The following requirements apply to the Buyer during the lifecycle of the Appointment for Trouble Ticketing.

- [R77] The Buyer **MUST** set the Related Entities attribute defined in Table 27 - Appointment Attributes to the Ticket Identifier and Workorder Identifier, in that order for the Search Appointment Timeslot use case.
- [R78] The Buyer **MUST** set the Related Entities attribute defined in Table 28 - Search Appointment Timeslot Attributes to the Ticket Identifier and Workorder Identifier, in that order for the Create Appointment and Patch Appointment use cases.

The following requirements apply to the Seller during the lifecycle of the Appointment for Trouble Ticketing.

- [R79] The Seller **MUST** use Ticket Identifier and Workorder Identifier in the Related Entities to lookup the "related Workorder".
- [R80] The Seller Response Code for a Create Appointment response **MUST** return an error if the related Workorder contains any Appointment with Appointment State of SCHEDULED.
- [R81] After creating an Appointment, the Seller **MUST** add the Appointment to the related Workorder.

The following requirements apply to the Seller on a Ticket after creating or patching an Appointment.

- [R82] The Seller **MUST** set the Appointment Required attribute to FALSE in the related Workorder.
- [R83] The Seller **MUST** update the related Ticket State to IN_PROGRESS.

9.9 Create Appointment

This section lists the attributes and requirements for Use Case 8.

9.9.1 Create Appointment - Buyer Request

The following are the requirements on the Buyer for the Create Appointment request.

- [R84] The Buyer's request **MUST** include the following attributes defined in Table 27 - Appointment Attributes:
- Related Entities
 - Appointment Timeslot
 - Appointment Place
 - Buyer Appointment Contact
- [O14] The Buyer's request **MAY** include the Appointment Notes attribute defined in Table 27 - Appointment Attributes.

9.9.2 Create Appointment - Seller Response

The following are the requirements on the Seller for the Create Appointment response.

- [R85] When providing a response to a Create Appointment request, the Seller **MUST** specify the Seller Response Code attribute defined in Table 19 - Buyer and Seller Attributes.
- [R86] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 27 - Appointment Attributes.

The following requirements apply when the Seller Response Code indicates success.

- [R87] The Seller **MUST** return an error if a technician is not available for an appointment at the Buyer's location for the Appointment Timeslot and set the Appointment State to CANCELLED.
- [R88] The Seller's response **MUST** echo back all attributes and values set by the Buyer in the Create Appointment request.
- [R89] The Seller **MUST** set the Appointment State to ACKNOWLEDGED.
- [R90] The Seller's response to a Create Appointment request **MUST** include the following attributes defined in Table 27 - Appointment Attributes:
- Appointment Identifier
 - Appointment State
 - Seller Appointment Contact

- [O15] The Seller's response **MAY** include the Appointment Notes attribute defined in Table 27 - Appointment Attributes.
- [R91] The Seller **MUST** set the Appointment State to SCHEDULED once all the business rule validation has been completed.

9.10 Patch Appointment

This section lists the attributes and requirements for Use Case 9.

9.10.1 Patch Appointment - Buyer Request

The following are the requirements on the Buyer for the Patch Appointment request.

- [R92] The Buyer **MUST** include the Appointment Identifier as specified in Table 27 - Appointment Attributes.
- [R93] The Buyer **MUST** include at least one of the following attributes defined in Table 27 - Appointment Attributes:
- Appointment Timeslot
 - Appointment Place
 - Buyer Appointment Contact
 - Appointment Notes

Note: Existing Appointment Notes cannot be modified or deleted. Appointment Notes, if included by the Buyer are appended to the existing lists, as specified in the Seller Response below.

9.10.2 Patch Appointment - Seller Response

The following are the requirements on the Seller for the Patch Appointment response.

- [R94] The Seller's response **MUST** include the Seller Response Code defined in Table 27 - Appointment Attributes.
- [R95] The Seller Response Code **MUST** return an error if the Appointment with the Appointment Identifier is not found.
- [R96] The Seller Response Code **MUST** return an error if the Related Entities corresponding to the Appointment was not created by the Buyer.
- [R97] The Seller Response Code **MUST** return an error if the Appointment State is not SCHEDULED.

- [R98] If an Appointment Timeslot was included by the Buyer, the Seller Response Code **MUST** return an error if a Technician is not available for an appointment at the Buyer's location for the specified timeslot.
- [R99] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 27 - Appointment Attributes.

The following requirements are to be performed by the Seller on the Appointment when the Seller Response Code indicates success.

- [R100] If the Buyer's request contains Appointment Notes, the Seller **MUST** add that to the existing Appointment Notes.
- [R101] The Seller's response **MUST** echo back all attributes and values set by the Buyer in the Create Appointment request.
- [R102] If contained in the Buyer's request, the Seller **MUST** update the following attributes as requested by the Buyer:
- Appointment Timeslot
 - Appointment Place
 - Buyer Appointment Contact

9.11 Cancel Appointment

This section lists the attributes and requirements for Use Case 10.

9.11.1 Cancel Appointment - Buyer Request

The following are the requirements on the Buyer for the Cancel Appointment request.

- [R103] The Buyer's request **MUST** include the Appointment Identifier as specified in Table 27 - Appointment Attributes.

9.11.2 Cancel Appointment - Seller Response

The following are the requirements on the Seller for the Cancel Appointment request.

- [R104] The Seller's response **MUST** include the Seller Response Code defined in Table 19 - Buyer and Seller Attributes.
- [R105] The Seller Response Code **MUST** return an error if the Appointment with the Appointment Identifier is not found.
- [R106] The Seller Response Code **MUST** return an error if the Related Entities corresponding to the Appointment was not created by the Buyer.

[R107] The Seller Response Code **MUST** return an error if the Appointment State is not SCHEDULED.

[R108] If the Seller Response Code indicates success, the Seller **MUST** set the Appointment State to CANCELLED.

9.12 Retrieve Incident List

This section lists the attributes and requirements for Use Case 11.

9.12.1 Retrieve Incident List - Buyer Request

The following are the requirements on the Buyer for the Retrieve Incident List request.

[O16] The Buyer **MAY** use any of the following attributes defined in Table 30 - Incident Attributes as a filter criteria:

- Incident Identifier
- Product Identifier
- Incident Severity
- Incident Priority
- Incident Type
- Incident Creation Date (range of dates)
- Incident Start Date (range of dates)
- Incident Target Resolved Date (range of dates)
- Incident Resolved Date (range of dates)
- Incident State

[O17] The Buyer **MAY** use a combination of filter criteria to avoid getting a Too Many Records response code.

9.12.2 Retrieve Incident List - Seller Response

The following are the requirements on the Seller for the Retrieve Incident List response.

[R109] When providing a response to a Retrieve Incident List request, the Seller **MUST** specify the Seller Response Code attribute defined in Table 19 - Buyer and Seller Attributes.

- [R110] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 30 - Incident Attributes.
- [R111] If the Seller Response Code indicates success, the Seller **MUST** respond to a Retrieve Incident List request with a summarized list of instances containing the following attributes defined in Table 30 - Incident Attributes or an empty list if no Incidents matching the filter criteria are found:
- Incident Identifier
 - Product Identifiers
 - Incident Description
 - Incident Severity
 - Incident Priority
 - Incident Type
 - Incident Creation Date
 - Incident Start Date
 - Incident Target Resolved Date
 - Incident Resolved Date
 - Incident State

9.13 Retrieve Incident by Incident Identifier

This section lists the attributes and requirements for Use Case 12.

9.13.1 Retrieve Incident by Incident Identifier - Buyer Request

The following are the requirements on the Buyer for the Retrieve Incident by Incident Identifier request.

- [R112] The Buyer **MUST** include the Incident Identifier defined in Table 30 - Incident Attributes.

9.13.2 Retrieve Incident by Incident Identifier - Seller Response

The following are the requirements on the Seller for the Retrieve Incident by Incident Identifier response.

- [R113] The Seller's response **MUST** specify the Seller Response Code attribute defined in Table 19 - Buyer and Seller Attributes.

- [R114] The Seller Response Code **MUST** return an error if the Incident with the Incident Identifier is not found.
- [R115] If the Seller Response Code does not indicate success, the Seller **MUST NOT** reply with any of the attributes in Table 30 - Incident Attributes.

The following requirements apply when the Seller Response Code indicates success.

- [R116] The Seller's response to a Retrieve Incident by Incident Identifier request **MUST** include the following attributes defined in Table 30 - Incident Attributes:
- Incident Identifier
 - Product Identifiers
 - Incident Description
 - Incident Severity
 - Incident Priority
 - Incident Type
 - Incident Creation Date
 - Incident Resolved Date
 - Incident State
 - Seller Incident Contact
- [R117] The Seller's response to a Retrieve Incident by Incident Identifier request **MUST** include all of the following optional attributes defined in Table 30 - Incident Attributes, if they were set by the Seller:
- Incident Start Date
 - Incident Target Resolved Date
 - Incident Notes
 - Incident Attachments
 - Incident Related Objects

9.14 Register for Event Notifications

This section lists the requirements for Use Case 13.

9.14.1 Register for Event Notifications - Buyer Request

The following are the requirements on the Buyer for the Register for Event Notifications request.

- [R118] The Buyer **MUST** include all attributes defined in Table 32 - Register for Event Notifications Attributes.
- [R119] If the Action attribute is START, the Buyer **MUST** specify the List of Notification Event Types to be started.
- [R120] If the Action attribute is STOP, the Buyer **MUST** specify the List of Notification Event Types to be stopped.

9.14.2 Register for Event Notifications - Seller Response

The following are the requirements on the Seller for the Register for Event Notification response.

- [R121] The Seller Response **MUST** include the Seller Response Code defined in Table 19 - Buyer and Seller Attributes.

9.15 Send Ticket Notification

This section lists the attributes and requirements for Use Case 14.

The following are the requirements for all Ticket Notification Event Types.

- [R122] The Seller **MUST** support Ticket Notifications.
- [R123] The Buyer **MUST** support and register for Ticket Notifications.
- [R124] The Seller **MUST NOT** send Ticket Notifications to Buyers who have not registered for Ticket Notifications.
- [R125] The Seller **MUST** send Ticket Notifications to Buyers who have registered for Ticket Notifications.
- [R126] The Seller **MUST** include the following attributes defined in Table 33 - Send Ticket Notification Attributes:
 - Ticket Notification Event Type
 - Seller Ticket Identifier
- [R127] The Seller **MUST** send a Ticket Notification with Ticket Notification Event Type UPDATE whenever the Seller updates any of the following Ticket attributes:
 - Seller Severity

- Seller Priority
- Target Resolved Date
- Notes
- Attachments
- Seller Ticket Contact
- Seller Technical Contacts
- Related Objects
- Workorders

[R128] The Seller **MUST** send a Ticket Notification with Ticket Notification Event Type `STATE_CHANGE` whenever a Ticket State change occurs.

The following are the requirements for Ticket Notification Event Type `INFO_REQUIRED`.

[R129] The Seller **MUST** add a Note to the Ticket prior to sending the Notification to inform the Buyer about what additional information is required to continue processing the Ticket.

[R130] If the Appointment Required attribute in a Workorder for the Ticket is `TRUE`, the Buyer **MUST** schedule an appointment using a Search Appointment request followed by a Create Appointment request before the Seller is able to continue processing the Ticket.

[R131] If no Appointment is required, the Buyer **MUST** use the Patch Ticket by Ticket Identifier request to provide the missing information before the Seller is able to continue processing the Ticket.

The following are the requirements for Ticket Notification Event Type `CLEARANCE_REQUEST`.

[R132] The Seller **MUST** send a Ticket Notification with Ticket Notification Event Type `CLEARANCE_REQUEST` before closing an open Ticket.

9.16 Send Incident Notification

This section lists the attributes and requirements for Use Case 15.

The following are the requirements for all Incident Notification Event Types.

[R133] The Seller **MUST NOT** send Incident Notifications to Buyers who have not registered for Incident Notifications.

[R134] The Seller **MUST** send Incident Notifications to Buyers who have registered for Incident Notifications.

[R135] The Seller **MUST** include all attributes defined in Table 34 - Send Incident Notification Attributes.

The following are the requirements for Incident Notification Event Type CREATED.

[R136] The Seller **MUST** send an Incident Notification with Incident Notification Event Type CREATED whenever a new Incident has been created.

The following are the requirements for Incident Notification Event Type IN_PROGRESS.

[R137] The Seller **MUST** send an Incident Notification with Incident Notification Event Type IN_PROGRESS whenever an Incident State changes from CREATED to IN_PROGRESS.

The following are the requirements for Incident Notification Event Type UPDATE.

[R138] The Seller **MUST** send an Incident Notification with Incident Notification Event Type UPDATE whenever an update occurs for an Incident.

The following are the requirements for Incident Notification Event Type RESOLVED.

[R139] The Seller **MUST** send an Incident Notification with Incident Notification Event Type RESOLVED whenever the Incident State changes to RESOLVED.

10 State Diagrams

10.1 Ticket Process Flow

The Ticket process flow is shown below. The diagram captures various states that the Ticket goes through in its lifecycle. The specific states are managed by the Seller based on its processing and/or based on Buyer's action. If the Buyer subscribes to Ticket State change notifications, they will receive a notification every time the state changes.

[R141] The Seller **MUST** support all Ticket States and their associated state transitions shown in Figure 4 and Table 35.

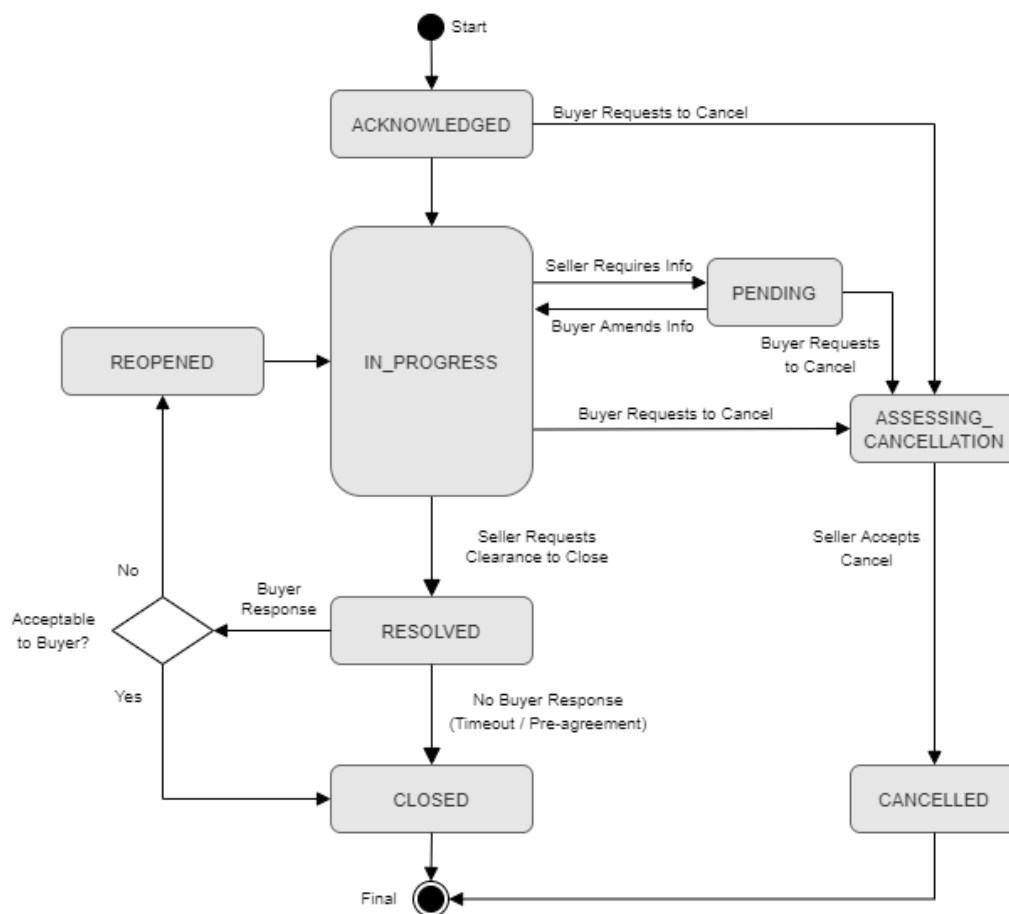


Figure 4 - Ticket Process Flow

The definitions of the various Ticket State values are as follows:

State	Description
ACKNOWLEDGED	A request to create a Ticket was received and accepted by the Seller. The Ticket has been validated and created by the Seller and allocated a unique Seller Ticket Identifier.
IN_PROGRESS	The Ticket is in the process of being handled and investigated for resolution by the Seller.
RESOLVED	The Buyer's Issue described in the Ticket was resolved by the Seller. The Seller is now waiting for the Buyer to confirm that the Issue they reported is no longer observed.
CLOSED	The Buyer that created the Ticket has confirmed that the Issue they reported is no longer observed, or the pre-defined timeframe (agreed upon between Buyer and Seller) for confirming that the Issue has been resolved has passed without a response by the Buyer. This is a terminal state.
REOPENED	The Buyer has confirmed that the Issue described in the Ticket has not been resolved satisfactorily and rejected the Seller's request to close the Ticket. The Ticket has been reopened and is waiting to continue being handled and investigated for resolution by the Seller.
PENDING	The Seller is waiting on additional information or an Appointment to be scheduled for the Workorder from the Buyer in order to continue the handling of the Ticket. This may result in the clock being stopped for the service level agreement until the Buyer has responded to the request.
ASSESSING_CANCELLATION	A request has been made by the Buyer to cancel the Ticket and is being assessed by the Seller to determine whether to just close the Ticket, or may also choose to resolve the Issue to prevent similar Create Ticket requests from other Buyers. If the Seller chooses to resolve the Issue, the Seller might create an Incident or an internal Ticket for the Issue, but that is outside the scope of this document. After the Seller has completed the assessment, the Seller updates the Ticket State to CANCELLED.
CANCELLED	The Ticket has been successfully cancelled by the Buyer. This is a terminal state.

Table 35 - Ticket State Values

The definitions of the various Workorder State values for a Ticket are as follows:

Notification Event Type	Description
OPEN	A Workorder was initiated by the Seller to be assigned to a Technician responsible for resolving the Ticket.
IN_PROGRESS	The Seller Technician responsible for the Workorder has been assigned and started one or more of the assigned Tasks.
UNABLE_TO_COMPLETE	The Seller Technician responsible for the Workorder was unable to complete one or more of the assigned Tasks. Additional tasks are required to resolve the Ticket.
COMPLETED	The Seller Technician responsible for the Workorder has successfully completed all the assigned Tasks.

Table 36 - Workorder State Values

The definitions of the various Appointment State values for a Ticket are as follows:

State	Description
ACKNOWLEDGED	The Seller has accepted the Create Appointment request and has created the Appointment. The business rules relate to creating the Appointment are validated in this state.
SCHEDULED	The Seller has negotiated and scheduled the Appointment with the Buyer.
CANCELLED	The Appointment was cancelled. This is a terminal state.
FAILED	The Appointment did not take place. For example, Seller Technician was unable to get to the Appointment due to an incorrect location or unable to get access to the Buyer's site. This is a terminal state.
COMPLETED	The Appointment took place as scheduled. This is a terminal state.

Table 37 - Appointment State Values

The definitions of the various Notification Event Type values for a Ticket are as follows:

Notification Event Type	Description
UPDATE	An open Ticket was updated by the Seller. Note: Buyer initiated Ticket updates due to Patch Ticket by Ticket Identifier will not trigger this Notification Event Type.
STATE_CHANGE	A Ticket State change occurred in the Seller's system.

Notification Event Type	Description
INFO_REQUIRED	The Seller requires more information from the Buyer for a Ticket or requests the Buyer to schedule an Appointment for a Workorder to continue processing a Ticket. The Ticket is in a PENDING state.
CLEARANCE_REQUEST	<p>The Seller is requesting the Buyer to verify that the Issue on which a Ticket was based is no longer observed. The Ticket is in a RESOLVED state.</p> <p>The Buyer confirms if the Issue has been resolved satisfactorily or not using a Respond to Ticket Clearance Notification request.</p>

Table 38 - Ticket Notification Event Type Values

10.2 Incident Process Flow

The Incident process flow is shown below. The diagram captures various states that an Incident goes through in its lifecycle. The specific states are managed by the Seller based on its processing. If the Buyer subscribes to Incident state change notifications, they will receive a notification every time the state changes.

[R142] The Seller **MUST** support all Incident states, Incident Notifications and their associated state transitions shown in Figure 5, Table 39 and Table 40.

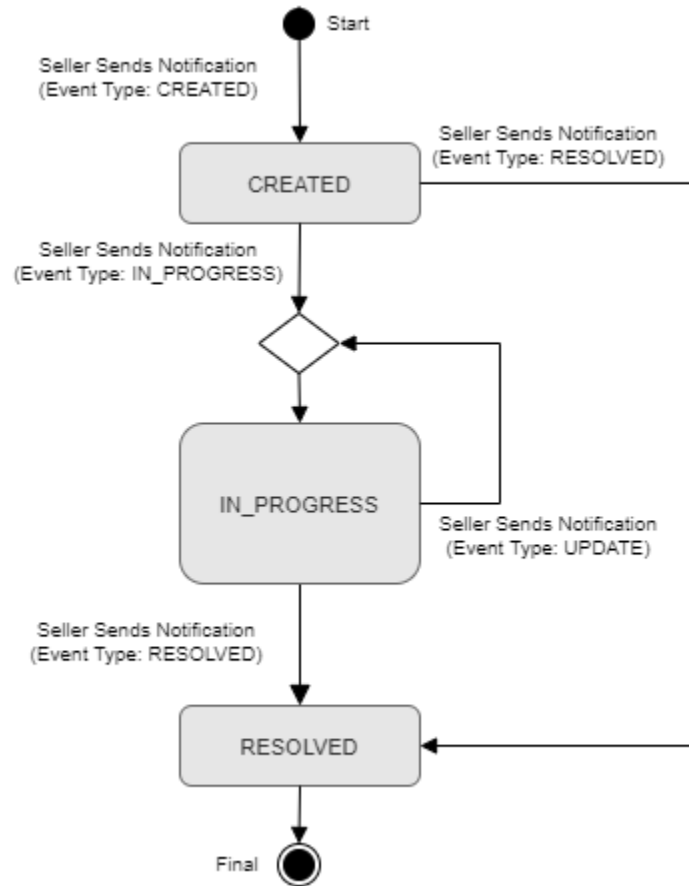


Figure 5 - Incident Process Flow

The definitions of the various Incident State values are as follows:

State	Description
CREATED	A new Incident has been created and allocated a unique Seller Incident Identifier.
IN_PROGRESS	The Incident is in the process of being handled by the Seller.
RESOLVED	The Situation described in the Incident was resolved by the Seller. This is a terminal state.

Table 39 - Incident State Values

The definitions of the various Notification Event Type values for an Incident are as follows:

Notification Event Type	Description
CREATED	A new Incident has been created by the Seller.

Notification Event Type	Description
IN_PROGRESS	An Incident transitioned from CREATED to IN_PROGRESS by the Seller.
UPDATE	An IN_PROGRESS Incident was updated by the Seller.
RESOLVED	An IN_PROGRESS or a new Incident was resolved by the Seller.

Table 40 - Incident Notification Event Type Values

11 References

- [1] Internet Engineering Task Force RFC 2119, *Key words for use in RFCs to Indicate Requirement Levels*, March 1997
- [2] Internet Engineering Task Force RFC 8174, *Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words*, May 2017
- [3] MEF 10.3, *Ethernet Service Attributes Phase 3*, October 2013
- [4] MEF 12.2, *Carrier Ethernet Network Architecture Framework Part 2: Ethernet Services Layer*, May 2014
- [5] MEF 26.2, *External Network Network Interfaces (ENNI) and Operator Services Attributes*, August 2016
- [6] MEF 50.1, *MEF Services Lifecycle Process Flows*, August 2017
- [7] MEF 51.1, *Operator Services Definitions*, December 2018
- [8] MEF 55.1, *LSO Reference Architecture and Framework*, February 2021
- [9] MEF 57.1, *Ethernet Ordering Technical Specification Business Requirements and Use Cases*, December 2018
- [10] MEF 79, *Address, Service Site, and Product Offering Qualification Management Requirements and Use Cases*, June 2019
- [11] MEF 80, *Quote Management Requirements and Use Cases*, May 2021
- [12] TMF621 TM Forum, *TMF621 Trouble Ticket Management API REST Specification R19.0.1*, November 2019.
- [13] TMF646 TM Forum, *TMF646 Appointment API REST Specification R19.0.1*, November 2019.