New Distribution Capability (NDC)

Together Let's Build Airline Retailing

Implementation Guide v4.2

November 2017

Contents

Foreword

In developing the IATA standard for the New Distribution Capability (NDC), it has become apparent that there are a number of items which, whilst not appropriate for inclusion in the text of the standard, are fundamental to obtain a clear understanding of how NDC could be implemented. Thus there is significant benefit in documenting these, to promote a common understanding of the ways in which NDC can be implemented.

Consequently, this Implementation Guide provides clarifications and explanations of the concepts and scope underpinning NDC.

This publication is intended for business and technology individuals considering or actually involved in the implementation of systems and processes that will utilize NDC standards. Whilst it is written with the Airline in mind as the primary audience its contents will be useful for any implementer of NDC, whether they be an Airline, Seller or Aggregator. It describes best practice processes of the standards in a simplified manner and does not enter schema-specific details such as the actual element and attribute names, as found in the schemas' data structure – rather, it aims to complement the explanation of process flows with high-level illustrations of messages designed to be easily comprehensible to first-time adopters of the standards.

However, it should be noted that this publication is not a binding document - the formal texts relating to NDC are contained in the appropriate Resolutions and Recommended Practices adopted by the IATA Passenger Services Conference.

This fourth edition of the guide has been produced by the PDMG Implementation Guide Task Force set up to oversee the revision and updating of the previous version 4.0 of the Implementation Guide.

The Implementation Guide Task Force was established in April 2015 during the PDMG-WG9 meeting. Many individuals contributed to the development and provided valuable subject matter expertise to update and enhance this publication.

Questions or comments should be directed to NDC_Imp_Guide@iata.org

Notice

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The NDC Implementation Guide

This NDC Implementation Guide is published pursuant to IATA Passenger Services Resolution (PSC) 787, adopted by the IATA Passenger Services Conference during its 18-19 October 2012 meeting in Abu Dhabi. The United States Department of Transportation (DOT) in granting final approval of Resolution 787 on 7 August 2014, accepted a set of conditions jointly submitted by IATA and Open Allies for Airfare Transparency. These conditions clarify the intended application of Resolution 787, and apply to all Airlines globally that wish to implement NDC (DOT's final order approving Resolution 787 and the accompanying conditions can be found using the following URL:

http://www.regulations.gov/document?D=DOT-OST-2013-0048-0459

This guide was produced by IATA's NDC team, with support and collaboration of the PDMG Working Group.

This document aims to:

- Present the NDC program vision, objectives, benefits and scope
- Illustrate how Airlines and their partners can use the NDC Standard
- Explain details of the Standard
- Show examples of how the NDC Standard might be implemented

This implementation guide is for general use, and is publicly available on IATA's NDC website at http://www.iata.org/ndc.

This document looks at NDC essentially through the lens of the Airline stakeholder. IATA's goal over time is to include additional perspectives from other stakeholders. To this end we would welcome feedback that would enable us to enrich the views from the perspective of Sellers, IT providers and others.

1 About the NDC Implementation Guide

1.1 Structure of the NDC Implementation Guide

The NDC Implementation Guide supports companies in the process of implementing NDC and contains an explanation of the NDC environment and guidance on developing potential areas of an NDC project (without presuming to define what a project should cover).

The guide is divided into five sections. The first two sections give a high level view of NDC in the Airline context. The later sections provide technical information to support a team considering developing or implementing systems based on the NDC Standard.

The first section of the guide contains explanatory notes on the guide itself, and other information useful to understanding the context of the material in the guide.

The second section informs the reader of NDC's scope. There is also a commentary on the opportunities NDC presents for Airlines.

The third section drills down into related functions that NDC supports, which includes:

- Shopping (Offer Management)
- Airline Profile
- Order Management – Booking
- Order Management – Payment & Ticketing
- Servicing
- Interline

It also looks at the impact NDC may have on an Airline's existing internal processes.

The fourth section is where the guide gets more technical. This section explains important technical concepts and also discusses the design considerations taken into account during the development of NDC capability.

In the fourth section you will also find information about NDC's certification program, and IATA's secure token initiative to support transaction-level Seller authentication.

Note that this version of the NDC Implementation Guide relates to the PADIS Publication 17.2 and concentrates on explaining the NDC schemas in this release. Having said that, where upcoming versions of the schemas feature changes that are not backwards compatible, and where these changes have already been

endorsed by the PDMG WG community, the guidance herein may point to a pending release. This is for the purpose of futureproofing both this guide as well as the capability of implementers using it as a resource. An example of this may be that a message has been marked for deletion from a future release, in this instance, this message will be removed from the latest version of the implementation guide.

We realize Airlines implementing NDC may be looking for more information than this current version provides and for instance we will shortly be adding sections on:

- Explaining in detail the structure of the components of an Offer and an Order (and their underlying Offer Items/Order Items and Services), looking at schema elements and attributes more closely, complete with examples and illustrations.
- Specifics relating to multiple passengers in an NDC Shopping Request/Offer/Order.
- A more detailed description of servicing in NDC, both voluntary and involuntary.
- Further specific detail on Interlining within NDC, including servicing and revenue accounting/settlement.
- Further use cases to support these explanations, including learnings from actual implementers.

Each section provides definitions for terminology used in NDC. The sections continue with a commentary of all the messages associated with that function. This is followed by some use cases showing the flow of messages used to achieve a business objective in the specified domain.

The final major section covers implementation support. The section outlines how an Airline could go about defining its NDC project(s) and what to take into consideration when doing that.

The Appendices section covers reference material, including a glossary, legal considerations, and guidelines for the protection of Personal Data.

1.2 NDC and One Order

This document is the NDC Implementation Guide and it includes guidance on the full end to end processes supported by and within the scope of the NDC Standard. This is one of the reasons the One Order program is not mentioned elsewhere in this guide. One Order is an IATA-led program looking at the enhancement and simplification of the delivery and accounting processes that follow the creation (and servicing) of an

NDC Order. However, NDC Order Management should not be confused with the scope of the One Order program – Order Management as discussed within this guide is and will remain an NDC domain.

If you would like more information on the One Order program, please visit the following link: http://www.iata.org/oneorder.

2 Vision and Objectives for NDC

2.1 Introducing NDC

NDC (New Distribution Capability) is a travel industry-supported program (NDC Program) launched by IATA for the development and market adoption of a new XML-based data transmission standard (NDC Standard). The NDC Standard enhances the capability of communications between Airlines and Sellers, and supports personalization in the Offers Airlines can make.

The NDC Standard enables the travel industry to transform the way air products are retailed to corporations and to leisure and business travelers by addressing the industry's current distribution limitations, including but not limited to:

- Product differentiation
- Time-to-market
- Access to full and rich air content
- Transparent shopping experience

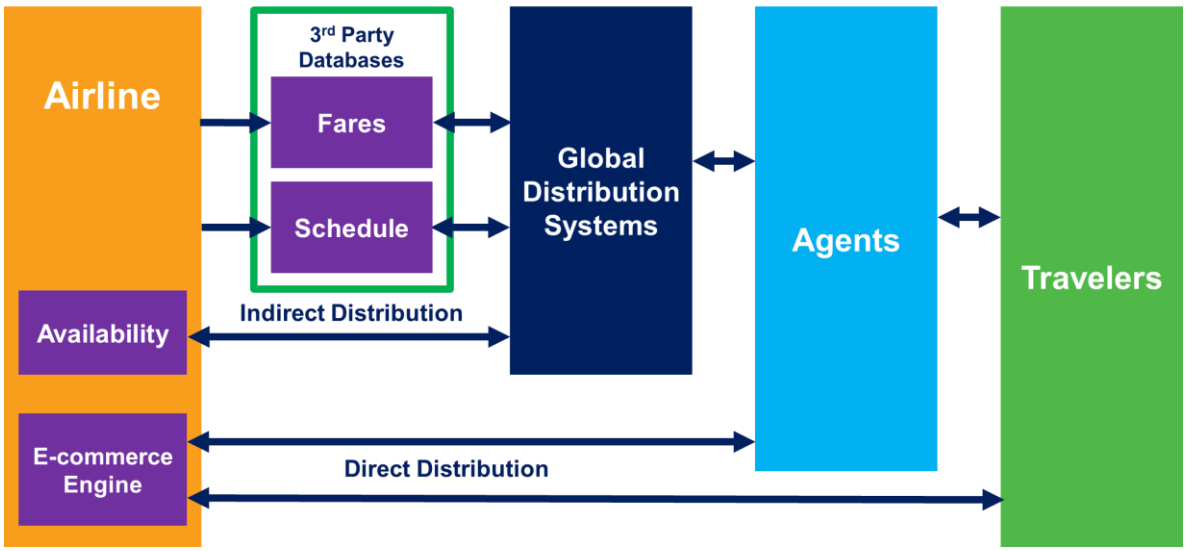
The NDC Standard enables an Airline to make sales Offers to 'Sellers' without those Offers being prepared by a third party intermediary. These Offers can be aligned in terms of their content and pricing to real-time inventories rather than being based upon previously filed products (e.g. making use of dynamic pricing and bundling) and may or may not be personalized. It also enables an Airline to directly manage other functions within the indirect distribution process such as the opportunity to complete the transaction, create the booking record (known as the "Order"), issue any document(s) and respond with confirmations – should it choose to do so.

For the latest news on NDC, visit our home page (http://www.iata.org/ndc).

Comparing today's world with NDC

The following diagrams describe the high level distribution process in today's world, and how it could evolve with the implementation of the NDC Standard.

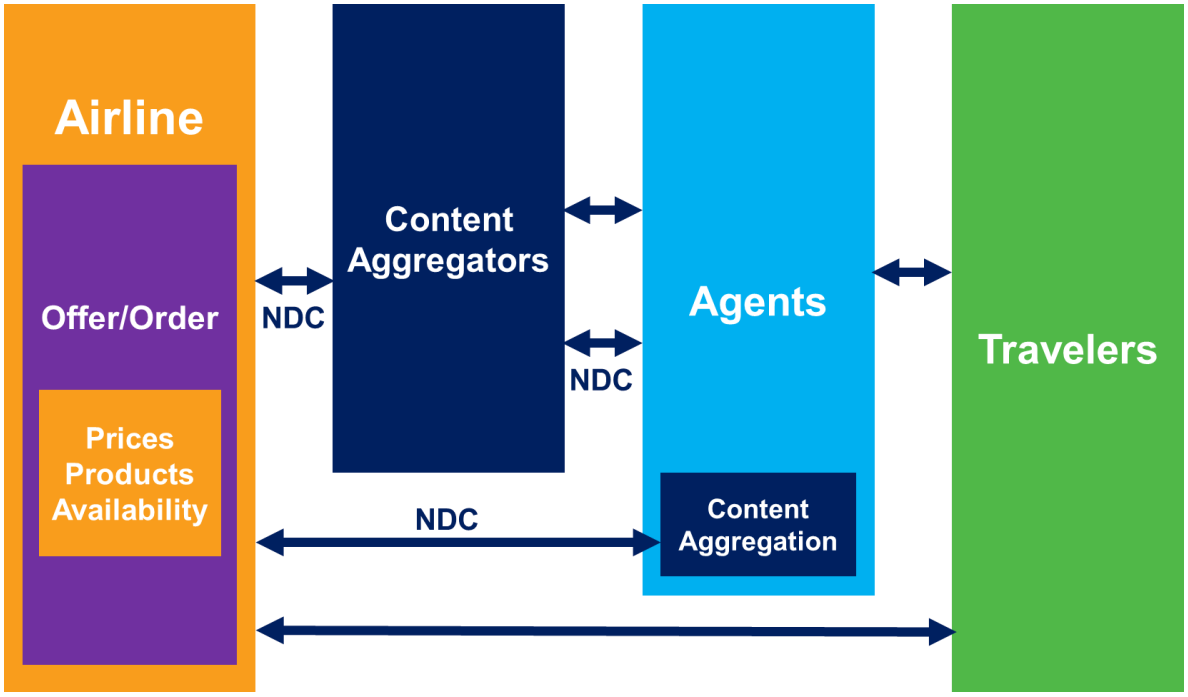
In traditional indirect distribution, Airlines publish some of their data via third party systems, alongside their own internal source of availability. It is then up to other third parties, Global Distribution Systems (GDSs), to use these sources of data to create itineraries and to correctly apply fares to them. It is only at the point that the Customer makes a booking that the Airline has visibility on that Customer and their request. At this stage the Customer decisions have been made based on the Airline's static data it published in advance and aggregated without the influence of the Airline



Traditional Flight Distribution

In an NDC environment, the key difference is that the Airline is the source of the entire Offer (content and form), and each Offer can be based on the nature of the request (and the nature of the Customer or Passenger, if recognized). The Airline has the opportunity to propose an Offer based on the request in real time, rather than having to propose components (e.g. schedules, fares) in advance, in the hope they match Customer requirements.

Third parties are not responsible for building itineraries as before, but the Airline will construct these, apply any pricing and conditions as they wish, and propose one or more Offers to the Customer. Whilst GDSs and other Aggregators continue to play a role, they are no longer responsible for building the Offer.



Air Retailing in NDC

If you would like to read more about the NDC Strategy, you can find more information here: http://www.iata.org/whatwedo/Airline-distribution/ndc/Documents/ndc-strategy-paper.pdf

The following URL can be used to access all the latest information and news on the NDC Program: http://www.iata.org/ndc

The NDC Standard is available to implement and use to any Airline, third party, intermediary, IT provider or non-IATA member. The NDC Program was initiated in 2012 and is in transition between its development phase to the implementation support phase. The first market deployments took place in 2015.

2.2 Scope of NDC

The NDC Standard has a clearly defined scope, but is agnostic in terms of precise usage. Indeed, an objective of NDC is to foster innovation. There is unlikely to be a "typical" NDC implementation. The nature and scope of each Airline's NDC implementation with their partners, and the business model these deployments support, may differ from one to another but all will remain within the scope of the NDC Standard.

The purpose of this guide is to provide guidance and best practices. For example, implementers may find a benefit in following these practices when it comes to expanding a deployment to multiple partners – enhanced interoperability will be achieved by following common practices.

Structured around key functional domains, the NDC schemas provide the opportunity to enhance the end-to-end Airline distribution process, including Shopping and Order Management, to deliver an enhanced Customer experience.

NDC Shopping

The **NDC Shopping** schemas enable Airlines to distribute their full product Offers and to merchandize their flight and ancillary services, using rich content, in either an anonymous or personalized manner.

NDC Airline Profile

The **NDC Airline Profile** schemas provide the ability for an Airline to communicate which Shopping requests it is willing to receive, and has the capability to respond to. Whilst optional, these schemas are a way an Airline could manage the volume of requests they receive.

NDC Order Management

The **NDC Order Management** schemas enable Airlines to manage NDC-driven Orders throughout the entire lifecycle, from booking to payment, ticketing and servicing. It is composed of:

- the schemas for **Booking & Servicing**, to enable Airlines and Sellers to manage the Order once the Customer has selected an Offer, and perform servicing at any point throughout the Order lifecycle.
- the schemas for **Payment & Ticketing**, to enable Sellers to pass forms of payment details to Airlines, resulting in accountable document issuance to fulfil NDC-driven Orders.

Interline

The **NDC Shopping** and **NDC Order Management** schemas will also enable Airlines to send requests for Offers to their interline partners, and manage the resulting booking and servicing, including for ancillary products.

NDC Domains

NDC is much more than replacing EDIFACT messages with XML, it offers the opportunity to change roles and responsibilities. For instance under NDC, Airlines construct Offers, made up of their products and services, and price these Offers in any way they choose. By adopting these new roles, moving the responsibility for producing the Offer from the GDS to the Airline, i.e. from an intermediary to the actual provider of the service, utilizing NDC would give an Airline real time flexibility on what its Offers will contain, in terms of price, product and conditions.

NDC enables more dynamism in the mechanisms that could be used to create Offers for the end Customers. One of those mechanisms is the personalization of Offers during the Shopping process. Under NDC, personalized shopping allows Airlines to tailor Offers made through the indirect channel using the personal attributes the Customer is willing to share. This enables the Airline, if they so wish, to distribute

through the indirect channel a wider range of Offers, of which today the Airline is limited to sell via its own website, and tomorrow may feature enhanced offerings.

Beyond the ability to shape and make Offers, NDC enables an enormously simplified set of processes for managing Orders. NDC allows Airlines to generate the Order from its accepted Offers. As the Airline generates the Offer, the resulting Order will be by definition "correct", so removing any need to check for and deal with instances where fares were not correctly applied, as today. Having established a ‘guaranteed clean’ Order, an NDC Airline can continue to ensure the integrity of its Orders through subsequent servicing and ticketing. NDC, therefore, presents the possibility of a much simplified process landscape.

The extent to which an Airline decides to utilize NDC will be influenced by its business needs and IT capability. It may be that an Airline chooses to implement NDC processes end to end, controlling Offers, Orders, payment and ticketing. Alternatively an Airline may implement, perhaps as an initial step, only the NDC shopping process and continue allowing 3rd parties to carry out booking and ticketing. Some Airlines may choose at some point to manage all their indirect sales using NDC based channels. Other Airlines may choose, perhaps as a transition step, to use a combination of NDC based and non-NDC based processes. The NDC Standard is agnostic as to whether an environment is based purely on NDC processes or are used in combination with other non NDC processes. It will be for each Airline to choose which solution would be most beneficial for its business. This guide is written with the assumption that an Airline is implementing the full scope of NDC, however an Airline can choose to only implement one or more of the NDC domains, or indeed only one or more of the messages available as part of the NDC Standard.

2.3 Roles in NDC

A number of specific roles were envisaged during the process of developing the NDC Standard. The roles outlined below, may correspond to independent actors in the supply chain or not: that is, a single organization may play the role of both Aggregator and Seller, or they could be separate companies.

The "Airline"

The Airline's role in NDC will be to respond to requests for Offers and to manage Orders. This Order Management role extends to include processing payments, issuing accountable documents, and where it comes to Order servicing, they will also be responsible for handling this from re-shopping for an Offer, through to applying any changes to the Order, processing further payments or refunds, and modifying accountable documents.

This is in contrast to the current model for indirect sales where an agent uses a GDS to assemble Offers from relatively static databases of schedules, fares and rules; only consulting the Airline for availability in a specified booking class.

The direct involvement of the Airline in assembling Offers fundamentally changes the shopping process. Ticketing and revenue accounting processes will also be affected by NDC putting the Airline at the center of interactions (between the Seller/Aggregator and any other Airlines involved within an interline itinerary) during the indirect shopping process.

To make the necessary distinction between the different roles Airlines can play in interline transactions the Airline role can be further subdivided.

- **The Offer Responsible Airline (ORA):** The Airline receiving the shopping request from the Seller/Aggregator is called the 'Offer Responsible Airline' or 'ORA'. Within applicable legal and contractual constraints, the ORA has complete freedom in the manner it prepares responses which may include other Airlines' products. For example, the ORA could dynamically interact with other Airlines, so called Participating Offer Airlines (see below), using NDC messages to obtain settlement-priced product Offers from one or more POAs, and then choose to include one or more of those products in the final Offer(s) it returns to the Seller/Aggregator.

  Note - It is assumed that the ORA and POA(s) will have valid commercial agreement(s) in place before the shopping process between the Airlines commences.

- The **Participating Offer Airline (POA)**: If the Offer Responsible Airline sends NDC messages to other Airlines during an interline NDC process, then these other Airlines are called 'Participating Offer Airlines' or 'POAs'.

The "Seller"

Sellers request Offers, initiated by a Customer request, directly from an Airline or via an external Aggregator and present the Offers back to the Customer for selection. In most cases, when an Offer is selected by a Customer, the Seller will initiate a process resulting in the creation of an Order by an Airline. The Seller may also be responsible for sending payment information, and initiating any subsequent servicing of the Order.

The "Aggregator"

An Aggregator's role is to request Offers from Airlines based on a shopping request initiated by a Seller, and respond to the Seller with a consolidated set of these Offers. This consolidation could involve receiving one or more Offers from Airlines (ORAs) and deciding which Offers and in what form they should be presented to the Seller.

The Aggregator's role in NDC could be performed by a 3rd party or handled internally by the Seller. The Aggregator is not a party within the transaction itself and cannot alter the Offers it receives from the Airlines.

An Aggregator may have a secondary role in passing Order Management messages between Seller and Airline.

2.4 NDC end to end – high level description

2.4.1 Overview

Before the individual NDC domains are covered in detail in Section #3, this section provides an overview at a high level of the end to end NDC process flow.

2.4.2 Shopping

2.4.2.1 Shopping Request – Seller to Aggregator

Reflecting a Customer's travel requirements, a shopping request is initiated by a Seller. This shopping request will include the basic information (such as O&D) that an Airline will need to be able to respond with Offers to the Seller and may include more information about the Customer/traveler (for personalized shopping), or about the specific products the Customer is looking for (for attribute shopping e.g. specifying cabin, specific aircraft features, certain ancillary product requirements etc.).

2.4.2.2 Shopping Request – Aggregator to Airline

This request is received by an Aggregator who sends requests to the Airlines it believes will be able to respond with relevant Offers. The Aggregator at this stage needs to make a determination as to which Airlines to send the request to – and this may or may not involve use of the Airline Profile (alternatively it may use internal data, or be led by the Seller, to make the determination). The Aggregator will send the requests to those Airlines that are NDC capable, and that are willing to receive shopping requests for a specified market.

2.4.2.3 Offer Construction

The Airline receives the shopping request from the Aggregator and begins to build the Offers it wishes to respond to the request with – this is an internal process within the Airline's Offer Management System. How the Airline chooses to build Offers, which products it wishes to include, and at what price, is for the individual Airline to decide – it will be based on their own commercial decisions along with the capability of their internal systems.

These Offers may include one flight option or many, and may include additional ancillary items. These ancillaries may be included in Offers for purchase individually alongside the flight(s), or as part of a bundle where one price is specified for the flights and ancillaries together. There is also the possibility that a standalone ancillary may be purchased that does not have to be purchased and/or consumed in relation to a specific flight. Of course the Airline may not wish to return an Offer or they may not be able to satisfy the request – this is also a valid response to a shopping request.

The Offers may be generic or they may be tailored to the individual Customer (personalized). It is worth noting that just because a Seller/Aggregator sends a personalized request to an Airline, the Airline may choose not to take this information into account when building their Offers.

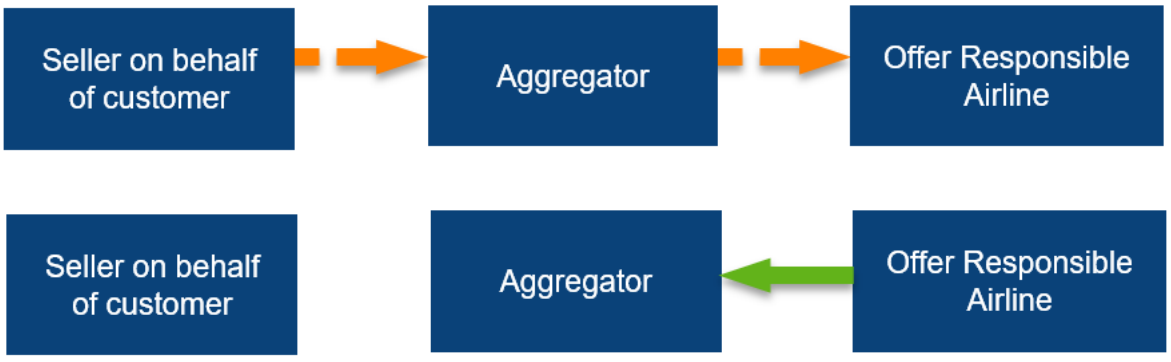
These Offers are each uniquely identifiable by both the Airline and Seller/Aggregator thanks to the use of an “Offer ID”. The individual products within an Offer are broken down into “Offer Items” and “Services”. An Offer contains one or more Offer Items, and each Offer Item contains one or more Services. Each Offer Item and Service are individually referenced using “Offer Item IDs” and “Service IDs”. The structure of an Offer, and the use of these IDs, is discussed in more detail in Section #3.1.1.

Each Offer will have certain rules and conditions applied to it and as per the decision as to which products to include, and what price it applies, it is up to the Airline to decide what these are. These conditions could include various time limits, for example how long the Offer is valid for, by what time payment must be made, how long inventory is guaranteed for (if at all) etc.

2.4.2.4 Shopping Response - Airline to Aggregator

The Airline then responds to the Aggregator with the Offer(s) it has created. The Aggregator cannot alter the contents of these Offers, nor can it combine elements of one with another. The Aggregator may be receiving shopping responses with multiple Offers from numerous Airlines. At this stage, the Aggregator’s role is to consolidate these Offers and make a decision as to which Offers to return to the Seller, and in what form (e.g. the ranking by which they are presented). The Aggregator will then send a shopping response to the Seller with the consolidated set of Offers.

As a reminder, the Aggregator role may be external to the Seller, or this may be a function being performed by the Seller themselves internally. The Aggregator’s role does not change in the latter scenario, however NDC messaging may not be present as any interaction between systems may be handled internally.



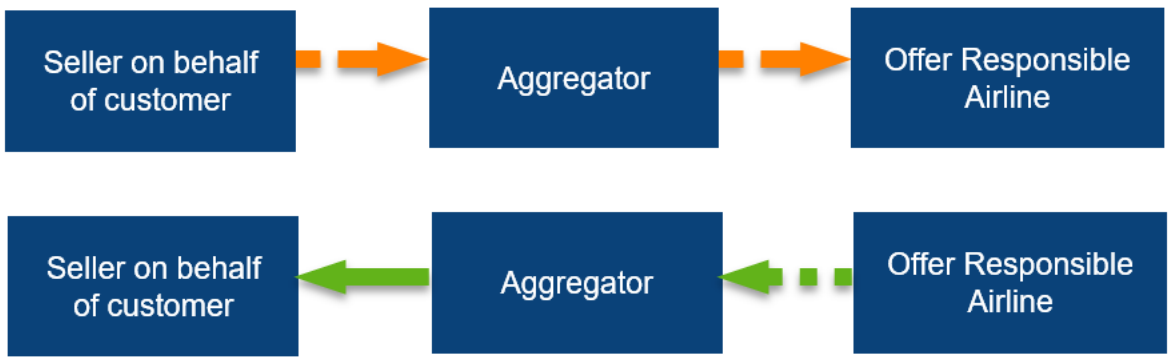
2.4.2.5 Shopping Response – Aggregator to Seller

The Seller receives the shopping response from the Aggregator and may perform further analysis to determine which Offers to display to the Customer, and how these should be presented. As with the Aggregator, the Offers received may not be altered, nor can elements of one Offer be combined with another.

One of the main differences between this process and how a Seller may receive/put together their Offers today is that it is the Airline that receives details of a Customer's request and builds an Offer internally. This is a shift from the model where a Seller, with the help of an Aggregator, puts together an Offer for the Customer using pre-determined fares, rules and ancillary products.

For example in NDC, a Seller/Aggregator cannot build a single flight itinerary by combining various Offers for point to point flights from one Airline, nor build an interline itinerary by combining Offers for flights from different Airlines. If a Seller/Aggregator was to attempt this, they would be presenting to the Customer individual Offers for each of the point to point flights, and if selected by the Customer, each Offer would become an independent Order, delivered and handled separately during its lifecycle.

How this applies to ancillary products delivered by third party suppliers (e.g. a non-airline controlled lounge), or for non-flight related products such as packaging a flight with a hotel or car, is outside the scope of NDC.



2.4.3 Order

2.4.3.1 Offer Selection

If a Customer chooses to accept an Offer, the Seller will ask the Airline to create an Order. This Order creation request may be sent directly to the Airline, or it may still pass through the Aggregator.

If the request passes through the Aggregator, their role is passive in that they do not have an impact on the transaction itself. They may continue to aid with authentication of the messages and the actors involved, and may have a role to play in facilitating connectivity by translating messages from one version to another if required by Seller and Airline.

2.4.3.2 Order Creation

When this request is received by the Airline, it will create the Order within its Order Management System after validating that the conditions of the Offer have been met (e.g. the Offer Time Limit has not expired).

2.4.3.3 Order Confirmation

The Airline will respond to the Seller (perhaps via the Aggregator) with any details of the Order that are relevant for the Seller and Customer. This will include a unique Order ID which may have a 1 to 1 relationship with the Offer ID, but does not have to be identical, along any relevant Order Item IDs and Service IDs which have a one to one relationship with the Offer Item IDs and Service IDs originally presented as part of the Offer.

Further time limits such as inventory guarantees may be applied by the Airline.

Note - Depending on the nature of the shopping flow, a Customer may have selected more than one Offer and the Airline may have created a single Order from these Offers. In this instance, the Offer ID and Order ID will no longer have a one-to-one relationship. An example of such a flow is presented in section 3.1.

2.4.4 Payment

Note - Where reference is made in this section to "industry settlement providers" (and similar), the example used for illustrative purposes is IATA's BSP, however NDC does not prevent implementers from using other local agency settlement providers (e.g. ARC/TCH). Implementers should contact representatives of their chosen providers for information on how NDC transactions are supported by these providers.

The Airline is now able to apply to indirect distribution the same payment solutions as applied on its own website, or indeed any other forms of payment that it wishes to support. Therefore, the forms of payment supported are not limited by NDC and the choice of which to support will be made by the Airline (and may or may not be limited by the capability of the Seller).

The Airline is responsible for internally performing the necessary steps to process the payment.

Where the Seller is accredited into a settlement plan, such as IATA's BSP, payment may be settled through this mechanism. In such scenarios, the Seller will be responsible for processing the payment, and the ORA's role will be to validate the Seller's status in the plan.

NDC supports both instant and delayed payment. It is the Seller's responsibility to ensure timely payment in accordance with the conditions attached to the Offer/Order.

If "instant payment" was a condition of the Airline's original Offer, the Customer's payment information is sent as part of the Order creation request to the Airline.

If a payment time limit was applied to an Offer and delayed payment is supported by the Airline, NDC allows payment information to be sent from Seller to Airline in a subsequent message.

2.4.5 Accountable Document issuance

When payment has been processed by the Airline, as explained in 2.4.4, it will be their responsibility to issue the relevant accountable documents against flight(s) and any ancillaries, and communicate document numbers to the Seller.

It should be noted that it is the ORA that determines which accountable documents to issue. It is responsible for document issuance, and the assumption is that it is also the Validating Carrier of the accountable documents.

Note - Depending on their commercial agreements and technical capability, the ORA may request another Airline to perform the issuance on their behalf. In this case, the other Airline will become the validating carrier. Alternatively, the ORA may use the services of a Ticket System Provider (TSP) for this.

In an interline NDC scenario, before document issuance, it is still a requirement that a bilateral agreement between the ORA and each Airline participating on the documents would be required.

As today, when managing documents, the Airline needs to be confident that revenue integrity, servicing and revenue accounting can be maintained.

Both payment and the issuing of accountable documents are covered in detail in Section #3.3.

2.4.6 Settlement

Note - Where reference is made in this section to "industry settlement providers" (and similar), the example used for illustrative purposes is IATA's BSP, however NDC does not prevent

implementers from using other local agency settlement providers (e.g. ARC/TCH). Implementers should contact representatives of their chosen providers for information on how NDC transactions are supported by these providers.

NDC provides Airlines with the opportunity to process immediately the card payments made by their Customers and request payment from their acquiring bank and this will not require any further settlement with the Seller.

Where the Seller and ORA participate in a settlement plan such as the BSP, the ORA can use that mechanism to receive cash payments or pay commissions by entering the sale information into the settlement plan. This will exactly follow the agreed Offer and Order, hence there are fewer opportunities for errors, disagreements or debit memos. This should result in settlement between Sellers and ORAs being far quicker and simpler.

2.4.7 Interline

In addition to the end to end process described above, NDC supports interlining. The same messages and process flow are used when shopping for and Ordering against an interline itinerary – the Seller will still initiate a shopping request based on a Customer's requirements, and the Aggregator will still send this request on to Airlines in the hope of receiving shopping responses with Offers.

The main difference between the online vs interline flow exists where the Airline (the Offer Responsible Airline, or ORA) chooses to send a shopping request to another Airline (a Participating Offer Airline, or POA), combining the POA's Offers with their own products, to form one combined, final Offer to the Seller/Aggregator.

The ORA may have chosen to do this either because they are not able to full satisfy the original request by building an Offer comprising solely their own services, or to enhance the contents of their Offer by incorporating services one or more POAs may provide.

The POA would not normally communicate a Customer facing "price" to the ORA for their products, but instead include a Settlement Value as part of their Offer, specifying the amount due to the POA from the ORA for the provision of a service, be it flight or ancillary.

The ORA remains responsible for responding to the Seller/Aggregator, and when an Offer is accepted, it is the ORA that will create the "Master Order", process payment, issue the accountable document(s) and be responsible for interline settlement with POA(s). The POA becomes in effect a "supplier" to the ORA.

This brief description only begins to touch on Interlining in NDC, and this is described in greater detail in Section #3.7.

2.4.8 Servicing

2.4.8.1 Voluntary Servicing

When an Order has been created and then subsequently needs to be changed or cancelled, this comes into the realm of “Order Servicing”. This could be something as simple as the purchase of an additional ancillary product against an existing Order, a full cancellation and subsequent refund, or more complex requests such as a changes to flights, routes, bundled products or the passengers involved in the Order – which may or may not result in additional collection or an eventual refund to the Customer.

NDC supports the servicing of Orders, and it will be the responsibility of the ORA to facilitate the servicing of the Order. In many cases, requests to change or cancel an Order will be initiated by the original Seller (or an authorized party) on behalf of a Customer, and changes will often involve “re-shopping”.

How the NDC messages are used for Voluntary Order Servicing is covered in Section #3.5.

2.4.8.2 Involuntary Servicing

Involuntary servicing may take place where a Customer (via a Seller) does not initiate the servicing of an Order.

Ultimately, it is the responsibility of the ORA to communicate any involuntary changes of an Order to the Customer via a Seller. In the Planning Window this will be a relatively straightforward exchange, however in the Operational Window and during irregular operations, it may be that the ORA has to communicate directly with the Customer.

A more detailed explanation of how NDC messages are used to support Involuntary Order Servicing can be found in Section #3.5.

2.4.8.3 Interline Servicing

Where more than one Airline is present in an Order, the NDC Order Servicing messages can also be used.

For voluntary changes to an Order, the message flow is similar to the online flow – the Customer will contact the Seller (or the ORA) to begin the process, and it is the ORA that is ultimately responsible for making and confirming any changes to an Order. Depending on the nature of the change, the ORA may have to re-shop the POA

that is already a part of their Order, or they may take the opportunity to request Offers from new POAs.

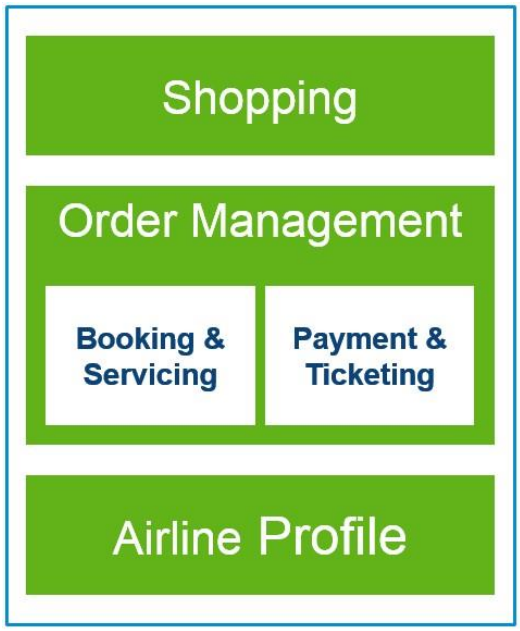
The POA is not permitted to make changes to the Master Order – this is the responsibility of the ORA.

However, involuntary changes (be they in the Planning or Operational Window) may result in a POA having an impact on the servicing of Orders and it may be the case that it is the POA initiating a change to the Order. Any changes should be specifically for operational reasons as the ORA owns the Master Order.

This version of the guide focuses on online servicing. Further detail on both voluntary and involuntary Interline Servicing will be described in future versions.

3 NDC Standard description

This section of the guide will follow the structure of the NDC Domains, with a subsection aligned closely to the range of functionality provided by the schemas. Within each subsection there will be a discussion on the topics and concepts that are important to understand in relation to that functional area, followed by a brief description of the messages, and finally Use Cases illustrating where the messages are shown in use.



Areas of NDC functional impact

Use Cases show a given way of interpreting and implementing the schemas. The intention here is to illustrate, not to limit; other ways of implementing the schemas exist and may be perfectly valid.

Airline Profile will be covered in Shopping, since it is only used within this domain (although discussion of how Airline Profile applies to Interline will be covered in the Interline section).

A dedicated chapter enlarges the simple picture as described above to the more complex case of interline.

3.1 Shopping

The NDC shopping schemas enable Airlines to distribute their products in the form of Offers and to merchandize their services, be they their flights or ancillaries (flight or non-flight related), using rich content.

3.1.1 NDC Shopping Principles

Shopping within NDC begins with a request from a Seller to an ORA as a result of a Customer enquiry. These requests may be as simple as looking for a particular route and date, or may be more advanced, looking for a date range (calendar shopping), specific product criteria (attribute shopping) or may be personalized (where Customer/traveler data is provided).

A shopping request must always be initiated as a result of a genuine Customer query – unsolicited shopping requests are not permitted.

Whether or not the ORA responds to the Seller/Aggregator with Offers and what these Offers contain is the internal commercial decision of the ORA, built within the Airline's own system. Thus, NDC represents a shift from the model where Offers can only be based on information such as prices, conditions and schedules, this information being filed outside of an Airline's system and combined to form a final Offer to a Customer by a third party, over which the Airline has no control.

In NDC, Offers are created directly in response to a request from a Seller (which may go through an Aggregator on its way to the Airline). Each Airline will be free to decide on the mechanisms it uses to construct its Offers, and which to return to the Seller. What the NDC Standard does specify are the components that can make up Offers by virtue of being able to be carried in the messages, and a means to communicate those Offers in a consistent way.

The method and ranking used to display Offers is not in scope of NDC, this is a commercial decision between the parties that may or may not be influenced by their agreements with Airlines and applicable to local laws.

3.1.1.1 Key Shopping Features

Shopping requests may be sent with individual traveler data (**personalized**) or sent without any specific traveler data (**anonymous**). The shopping response may be customized based on the traveler information that is passed in the request. Although, sending individual traveler data in the request doesn't guarantee the ORA will return a different Offer as part of their response.

Shopping requests may be formulated to include basic or more advance search criteria.

- Basic shopping: A request that contains criteria such as the origin, destination and travel dates.

- Ancillary-only shopping: A request that contains criteria to search for specific ancillary offerings (pillows for sale, Aisle seat with extra legroom).
- Affinity shopping: A wide search where a range of criteria are defined. This may include specific interests, destination attributes (such as a beach location), defined budget parameters, date ranges and/or destination ranges.
- Attribute shopping: A search specifying one or more attributes to obtain more focused results (e.g. flat-bed only).

Furthering the concept of "personalized" shopping – the request could include various pieces of information about the Customer or traveler, which may or may not be related to a frequent flyer/loyalty program. When this data is received by the Airline and they can determine that a passenger is already known to them, this traveler is deemed to be a "Recognized Traveler". Again, this may or may not be based on a loyalty program, or the Airline could choose to use other data in an attempt to recognize the traveler.

Note - The term "Recognized Traveler", nor the concept of personalization, is not to be confused with the TSA "Known Traveler" program.

3.1.1.2 Offer Management

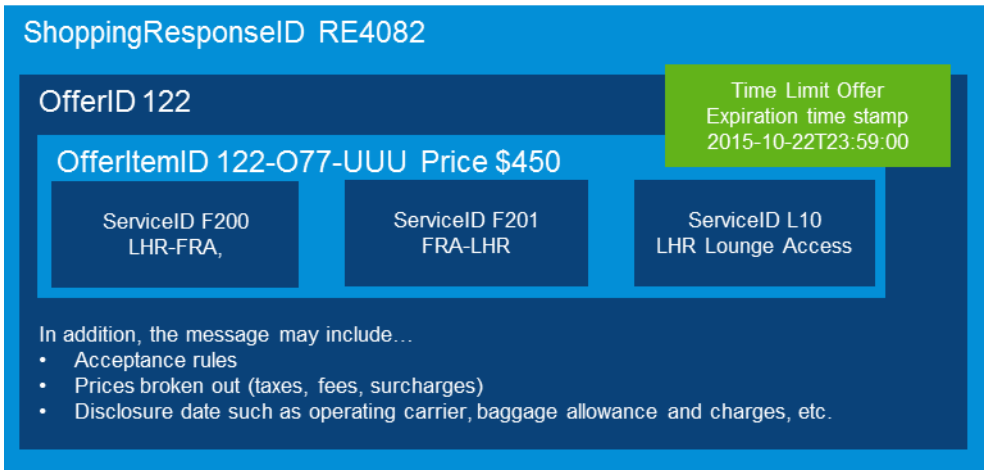
Offer Management refers to the ability to create and communicate an Airline's products as part of the shopping process.

When a shopping request is being processed, its response will contain a set of shopping Offers. The response will have a globally unique instance identifier known as the Shopping Response ID.

Key features

- Offers are returned to the Seller/Aggregator by the ORA and are uniquely identified by an Offer ID.
- Offers contain one or more Offer Items.
- An Offer may support non-homogeneity where each Customer may be presented with different set of Offer Items.
- Each Offer may have a total price attached.
- Once the ORA has sent its Offers to the Seller/Aggregator, the Offers and their contents can no longer be altered.
- Offer Items are identified by an Offer Item ID. They contain one or more Services.
- Offer Items can have a mandatory or optional status, indicating selection criteria.

- Each Offer Item has a price.
- Services represent individually deliverable Airline products and ancillary services that are not necessarily attributed to a particular journey (e.g. subscription services such as an annual lounge pass).
- Services within an Offer Item may be just flights, or just ancillary products, or a combination of both.
- A Service is also identified by a Service ID.



Key features of an Offer

With NDC, the ORA is entirely responsible for the contents of an Offer:

- the products it contains (be they flights bundled with ancillaries, separately selectable services, or a combination of a bundle with additional selectable services),
- any acceptance rules (e.g. time limits),
- the price of the Offer Item(s) containing either individual services or a bundle
- any other conditions (e.g. against refunds or changes once ordered)
- other guarantees/time limits.

NDC enables Offers to contain more flexibility than was possible previously.

Whilst the ORA will be responsible for creating Offers, the Seller is able to decide whether or not a particular Offer is displayed to the Customer, and of course ultimately it is the Customer's decision as to whether or not an Offer is accepted.

In NDC the request/Offer conversation will always be between Sellers and Airlines, whether or not there is an Aggregator involved, although an Aggregator may have an important role to play in the shopping process.

Offer Pricing

One of the key features of any NDC Offer is the price. Whilst there may be a price at Offer level, this will simply be a total of the prices of each of the Offer Items. In some cases, where optional Offer Items are returned by the Airline as part of the Offer, there may not be a total price at the Offer level, the prices may remain simply at the Offer Item level.

The method used by an Airline to determine the price of an Offer Item is not in scope of NDC – it is an internal decision of the Airline in question. Whether it uses dynamic pricing, whether its price is a function of a published fare, or if it chooses to apply a published or private fare in a similar way to how agents apply fares today in the existing indirect distribution model, this is not defined within NDC.

The NDC Standard simply supports the communication of a price per Offer Item between Airline and Seller/Aggregator, along with a total price at Offer level if applicable.

Offer Items

Offer Items allow the Airline to present within its Offer specified Services, and the Offer Item(s) have a given price. As the Airline has priced the Offer Item as a unit, the Seller must present the services in the context of the Offer Item received from the Airline. Further, it is not possible for the Customer to select Services from one Offer Item and combine them with Services from another – the Offer Item must be selected as a whole.

Note - there is an exception to this in one particular instance, often referred to as the "pick 3 of 5 scenario". The Offer Item is a priced unit, and contains several different Services (for example a seat assignment, extra bag, lounge pass, priority boarding and fast track security). The Customer is allowed to select any 3 of the 5 Services from within the Offer Item, and will be charged the price of the Offer Item.

Similarly, one Offer Item from one Offer cannot be combined with an Offer Item from another Offer – of course, the Customer is able to accept two Offers and whether this results in a single Order, or two separate Orders, will be based on the Airline's capability and their commercial rules. Use cases in section 3.2.6 illustrate both one Offer and two separate Offers being converted into a single Order in each case.

Time Limits

An Offer may feature several time limits. Each of these are optional elements, although the expectation is that if an Airline implements full NDC Offer Management capability, at least the Offer Time Limit will be used.

Some are attached to the Offer validity:

- Offer Time Limit
- Inventory Guarantee Time Limit
- Price Guarantee Time Limit*

**This may also be used after the creation of an Order. This scenario is illustrated below (scenario 5).*

Others are related to payment and other functions following Order creation and may be similar to those in existence in existing distribution:

- Payment Time Limit
- Deposit Time Limit*
- Name Time Limit*

**Groups only*

It is also possible to include a:

- Bilaterally-Agreed Time Limit.

Its nature is dependent on the stakeholders, and their bilateral relationship.

The **Offer Time Limit** is the primary time limit that is used during the Shopping process. When the Offer Time Limit has expired, the Offer is no longer valid. Where, the Seller wished to accept an Offer after the expiration of the Offer Time Limit, in most scenarios the Seller would have to begin the shopping process again. It is up to the Airline to validate whether or not an Offer is still valid based on this, and they may or may not choose to purge Offers that have passed their time limit from their Offer Management System.

Alongside the Offer Time Limit, the Airline may apply an **Inventory Guarantee Time Limit** and **Price Guarantee Time Limit** – although it is unlikely that all three will be used against the same Offer. The Price Guarantee Time Limit may also be used following Order Creation.

Note - The mechanism by which an Airline guarantees inventory is not in the scope of the Standard.

The ORA will validate that time limits are adhered to. If a time limit has been exceeded, it is up to the ORA to accept or reject for further processing.

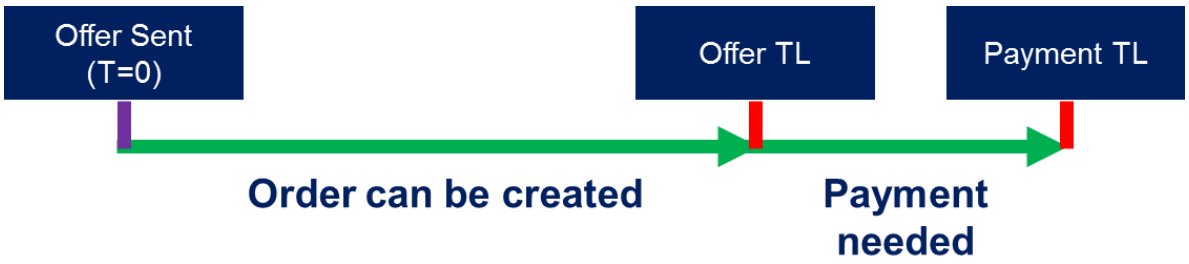
It is up to each individual Airline to decide what time limit to use and how. Their decision may differ based on their relationship with individual distribution partners, or

based on the identity of a recognized traveler. It also depends on their commercial wishes and their technical capability.

If an Airline has implemented full Offer and Order Management capability, the expectation is that they will always return an Offer Time Limit to the Seller. They will also always return a Payment Time Limit if they allow an Order to be created without being paid for immediately (whether t his be for a matter of minutes, hours or days after the initial Order Creation).

The expectation is that once an Order has been created, inventory is held until the Payment Time Limit. Once the Payment Time Limit has expired, inventory is released and the Order no longer exists.

Note - The expectation is that the Payment Time Limit is proposed at the time of Offer creation, although an Airline and a Seller may otherwise agree to send this only as part of an OrderViewRS.



Lifecycle of the two main time limits

The following five scenarios illustrate potential uses of these time limits together. To help with this illustration, the assumption here is that the Offer contains a flight only. In addition, the key features of an Offer are its Price, the Services it includes (in this case a flight), and the Availability of Inventory for this flight/Service.

Note - These scenarios are not exhaustive and simply illustrate various ways Airlines can use the time limits contained within the NDC Schemas to help manage their Offers and Orders.

Scenario 1 –The Offer is "Subject to Availability"

An Offer is returned to the Seller with an Offer Time Limit only. The price and the products within the Offer are all guaranteed, but are subject to availability. No inventory is held by the Airline. It is expected that in the majority of shopping scenarios this will be the case as at any one time, Airlines may have many thousands of active Offers in the marketplace and will not wish to hold inventory against all or even any of them.

Scenario 2 – Both price and inventory are guaranteed as part of the Offer

Both the price and inventory are guaranteed until the expiration of the time limit. As part of Offer, the Airline only has to return the Offer Time Limit to the Seller.

Scenario 3 – Inventory is guaranteed for a limited time, afterwards is "subject to availability"

An ORA may want to make an Offer valid for the next 24 hours but release its Inventory after one hour, to protect its other sales.

If the OrderCreateRQ is sent after the expiration of the Inventory Guarantee Time Limit, the Airline will check the availability of the Service(s) in question. If the inventory is still available the Order will be created based on the price, included Services and

conditions as per the original Offer. If the inventory is no longer available, the Order will not be created and the Seller will need to reshop.

At the point inventory is released, the Airline may use the InventoryReleaseNotif message to advise the Seller when guaranteed inventory has been released. This notification could be sent at any point after the Inventory Guarantee Time Limit has passed, up until the expiration of the Offer Time Limit. This is not mandatory. This mechanism can be used by the Seller to avoid sending an Order Create to the Airline where the transaction cannot be completed, and to help with their Customer servicing.

Scenario 4 – Price only valid for a limited period (before Order creation)

An ORA may want to make an Offer valid for the next 24 hours, but only guarantee the Price for one hour.

After the expiration of the Price Guarantee Time Limit, the Seller will have to ask the Airline to re-assess the price of the Offer (using the OfferPriceRQ/RS message pair) before being able to send an OrderCreateRQ, if the Customer is happy to proceed based on the new price. Inventory is guaranteed against this process until the expiration of the Offer Time Limit.

This scenario is similar to what happens today when a booking is repriced at the time of ticketing, although there is a key difference – when the Order has been created its price and its associated availability cannot be changed regardless of whether payment and document issuance happens immediately, or happens after a certain period of time. The exception to this is described scenario 5.

Scenario 5 – Price only valid for a limited period (after Order creation)

An ORA may want to make an Offer valid for the next 24 hours, guarantee the Price for the next two days, and give the Customer 3 days total for Payment.

In this scenario, the Order is created within the Offer Time Limit and the Customer proceeds to payment before the Payment Time Limit. If the Price Guarantee Time Limit has not been exceeded, the payment is processed and documents will be issued.

However, if the Price Guarantee Time Limit has expired, the Seller needs to ask the Airline to re-asses the price of the initial Offer (using the OrderReshopRQ/RS message pair) before proceeding to the Payment. This may be the result of an Airline rejecting payment, or the Seller proactively asking the Airline for the new price before initiating the payment.

It should be noted that following Order Creation, inventory is guaranteed throughout until the expiration of the Payment Time Limit.

This scenario is similar to what happens today when a booking is repriced at the time of ticketing.

3.1.1.3 The Role of an Aggregator in Shopping

The role of the Aggregator is the business function of distributing a Seller's shopping requests to multiple Airlines and aggregating subsequent responses. A Seller may use more than one Aggregator.

By default, the Aggregator returns all Offers to the Seller. However, the Aggregator may apply logic taking into account the Seller and only sends back the most relevant Offers – what constitutes the most relevant is not defined by NDC but will be up to those parties to decide.

The ORA and Aggregator may define rules as to which Offers must reach the Seller.

Any visibility the ORA has on what is sent from Aggregator to Seller is down to the ORA/Aggregator relationship.

The Aggregator could be a third party and/or the aggregation function could reside within the Seller system.

3.1.1.4 High Level Shopping Flow

A shopping flow involves 3 main parties: Seller, Aggregator and the Offer Responsible Airline (ORA). The Aggregation function may be done by an external party or internally by the Seller, but for the purposes of this flow, we have assumed the Aggregator's role is performed external to the Seller.

1. A shopping request is created by the Seller from a Customer request.
2. The shopping request is sent via an Aggregator (if external to the Seller), and the Aggregator selects the Airlines which should be involved in the request.
3. The ORA receives the shopping request and will create Offers.
4. The ORA returns these Offers to the Aggregator in a shopping response.
5. The Aggregator collects the Offers from each ORA and may apply selection/filtering logic.
6. The selected Offers are sent back to the Seller which may also apply further selection logic before displaying them to the Customer.

3.1.1.5 An Introduction to Interline Shopping

In the instance where the ORA is not able to fulfil the entire shopping request, or wishes to expand the range of products within its Offers, they may ask one or more POAs to fulfill the remainder as part of an interline Offer. It is the ORA that builds the Offer(s) featuring the POA's services. All communication with the Seller/Aggregator is handled by the ORA, which is a shift from today's model. This continues to apply when an Order is created or servicing takes place, and this is covered later in this guide in Section #3.7.1.

3.1.2 Airline Profile

The NDC Airline Profile schemas provide the ability for an Airline to communicate which Shopping requests it is willing to receive, and has the capability to respond to. Whilst optional, these schemas are a way an Airline could manage the volume of requests they receive.

As described in Section #3.1, the shopping process puts the Airline forefront when it comes to building Offers in response to a shopping request. The consequence of the Airline's new role as a result of implementing NDC is that it needs to be prepared to receive a high volume and process many different types of requests.

At the same time, if Sellers/Aggregators had to send requests to all NDC capable Airlines without a control mechanism in place, most of the messages would be irrelevant – i.e. the Airlines receiving the requests are unlikely to have products that meet the criteria. Sellers/Aggregators are therefore likely to get a very low answer rate.

To summarize, Airlines would face an issue of scalability (too many requests, with limited amount of relevant ones) and processing time and Sellers/Aggregators a high level of inefficiency for instance low or slow response rates.

Airlines therefore need to have the capability of supporting NDC transactions when it makes sense to them, avoiding the receipt of irrelevant requests. It needs to be able to communicate its position to their distribution partners. Airlines have the ability to manage the volume of NDC requests through the Airline Profile.

Two solutions may fulfill the need to control the volume of NDC transactions – one is the Airline Profile, the other being by bilateral agreement/implementation. Choosing a particular method will be the Airline's choice.

If the Airline's NDC status is not published publicly, it settles bilateral agreements with its chosen stakeholders (Sellers, Aggregators, interline partners…). Only those stakeholders that know they can send NDC requests and get Offers from the Airline, on the given scope that has been shared with them. The rest of the Airline distribution stays as today. The whole process is bilateral and not in the scope of NDC.

By sharing the Airline Profile with the distribution stakeholders, the Airline publishes information about the requests it is happy to accept, and its level of NDC capability (=the Airline Profile): circumstances, services, points of sales, markets or routes.

Note - The Airline Profile is not the equivalent of today's schedule – whilst it includes information about the routes an Airline will accept a shopping request for, the purpose of doing so is to avoid receiving unnecessarily large volumes of irrelevant requests.

The use of the Airline Profile is not mandatory – to be NDC capable the Airline does not need to maintain a Profile – but the schemas are available as a tool with which to manage this increased volume of requests. Similarly, it is not mandatory for the Seller/Aggregator to follow the Profile's advice – there is no mechanism defined within NDC or the Airline Profile to prevent a stakeholder sending a request to an Airline that had specified in its Profile that it was not willing to accept it.

An Airline's Profile is also available for consumption by other Airlines (ORAs), alongside Sellers and Aggregators, for interline requests. This is to help them decide which Airlines (POAs) to send a further shopping request to, where the ORA cannot fulfil the Seller/Aggregator's entire request with its own services.

Standards are defined and the schemas available to allow exchanges of that information. Section #3.1.2.2 focusses on Airlines using this facility.

3.1.2.1 Ownership and Maintenance of the Airline Profile:

The Airline Profile is owned and maintained by the Airline. In terms of its location, the Airline Profile can be maintained internally within the Airline, or it could be hosted externally by a third party. NDC does not define this location: it will be a decision per individual Airline.

If a profile does not exist for an Airline, unless it has a bilateral arrangement, it is assumed that the Airline is not accepting queries for NDC transactions from the requestor.

Each Airline is responsible for ensuring that their profile is up-to-date and that the Profile has been made available to the parties capable of exchanging NDC messages. However, the Profile does not include information regarding commercial agreements. Defining the exact contents of or mechanisms for the creation, usage, maintenance and deletion of Airline Profile is not in the scope of NDC.

Whilst the Airline maintains its entire Airline Profile, each stakeholder only has access to its own content – i.e. that content which the Airline has approved for that actor. The information may be different depending on the Seller/Aggregator making the request - the Airline may or may not limit its Offering based on the requestor.

For instance:

- The information returned may be very limited for an unknown Seller or non-partner Airline: For example - "no request is welcome".
- For a Seller with a global reach: For example – "the Airline's entire NDC distribution scope is available". Subscribers with access to Airline Profile data are not permitted to disclose any Airline Profile data to any other Stakeholders, unless agreed bilaterally.

3.1.2.2 Usage

The usage of the Airline Profile forms part of the shopping process.

In order to fulfil a given consumer's request, the Aggregator or Seller must first determine which Airlines are capable of responding. In order to make this determination it may query its subset of "Airline Profiles".

There are two methods of distributing Airline Profile data – "Pull" and "Push".

For efficiency purposes, whether the Push or Pull method is used, it is envisioned that the requestor would subsequently store a copy of the Airline Profile so that it is accessible without having to connect with the Airline at the time of the shopping request. Both methods are in fact used to update this local copy.

It should also be noted that only the information a particular Seller has access to is returned in the response.

The Pull method would see the Seller/Aggregator/POA sending a request for an Airline's Profile data, either directly to the Airline or to their external Airline Profile host.

Whilst this request could take place per shopping request, this would add significant load to an Airline's system, and would increase response times. It is therefore likely that the request would take place periodically, the frequency of this determined either by the Seller/Aggregator, or bilaterally between Seller/Aggregator and Airline.

The Push method involves one-way interaction between the Airline and Seller/Aggregator – The Airline (or external host) will "Push" its relevant Airline Profile data to the relevant Seller, Aggregator or POA.

This Push could be triggered whenever the Airline Profile is updated by the Airline, on a regular bilaterally agreed timescale or on an ad-hoc basis – this will be a decision to be made between the Airline and receiver, and a particular Airline may use more than one method across their range of partners.

The following elements are the Match criteria that determine the record used to indicate which transactions are permitted by the Airline:

- Date of Request
- Itinerary information (origin, destination...)

As a response, the Seller would receive a list of Airlines that meet the criteria, and are therefore capable of answering the request.

Examples of the processes in which the Airline Profile is used are shown in Shopping Use Cases Section #3.1.4.

To send requests, the following data is required:

- Receiver ID: Identification of the Airline Profile Receiver; may be either an Aggregator Identity ID, a Seller ID, or an Airline identity Code as defined in the Order Management Data Dictionary.
- Airline: The Airline(s) whose Profile is being requested.

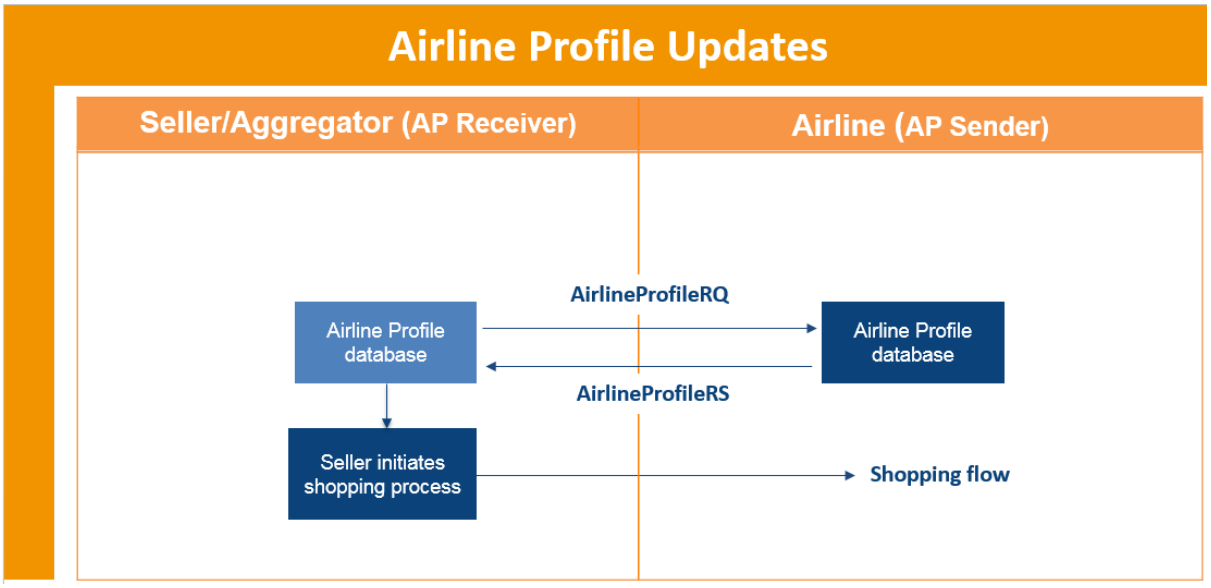
3.1.2.3 Specific Schemas for the Airline Profile:

As explained in the previous paragraph, there are two primary methods for receiving an Airline Profile:

Pull Method: An Airline Profile receiver sends a request to the Airline Profile sender to send one or more Airline Profiles and Airline Profile Sender transmits the appropriate profiles.

Messages used:

- **AirlineProfileRQ** - Request for Airline Profile(s)
- **AirlineProfileRS** - Response which may include either a link to the Profile or the Profile itself



Pull method

Push Method: Airline Profile Sender pushes Airline Profiles or links to Airline Profiles to receivers that have been activated/authorized.

Messages used:

- **AirlineProfileNotif** - Provides a mechanism to unilaterally send an Airline Profile or a link to the Profile to Receivers that have been previously authorized.

Note - Airline Profile in Interline is covered in section 3.7.3.4

3.1.3 NDC Shopping Messages

The topics in this section provide details about the messages that are central to the NDC shopping functionality.

In NDC, there are common capabilities across shopping messages which allow for multiple criteria to be used in the input.

- Calendar Shopping
- Affinity Shopping
- Ancillaries
- Seating Options
- Baggage Options

AirShoppingRQ/RS

The AirShopping transaction set supports both demanding and flexible shopping experiences for anonymous or personalized shopping. Both functionally-rich attribute shopping and affinity shopping support date range or specific month (calendar) shopping, amongst other features.

The response returns Offers which may include branded or itinerary-priced Offers with or without ancillary services. It also returns applicable rules for the integrated prices as well as for each service. The message also returns multi-media content at message level as well as media references at the individual Offer level.

OfferPriceRQ/RS

The OfferPrice transaction set may return two different sets of content. Based on request attributes, the response may initially provide additional à la carte ancillary services that are applicable and available for the selected Offer.

If no ancillary services are available, the message returns a final pricing. If ancillary services are available, the modified pricing request includes selected services and returns a final pricing that includes service(s) selection.
The response message also returns multi-media content at the message level.

SeatAvailabilityRQ/RS

The SeatAvailability transaction set returns data used to construct respective seat maps with fully integrated fees for any identified premium seats. The message also returns multi-media content at the message level with media content references at the individual service level.

ServiceListRQ/RS

The ServiceList transaction set returns a list of all applicable ancillary services that meet request qualifiers and flights.

The message supports shopping for additional a la carte services to complement any selected Offer, as well as shopping for specialty service items not generally included in an initial Offer but rather based on service search filters, e.g. sports equipment specialty baggage and unaccompanied minor fees.

The message also returns multi-media content at both the message and individual service levels identified in the Offer.

InvGuaranteeRQ/RS

The InvGuarantee transaction set requests that inventory be guaranteed for specified Offers, pending their conversion into a completed/paid and/or ticketed Order. The response returns an indication if the inventory has been guaranteed, and if so, the associated inventory guarantee time limit and a unique inventory guarantee reference ID.

The Guaranteed Inventory Time Limit cannot extend beyond the Offer Time Limit after which new Offers will be generated. An Inventory Guarantee may also be issued as part of the initial Offer. Valid responses are:

1. “Inventory Guarantee Identifier” for each Offer and/or product’s Service ID
2. No Inventory Guarantee - with reasons indicated or an indicator that there is “no inventory held” for the product Offer
3. The product is “not under inventory control”
4. “Waitlisted”

InvReleaseNotif

InvReleaseNotif transaction sends an unsolicited notification of released guaranteed inventory. The Acknowledgement message may be returned to acknowledge receipt of the notification.

BaggageAllowanceRQ/RS

The BaggageAllowance transaction set provides checked and carry-on baggage allowance details. Request qualifiers may include traveler, origin/destination, point of sale, flight-specific and ticketed fare information.

The response returns the baggage allowance, whether or not IATA Resolution 302 or DOT rules are applicable, baggage weight, dimensions and size information by origin/ destination pair. Implementers may also obtain an additional catalog of applicable embargoes and charges within the same origin and destination pair.

BaggageChargesRQ/RS

The BaggageCharges transaction set determines and returns the pricing for a set of checked bags. Request qualifiers include Traveler, origin/ destination, point of sale, flight-specific and ticketed fare information. The response returns the baggage charges, whether or not IATA Resolution 302 or DOT rules are applicable, and detailed trip-level pricing for all requested passengers, or origin/ destination level pricing that includes checked and carry-on baggage charges.

BaggageListRQ/RS

The BaggageList transaction set determines and returns a list of bag types (e.g. sporting equipment, pet in hold, overweight bags, etc.) that can be checked or brought in cabin for a fee and for a specified itinerary or carrier.

Request qualifiers may include traveler, origin/ destination, flight-specific and ticketed fare information.

FareRulesRQ/RS

The FareRules transaction set returns the filed details of a specific fare basis code.

FileRetrieveRQ/RS

The FileRetrieve transaction set supplements other NDC shopping messages with payloads designed to efficiently exchange Offer-associated media using IDs and URLs.

Using the FileRetrieveRQ message, implementers can subsequently retrieve binary encoded files - such as images or PDFs - from the IDs or URLs in a shopping response message that are returned in the FileRetrieveRS message.

This message pair also supports scenarios where trading partners maintain a physical cache of Offer associated media from other trading partners based on media IDs

and/or URLs. The message supports multi-media content at the message level. Alternatively, it may be providing links to web pages that contain optional service Terms and Conditions as an example.

3.1.4 Use Cases

Introduction

Use cases 2 and 3 illustrate different methods of shopping for ancillaries prior to Order creation. Each method is as valid as the others, and these three examples may not be the limit of the ways to achieve a similar result.

The reason for the inclusion of all three is to illustrate some common methods partners may wish to implement. By way of introduction…

Use case 2 – illustrates Offers being returned by the ORA for flights and ancillaries in the same shopping response, in response to the original shopping request
Use case 3 – illustrates an Offer being returned for flights, and then a separate shopping request being sent from Seller/Aggregator to ORA for ancillaries. Following selection by the Customer, the Seller asks the ORA for a new, combined Offer for the flights and ancillaries together.

How the Seller chooses to represent any of these workflows to its Customers is outside the scope of the NDC Standard, but the NDC Standard should not limit the possibilities for the Seller in terms of this representation (for example, the Seller may choose to represent Offers received in Use Case 2 on one web-based landing page. Alternatively, within use case 3, they may wish to implement a step by step process featuring multiple landing pages, adding each Offer to a “basket” when selected, an implement a “checkout” step at the end of the flow in advance of Order creation.

Whilst these use cases only describe the shopping phase, the Order creation process is described in use cases 4 and 5 in section 3.2.6.

Principal Actors

The principal actors in each use case are:

- Customer
- Seller/Aggregator
- Offer Responsible Airline (ORA)

The "Customer", the "Traveler" and the "Passenger"

In addition to the functional roles within NDC described in Section #2.3, throughout the guide and within the use cases there are mentions of the Customer, the Traveler and the Passenger.

The Customer is the individual or corporation that provides their requirements for Shopping to the Seller, to allow the Seller to initiate a Shopping transaction with the Airline (via an Aggregator where necessary). They continue to be involved in the transaction, selecting from proposed Offers, asking the Seller to proceed with the Order creation and being responsible for providing their payment information to the Seller. When they are in possession of an Order, they may also have requirements to change that Order, and communicating these requirements to the Seller or Airline will also be their responsibility.

The "Traveler" and "Passenger" are similar in their definition; they are the named individual entitled to the Services proposed in Offers and present in Orders.

- Every NDC transaction will involve a Customer initially during the shopping phase.
- This Customer may or may not be the same individual as the Traveler/Passenger.
- In the majority of the use cases in this guide, they are illustrated as the same individual.
- Every NDC created Order will feature a Traveler/Passenger.

Note - Where the Customer and Passenger are different individuals, in some instances (for example when a Passenger is at the airport) there may be situations where the Passenger approaches the Airline directly instead of the original Customer. It is up to the Airline and their distribution partners to decide on the scenarios in which this is permissible (for example, Airlines and Sellers may agree to allow this interaction in the Operational Window, but not in the Planning Window). In these cases, the Passenger would take on the role of a Customer from an NDC process flow perspective.

Common Preconditions & Assumptions

The following preconditions/assumptions are common to each use case:

- The ORA, the Seller/Aggregator, and other parties subject to the data exchange will have valid applicable agreements in place between them.
- All parties have taken steps to ensure that they are compliant with any applicable competition law provisions and regulation, data privacy,

confidentiality and protection regulations and any other laws and regulations they may be subject to.

- If the Seller/Aggregator chooses to use Airline Profile data to determine which ORA to send the shopping request to, it is assumed the ORA will have specified within its Airline Profile that it is an NDC carrier and it wishes to receive shopping requests for this destination or route.
- Seller and Aggregator credentials will be authenticated by the ORA.
- The term “Seller/Aggregator” is used in each use case and is not differentiated. This is because the ORA will receive messages either directly from the Seller, or via an Aggregator. The Seller will have initiated the request and as the Aggregator does not directly impact the content of the messages transferred, so it should not make a difference to each use case whether the ORA receives the message from a Seller directly, or via an Aggregator.
- Each illustration focuses on the flow from a Seller to one particular ORA, but the Seller may have contacted multiple ORAs simultaneously.

3.1.4.1 Use Case 1 – Time Limit / Personalized Shopping

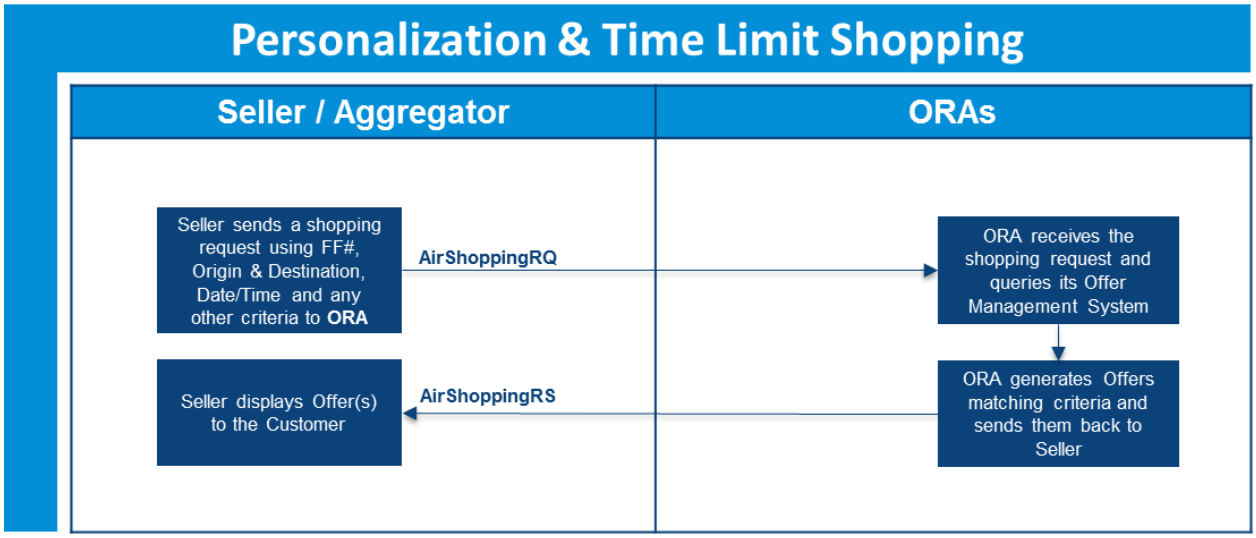
Description

A Customer based in Miami needs to fly to Dallas for business. He belongs to the Airline frequent flyer program and wants to explore all options Offered for his destination.

This Use Case describes the process of shopping for flights for a recognized traveler (based on Frequent Traveler details). Origin & Destination together with time and cabin preferences are specified.

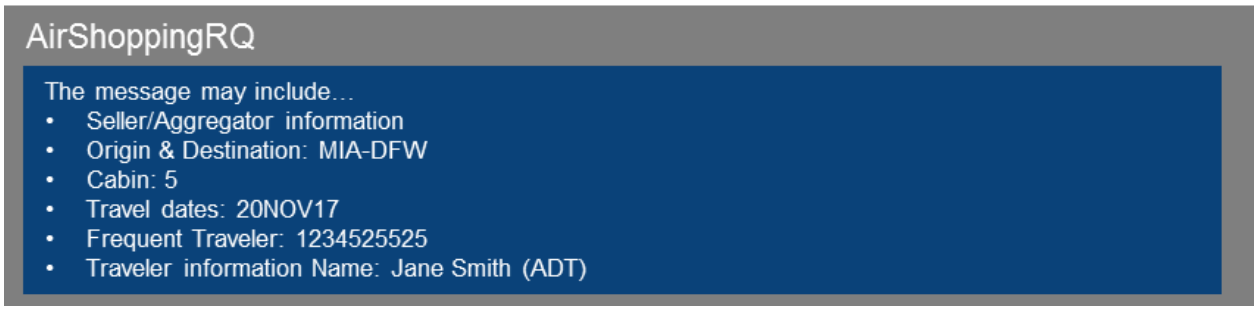
Preconditions/Assumptions

- The Customer communicates to the Seller/Aggregator his intended travel plan, which includes travelling to Dallas from their home city of Miami and agrees to share personal information such as Frequent Traveler number and name.



Steps to follow in the process

1. The Seller/Aggregator sends a shopping request to the ORA using Origin & Destination (MIA-DFW), dates, cabin preferences and Frequent Traveler information.



2. The ORA receives the shopping request and queries its Offer Management System to determine possible Offers.

3. The ORA builds possible itineraries, if necessary, using known schedules and rules (such as MCT, MEFT, Traffic restrictions, etc.). The ORA determines that it can meet the request with its own services and includes preferred seat selection to the Offers.

4. The ORA chooses to personalize the Offer(s) by appending an optional ancillary service (premium meal) as an a-la-carte Offer which the Passenger is eligible for on either of the flight segments proposed in the two flight-related Offers.

5. The ORA validates the Frequent Traveler data and determines which of its own services it wishes to include in the Offers it will return to the Seller/Aggregator.

6. The ORA chooses to apply an Offer Time Limit of 30 minutes to each Offer.

7. The ORA generates a shopping response containing these Offers.

Illustration of an Offer from an AirShoppingRS with time limit and associated services

8. The ORA transmits its Offer(s) to the Seller/Aggregator.

9. Offer(s) are presented to the Customer by the Seller.

Post Conditions
The Customer is in possession of Offer(s) based on her Frequent Traveler status. The Offers have an Offer Time Limit, after which the Offer (and all prices / inventory associated) can no longer be guaranteed.

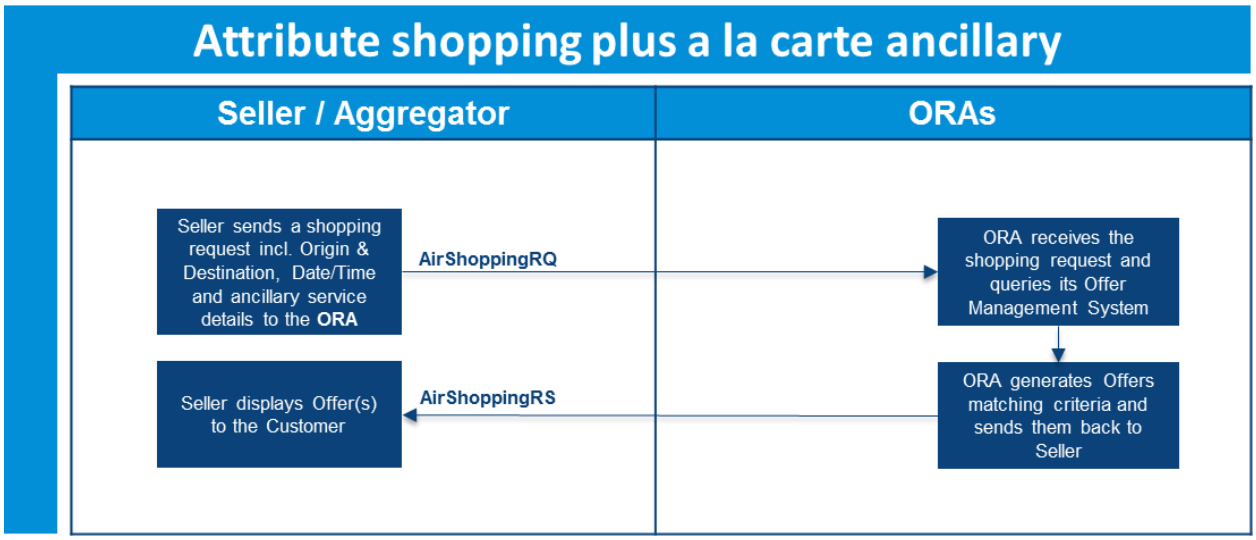
3.1.4.2 Use Case 2 – Attribute Shopping featuring à la Carte Ancillary

Description
One traveler based in New York would like to buy a round trip to Paris. He would like to get a flat-bed seat to be able to sleep, and he would also like to get a pre-paid bag for the journey.

This use case proposes a one-step way to create Offers including ancillary services using AirShoppingRQ/RS.

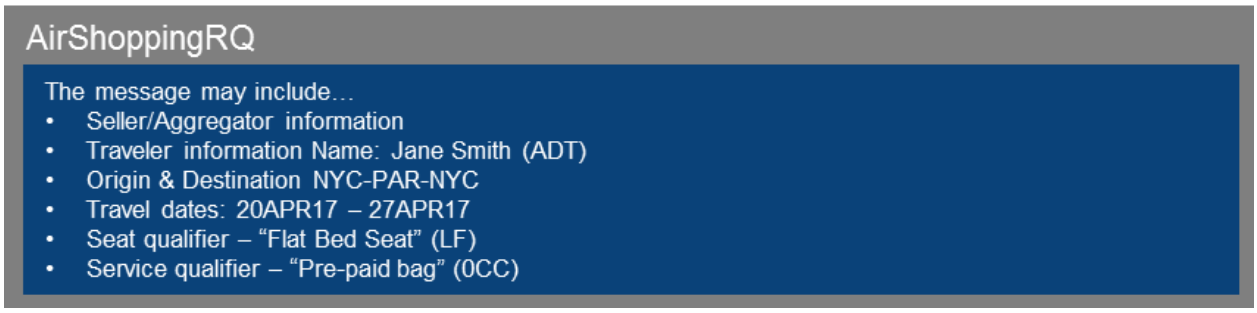
Preconditions/Assumptions

- The Customer communicates to the Seller/Aggregator their intended travel plan and preferences.



Steps to follow in the process

1. The Seller/Aggregator sends an AirShoppingRQ request to the ORA providing Origin, Destination & dates information and further attributes (in this case “flat bed seat”, plus a request for specific ancillary services).



2. The ORA receives the shopping request and builds Offers in its Offer Management System.

3. The ORA sends an AirShoppingRS to the Seller/Aggregator.

4. The Seller/Aggregator decides which Offer(s) to present to the Customer.

Post Conditions

The Customer is being presented an Offer(s) that satisfies his criteria.

3.1.4.3 Use Case 3 – Updating an Offer with ancillary items

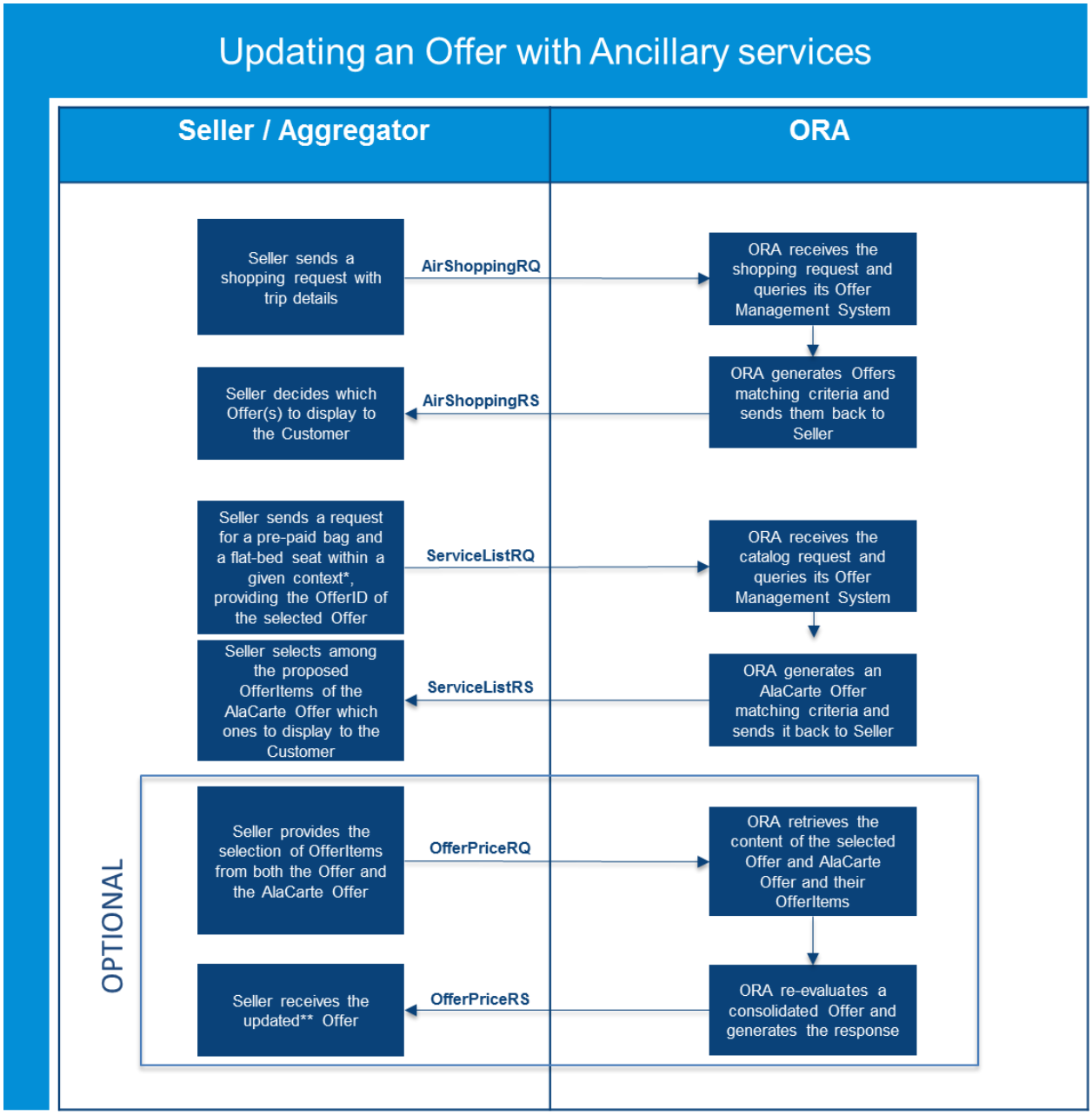
Description

One traveler based in New York would like to buy a round-trip to Paris. They would also like an additional pre-paid bag.

This use case shows how the Seller may initiate the request for ancillary items, after the ORA has returned Offers without ancillaries in its AirShoppingRS. This is done by the Seller using ServiceListRQ/RS to get a list of ancillary items matching a selected Offer from AirShoppingRS, followed by OfferPriceRQ/RS, to consolidate a new Offer for the flights plus ancillaries combined.

Preconditions/Assumptions

- For adding an ancillary before an Order is created, the workflow implemented by the actors in this use case involves the receiving of flight Offers, the Customer making a flight selection, then requesting additional ancillaries afterwards. The result is a combined Offer for both flights and ancillaries.
- The entire flow takes place before Order Create and just involves Offers.



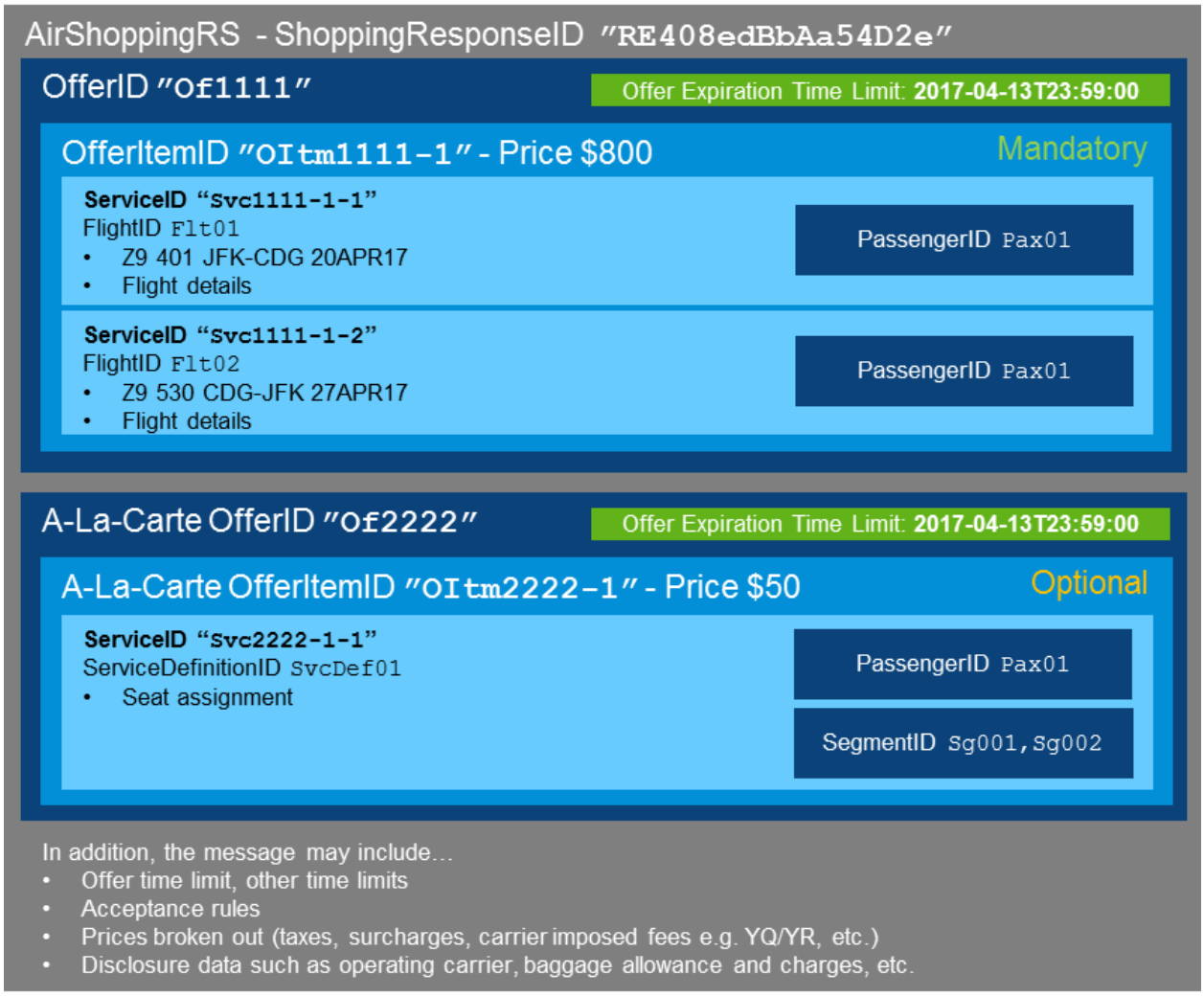
ServiceListRQ can take in input a context made of either flight info, OfferID & OfferItemIDs or OrderID

Steps to follow in the process

1. The Seller/Aggregator sends an AirShoppingRQ request to the ORA providing Origin & Destination and dates information.

2. The ORA receives the shopping request and builds Offers that match as many criteria as possible.

3. The ORA generates Offers and returns them to the Seller/Aggregator in the AirShoppingRS response.



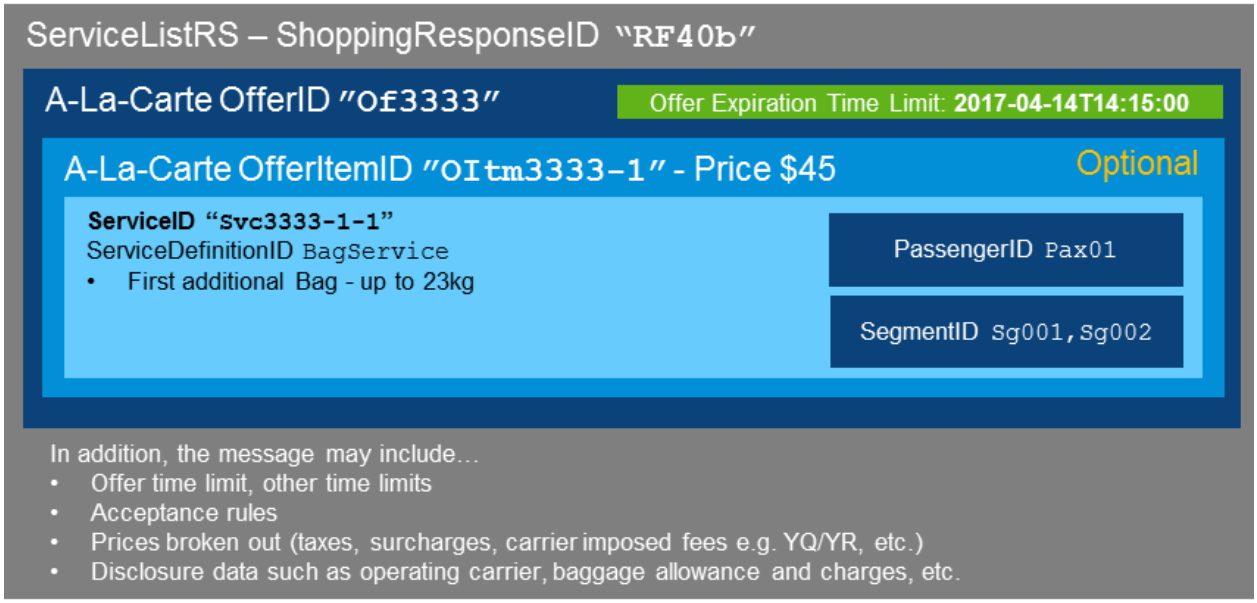
4. The Seller/Aggregator decides which Offer(s) to present to the Customer.

5. The Customer selects an Offer, and asks the Seller for a pre-paid bag.

6. The Seller/Aggregator sends a ServiceListRQ request to get the list of options for a pre-paid bag based on the context of the Offer which has been selected by the Customer at step 5.

7. The ORA determines the options matching the Seller request within the provided context.

8. The ORA sends back through ServiceListRS an A-La-Carte Offer including A-La-Carte OfferItems corresponding to services matching the request. Each service is identified by their ServiceID with their description.

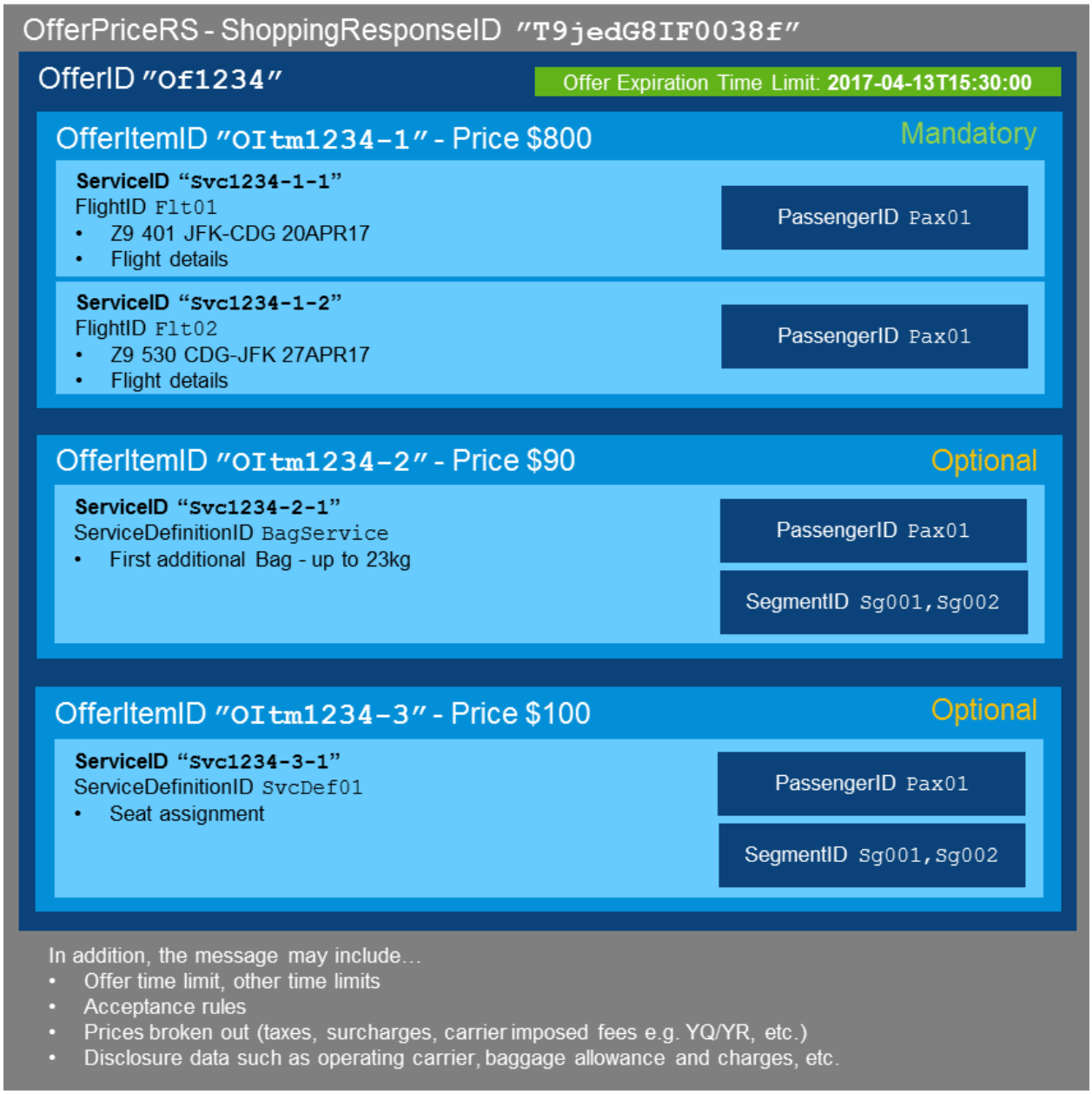


9. The Seller/Aggregator decides which A-La-Carte OfferItems to present to the Customer.

10. The Customer selects a provided pre-paid baggage options and the Seller/Aggregator sends the Offer & A-La-Carte Offer identifiers (and their OfferItems) in OfferPriceRQ to get a combined Offer for the selected flights and pre-paid bag(s).

11. The ORA, based on the context defined in the OfferPriceRQ by the OfferID, A-La-Carte OfferID and their OfferItemIDs, will create a new Offer for the Customer.

12. The ORA will deliver this new content under one unique Offer in OfferPriceRS to the Seller/Aggregator.



Note - In this use case the ORA has proposed an Offer where the flights and ancillaries are priced separately, in two separate Offer Items. The ORA could have chosen to include the ancillary items in the same Offer Items as the flight, and priced as one bundle.

The Seller will display the new Offer to the Customer.

3.1.4.4 Use Case 4 – Requesting an Offer for seats

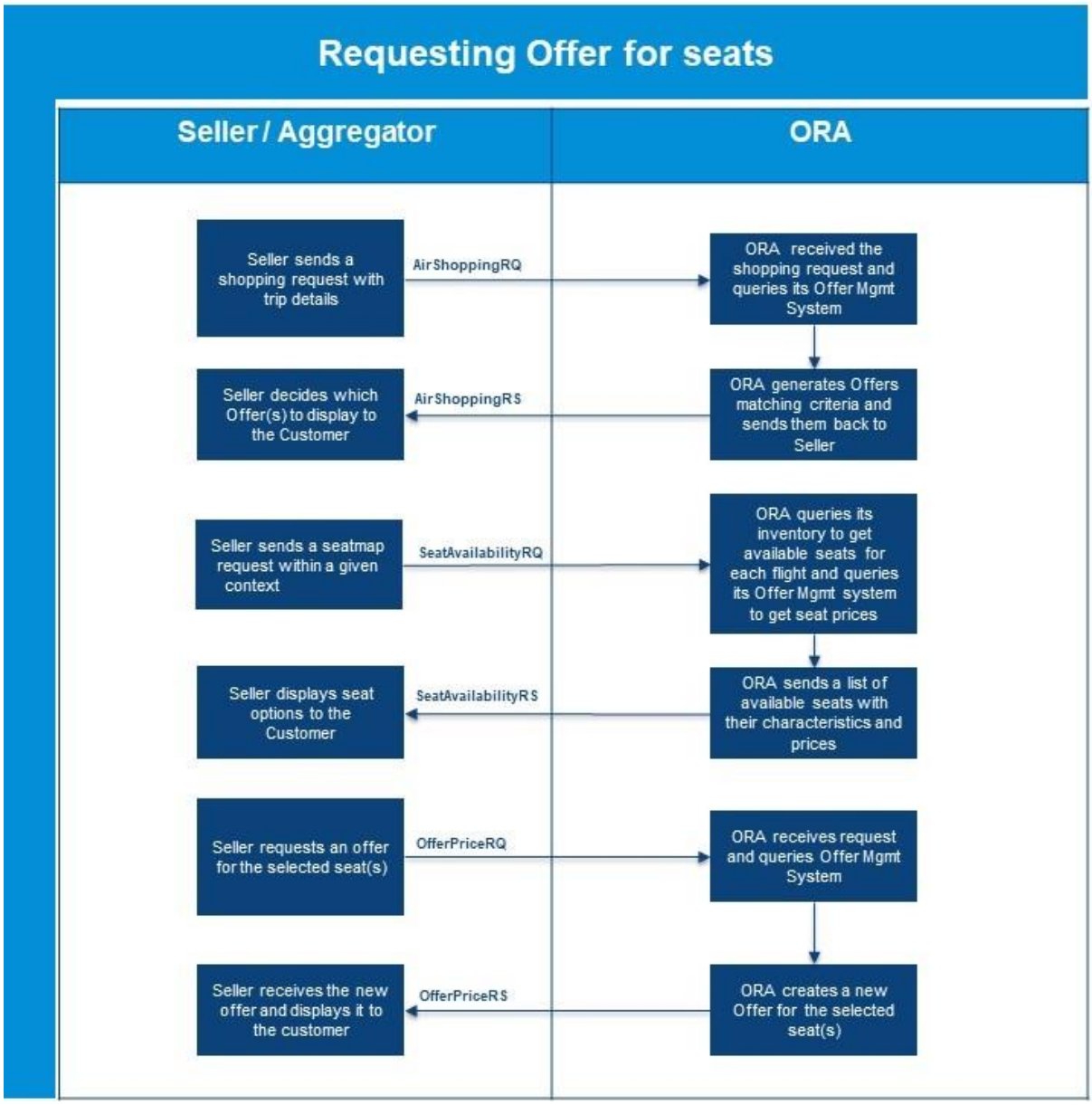
Description

One traveler based in New York would like to buy a round-trip from Paris to Mauritius. The traveler would also like to choose seats for both flights.

This use case shows how the Seller may initiate the request for seats, after the ORA has returned Offers in its AirShoppingRS, and before the Customer requests the creation of the Order.

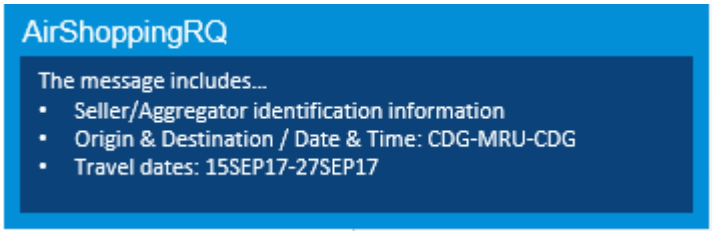
Preconditions/Assumptions

- The entire flow takes place before creation of the Order.
- The Seller decides to share personal Customer information (such as Frequent Flyer number) with the ORA when requesting seat availability.



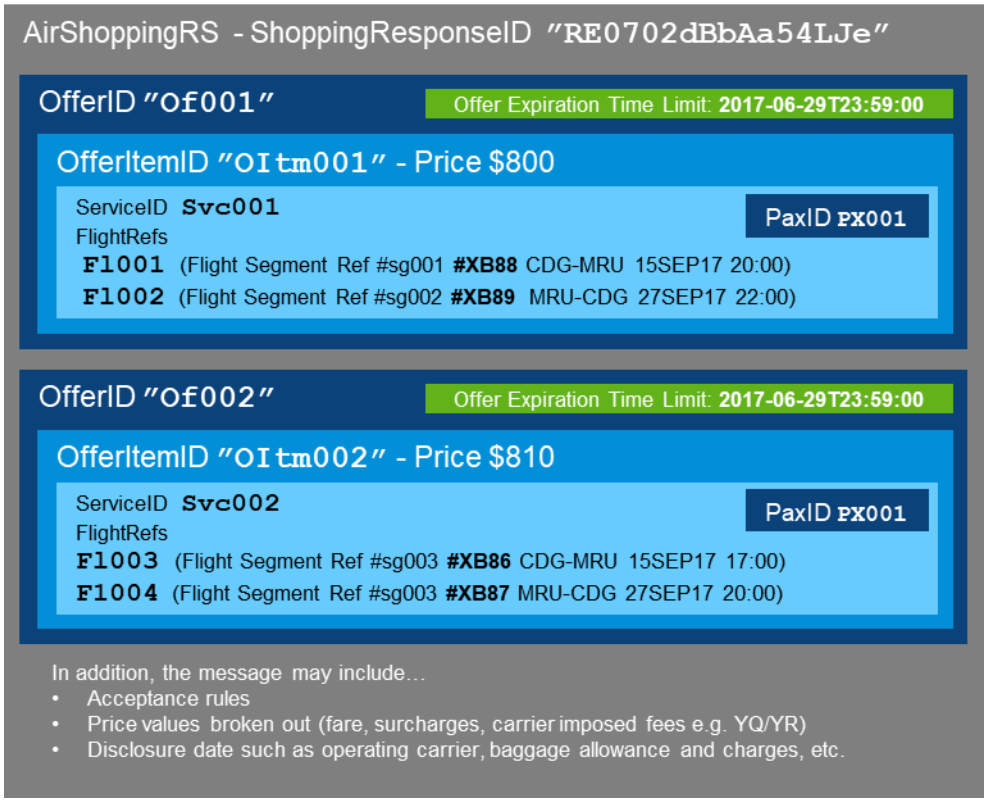
Steps to follow in the process

1. The Seller/Aggregator sends an AirShoppingRQ request to the ORA providing Origin & Destination and dates information.



2. The ORA receives the shopping request and builds Offers that match as many criteria as possible.

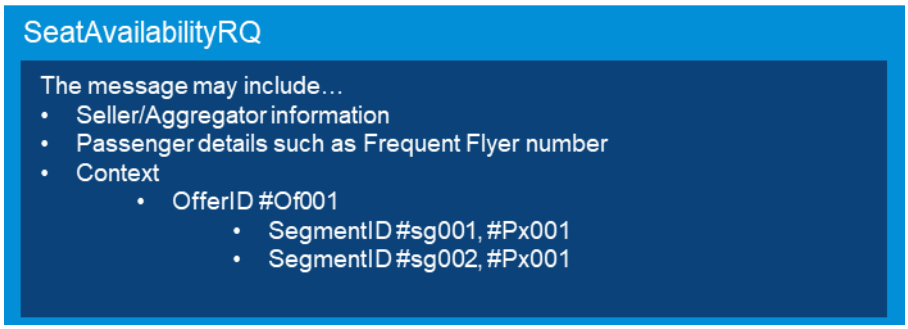
3. The ORA generates Offers and returns them to the Seller/Aggregator in the AirShoppingRS response.



4. The Seller/Aggregator decides which Offer(s) to present to the Customer.

5. The Customer selects the one of the Offers above and then wishes to select seats for selected flights.

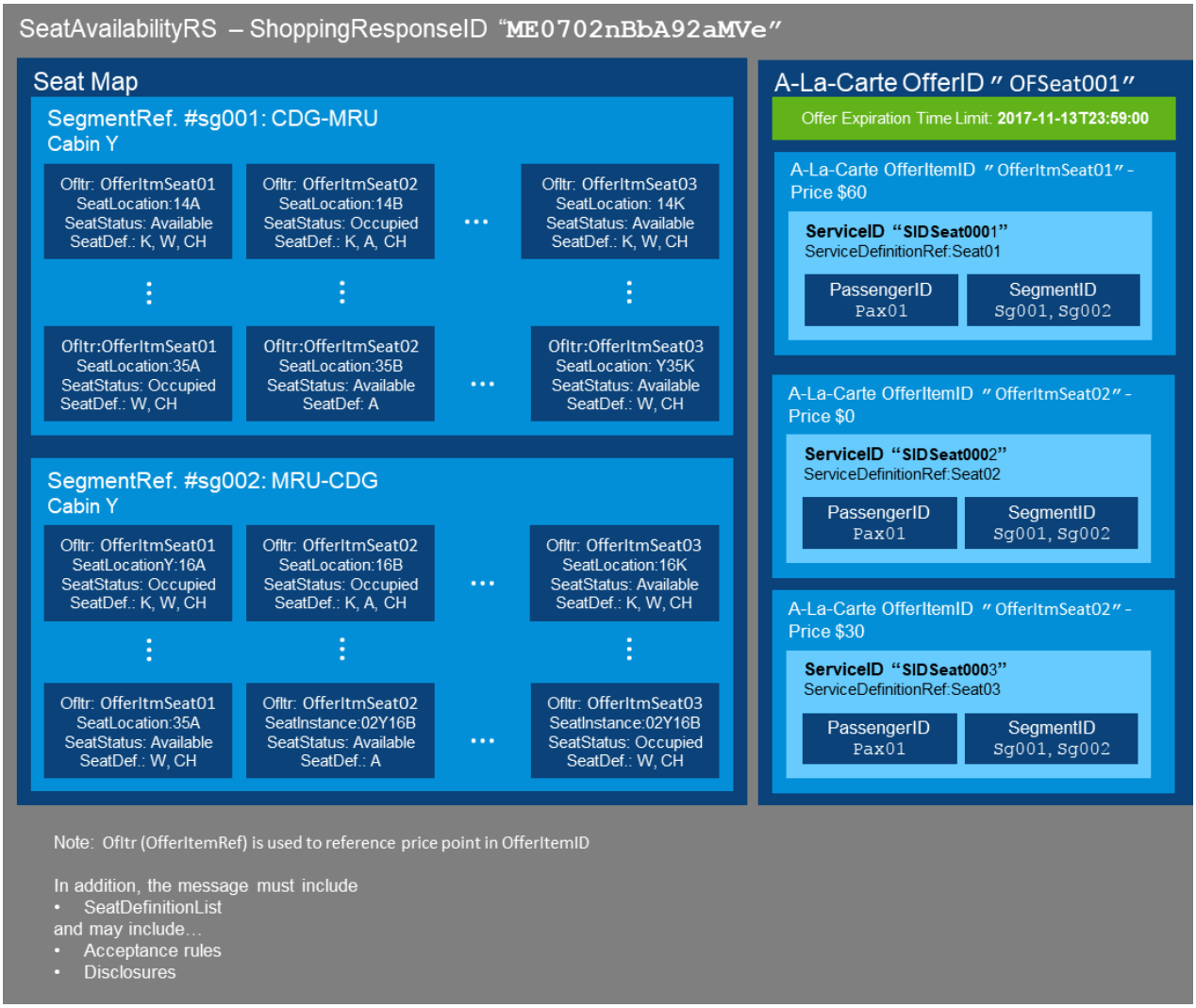
6. The Seller/Aggregator sends a SeatAvailabilityRQ request to get the available seats and their prices for each of the flights in the Offer that has been selected by the Customer in step 5.



7. The ORA queries its inventory to get available seats for each of the flights and queries its Offer Management System to get the associated prices.

Note - Seat availability and prices may or may not depend on passenger data (such as Frequent Flyer number) sent in input by the Seller/Aggregator.

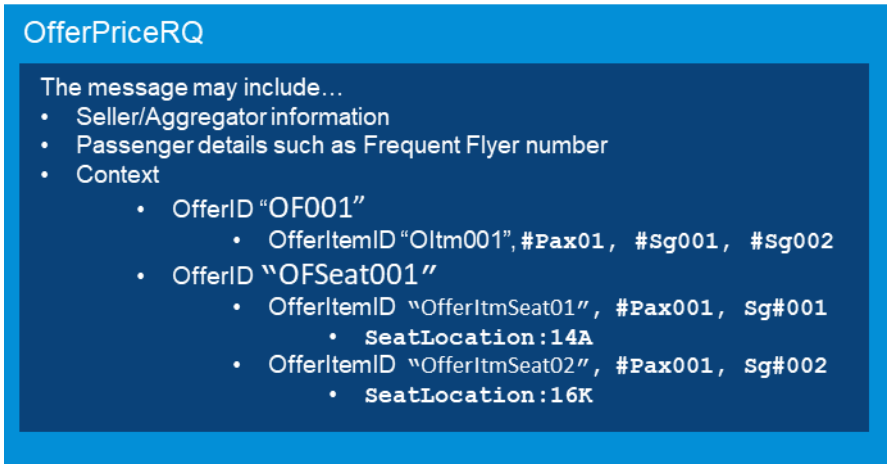
8. The ORA sends back a list of seats with associated characteristics, prices and availability to the Seller/Aggregator through a SeatAvailabilityRS message.



Note: it is recommended that both available and occupied seats are sent in response message so that Seller can render seatmap with the better accuracy.

9. The Seller renders the seat maps for each of the flights to the Customer.

10. The Customer selects one available seat for each flight and the Seller/Aggregator sends seat selection in OfferPriceRQ to get an Offer for both seats as well as previously selected Offer for the flight segments.



11. The ORA queries its Offer Management System and creates a new Offer for the selected seats, taking into account the Offer containing the flights as well as Customer information sent in input by the Seller/Aggregator.

12. The ORA returns the new Offer for the selected flights and seats to the Seller/Aggregator using OfferPriceRS message.

13. The Seller displays the Offer for the selected seats and flights to the Customer.

Post conditions

The Customer is in possession of a unified Offer for the flights and for the selected Seats.

3.2 Order Management - Booking

Note – In the "Order Management – Booking" and "Payment & Ticketing" sections, only a Seller and Airline are illustrated as being involved in transactions. However, message flow between them may continue to be facilitated by an Aggregator.

An Order is a uniquely identified record of the agreement of one party with another to receive products and services under specified terms and conditions.

Orders support the sale of a flexible range of Airline products and ancillary services.

An Order contains the services a passenger is entitled to, and that need to be delivered. The content of an Order includes Order Items (with a unique Airline-assigned Order Item ID), individually priced items within the Order, and made up of one or more Services.

It will also contain details of the Customer and/or Passengers.

NDC messages support non-homogenous Orders, where each passenger may hold a different set of Order Items. For example, this means that an Order may contain two Customers travelling to different places on different dates, but are purchased in the same Order.

3.2.1 Principles

The ORA is the owner and in full control of the Order. No changes may be made to any element of an Order without going through the ORA. This can also be referred to as a Master Order.

Note - An exception to this may occur in the event of an Involuntary Change by a POA.

An Airline, regardless of role, may choose to use the same ID for OfferID and its corresponding OrderID within its own Offer/Order Management system. This also applies to OfferItemIDs and its corresponding OrderItemIDs.

An Order Item is the lowest priced unit within the Order. The Order Item contains one or more Services for the purposes of future servicing actions on the Order, the entire Order Item must be re-shopped as a unit.

3.2.2 Key Features of Order Management

The key features of Order Management include the creation of Orders and their servicing. Starting at the point of acceptance of the Offer, the Order Management – Booking domain covers the following:

- Acceptance of an Offer for flights and/or ancillaries by the Seller.
- Creation of an Order by the Airline for the Offer Items requested.
- Retrieval of Orders (this may include retrieval of a list Orders meeting a range of search criteria).
- Retrieval of Order rules/conditions.
- Group Orders.
- Retrieval of transaction history of an Order.

The processes of Payment & Ticketing are covered in a dedicated Section #3.3.

An Offer Responsible Airline (ORA) may be in contact with other Airlines (Participating Offer Airlines, POAs) during the development of an Offer and if accepted its subsequent conversion into an Order, and this is covered in the Interline section.

The Order Management – Servicing domain (voluntary and involuntary, as well as interline servicing, are covered in section 3.5. This domain covers the following:

- Amendment of an Order for either voluntary (following a request from a Seller) or involuntary changes.
- Cancellation of an Order.
- Unsolicited notification to the Seller of Order changes, such as notifications of schedule changes.

3.2.3 Processes - Booking - Order creation

- Order creation begins when the Seller selects one or more Offer Items. The Airline constructs the Order within its own Order Management system ensuring that all the items requested are available and reserved for the Customer. This will be done in such a way as to facilitate subsequent delivery.
- Payment information may be sent at the time of Order creation or at a later stage. The processing of this information by the ORA is discussed in the Payment & Ticketing Section #3.3.

3.2.4 The relationship between NDC Offers and Orders

An Offer is accepted by selecting Offer Items which are subsequently converted in to Order Items at Order creation time.

The Order Items must maintain a one-to-one relationship with the Offer Items, and keep the same status (i.e. mandatory/optional) onwards into servicing. Consequently, Order Items will share the same content in terms of Services as the corresponding Offer Item.

3.2.5 NDC Order Management Messages - Booking

OrderCreateRQ/OrderViewRS

OrderCreate is an outbound message from Seller/Aggregator to Airline (and ORA to POA if applicable) that contains the details of a selected Offer and is used to request the creation of an Order by the ORA (or POA). Within OrderCreate, full passenger information will be sent. Payment information may or may not be included within the request from Seller/Aggregator to ORA.

OrderView returns up to date contents of an Order such as pricing information, conditions, time limits, Order status and passenger information. When payment has been processed at the time of Order Creation it also includes the status of this and, where they have already been issued, at least accountable document references (and further accountable document data if required).

OrderRetrieveRQ/OrderViewRS

The OrderRetrieve transaction retrieves a specified Order that matches one or more search criteria.

- Search criteria may include any supported Order Reference information, which may be the Order ID, a PNR reference, a ticket or coupon/document number, or other Airline supported Order reference and a Passenger Surname and Given Name.

Note - if the Order retrieval request is initiated from the party that originally requested the Order creation, then an Order ID may be sufficient along with the identity of the requesting party. If a Third party requests the retrieval of the same Order, it is up to the three parties to define what validation is required, and ultimately it is up to the Airline to accept or reject the request, taking into account local laws and regulations.

- The Seller may additionally specify filters to constrain the response information sets, including: Trip itinerary, Flight segment, Passenger, Payment and accountable document information. If no filters are specified, all Order information is returned.
- If a matching Order is found, the OrderView response will contain all Order information or filtered information (if filters were requested in the Order retrieval request.)
- If no matching Order is located, the OrderView response will include processing condition information and no Order information.

OrderHistoryRQ/RS

The OrderHistory transaction set requests the transaction history and audit trail for a specified Order.

OrderListRQ/RS

The OrderList transaction set retrieves a list of Orders that match one or more search criteria.

OrderRulesRQ/RS

The OrderRules transaction set requests the rules, change and penalty fees applicable to a specified Order.

3.2.6 Use Cases

Principal Actors

The principal actors in each use case are:

- Customer *(please refer to Section #3.1.4 for a definition)*
- Seller/Aggregator
- Offer Responsible Airline (ORA)

Common Preconditions & Assumptions

The following preconditions/assumptions are common to each use case:

- The ORA, the Seller/Aggregator, and other parties subject to the data exchange will have valid applicable agreements in place between them.

- All parties have taken steps to ensure that they are compliant with any applicable competition law provisions and regulation, data privacy, confidentiality and protection regulations and any other laws and regulations they may be subject to.
- Seller and Aggregator credentials will be authenticated by the ORA.
- The term “Seller/Aggregator” is used in each use case and is not differentiated. This is because the ORA will receive messages either directly from the Seller, or via an Aggregator. The Seller will have initiated the request and as the Aggregator does not directly impact the content of the messages transferred, so it should not make a difference to each use case whether the ORA receives the message from a Seller directly, or via an Aggregator.

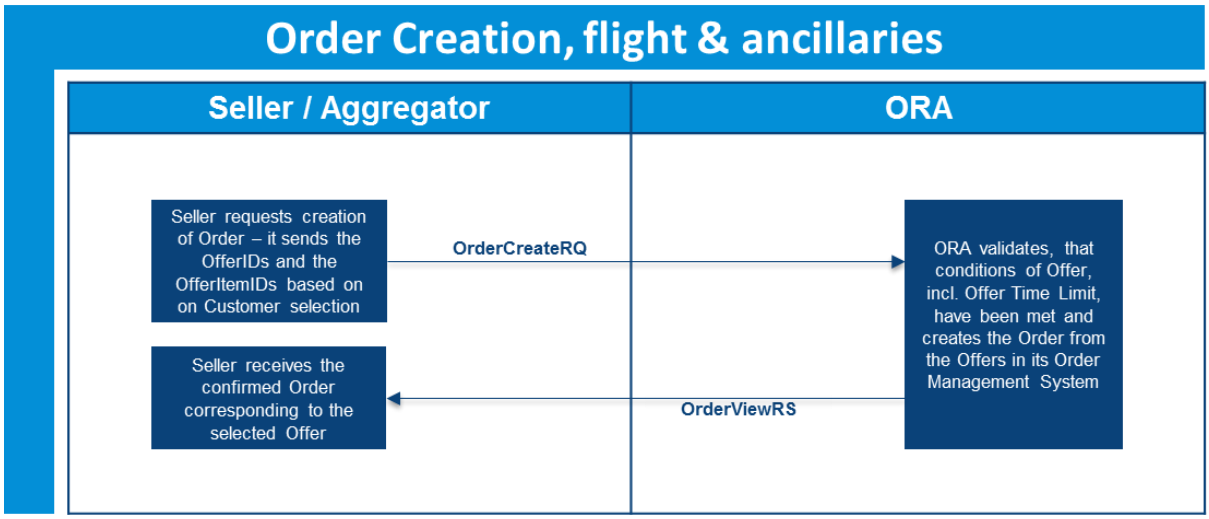
3.2.6.1 Use Case 5 – Basic Order Creation – flights plus ancillaries

Description

This Use Case illustrates the process of a Seller selecting Offers and requesting the creation of Offers, which include flights & ancillary services.

Preconditions/Assumptions

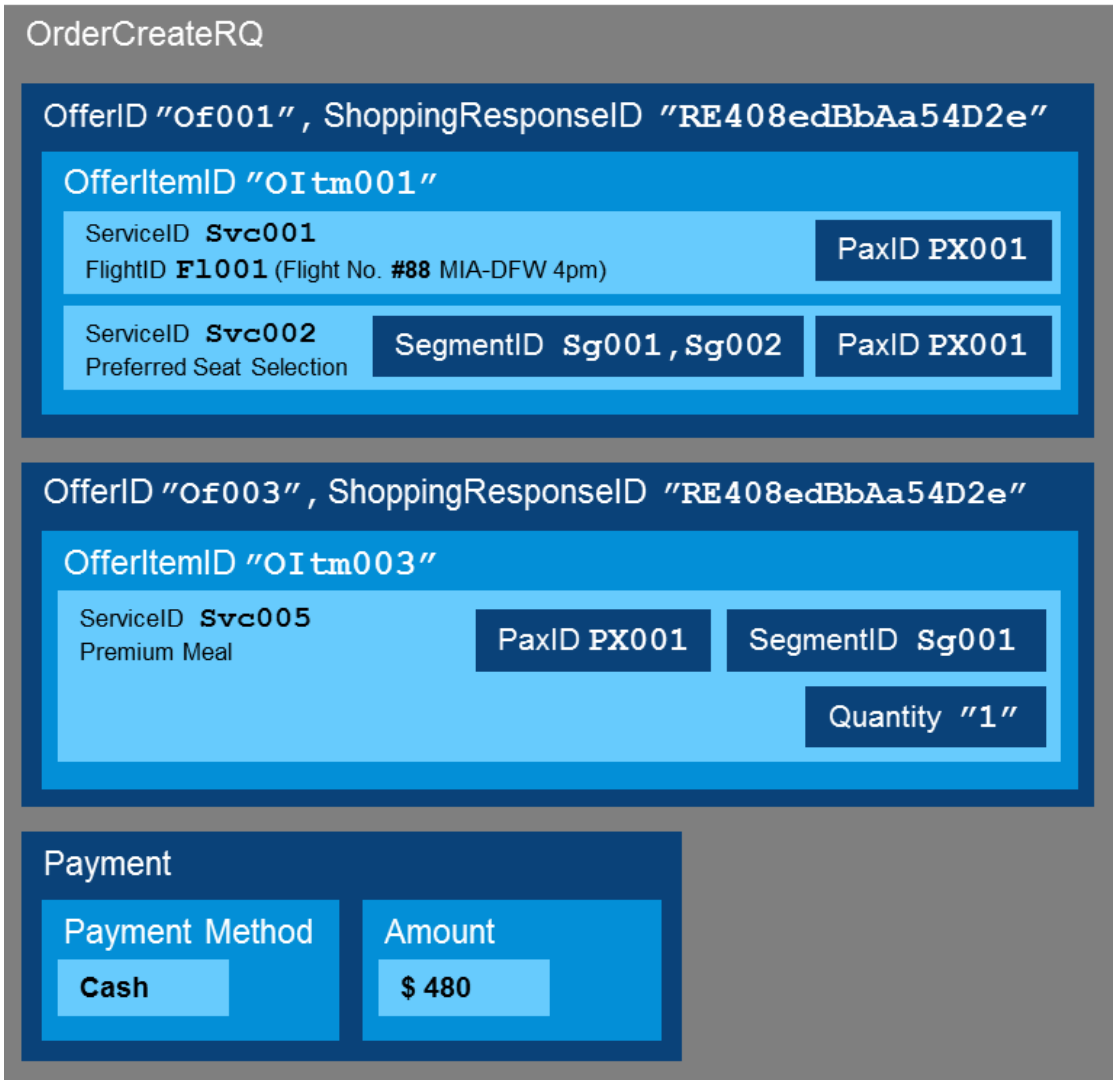
- The ORA previously provided the Seller/Aggregator with Offers. The Seller/Aggregator presented them to the Customer who then chose their preferred Offers/OfferItems.



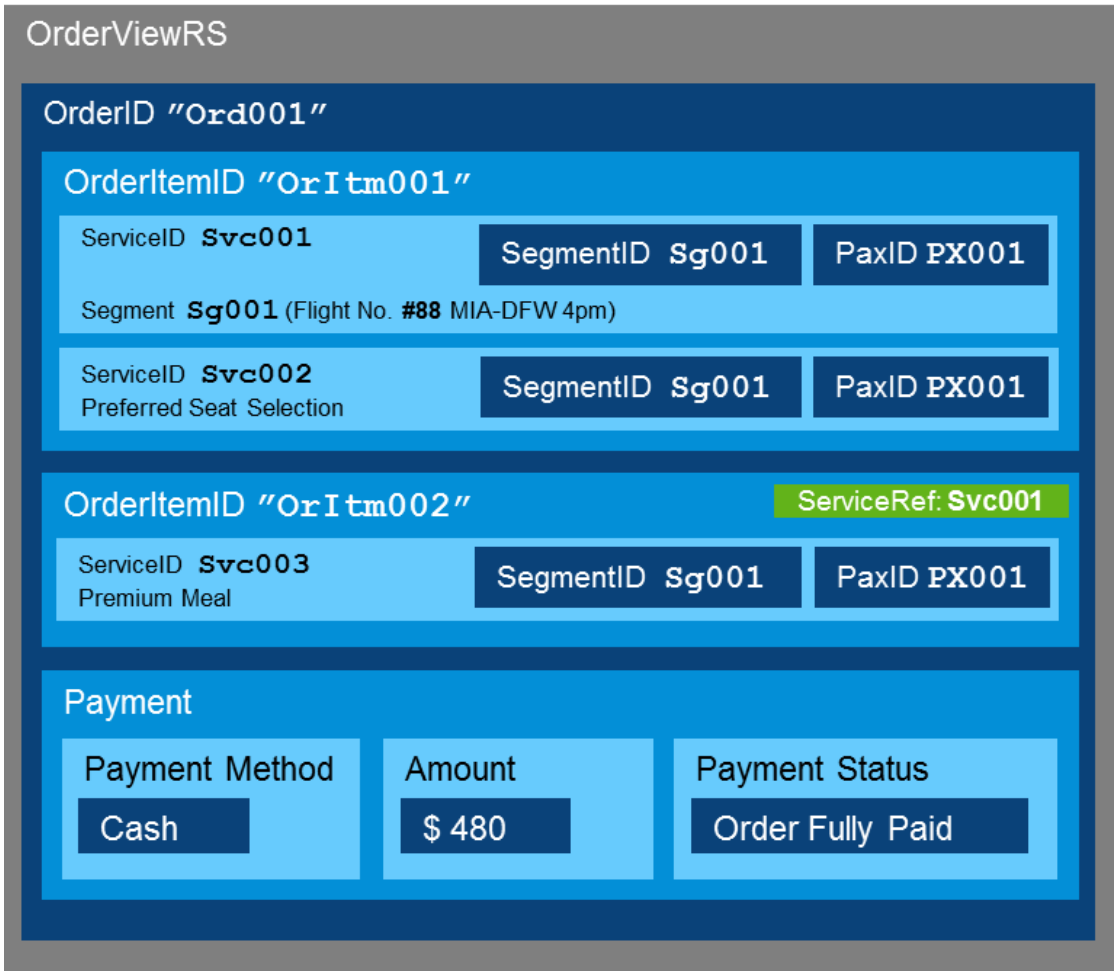
Steps to follow in the process

1. Based on the Customer’s selection, the Seller/Aggregator requests the creation of an Order by sending an OrderCreateRQ to the ORA containing the OfferID

and the OfferItemIDs of the selected Offers. The OrderCreateRQ message does not repeat any of the information from the originating Offers/OfferItems, but functions by referencing them by their respective IDs. Additional information that needs to be included is Passenger details (unless handling a Group booking).



2. The ORA creates the Order, creates Order Items corresponding to the selected Offer Items, and applies a unique OrderID to the Order. Each selected OfferItem becomes an OrderItem in the Order. However, the Services are broken down to a more granular level, i.e. one service per passenger per segment. The ancillary service “Svc003” should reference the flight service “Svc001”, as it is dependent on the consumption of Svc001 – this facilitates any servicing that may later take place and links the meal to the flight (e.g. if the flight is cancelled, the meal should consequently get cancelled in a “cascading” effect).



3. The ORA sends an OrderViewRS to the Seller/Aggregator containing the details of the confirmed Order.

Post Conditions

The Customer is in possession of a confirmed Order. Payment has not been made yet nor accountable documents issued.

3.2.6.2 Use Case 6 – Creating an Order from two Offers

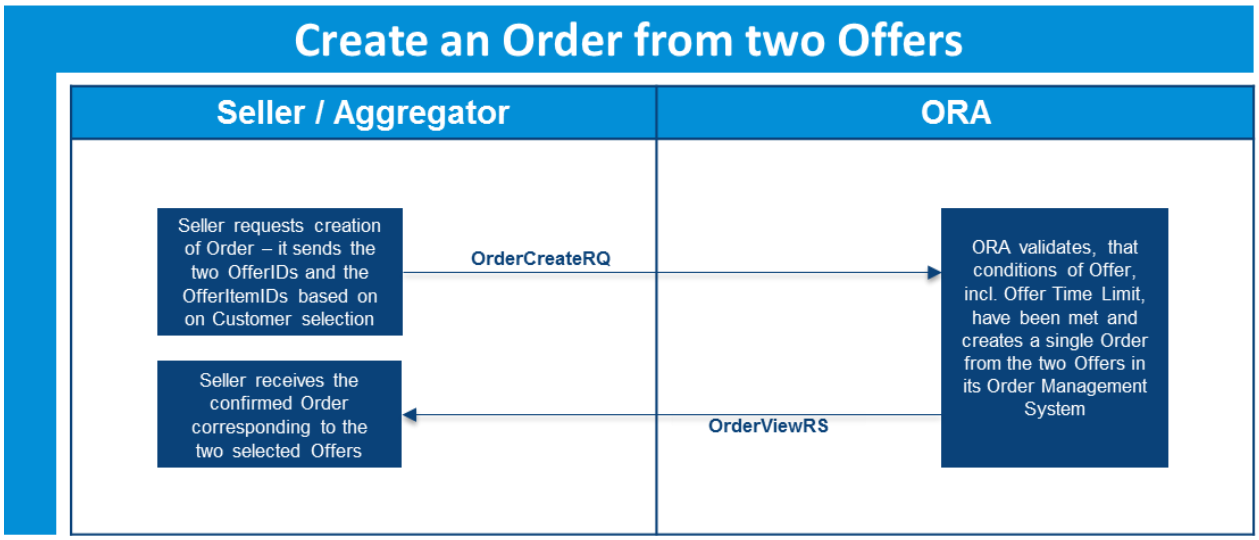
Description

This Use Case illustrates the process of creating a single Order from two separate Offers.

The first Offer is for flights only, and the second for additional ancillary items that were shopped after the first Offer for flights was selected (but before an Order for these flights was created). This Use Case can be applied in most scenarios where more than one Offer (for flights or ancillaries or both) is selected by the Customer, resulting in the ORA creating a single Order.

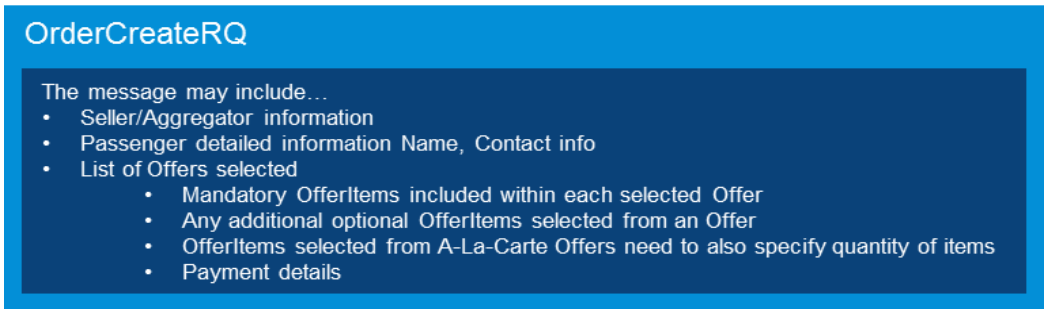
Preconditions/Assumptions

- The ORA previously provided the Seller/Aggregator with Offers. The Seller/Aggregator submitted them to the Customer who chose two Offers and create their OfferItems matching his expectations.
- The Offers were created by the same ORA.



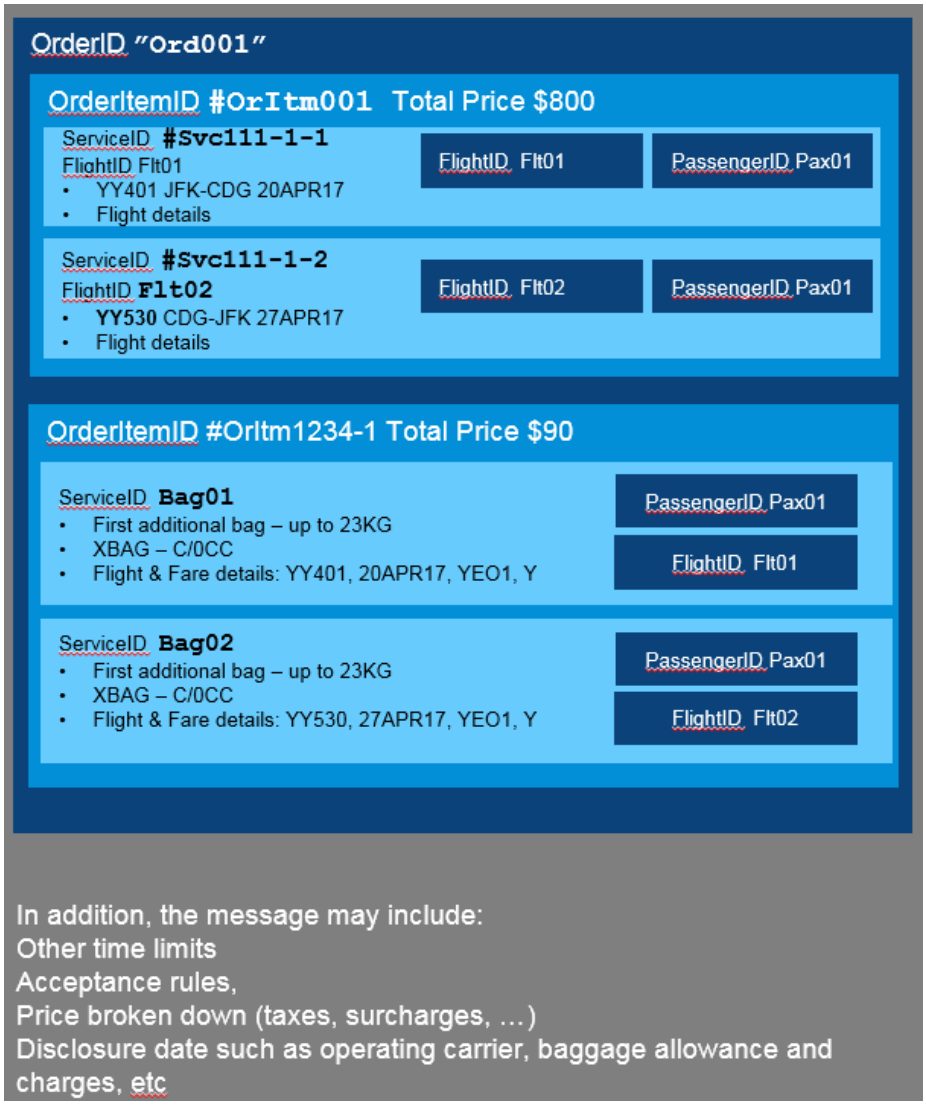
Steps to follow in the process

1. Based on the Customer's selection, the Seller/Aggregator requests the creation of an Order by sending an OrderCreateRQ to the ORA containing the OfferID and the OfferItemIDs of the selected Offers. These OfferIDs were received in a previous AirShoppingRS (for the flights) and a OfferPriceRS (for the ancillary items).



2. The ORA creates the Order, creates Order Items corresponding to the selected Offer Items, and applies a unique OrderID.

3. The ORA sends an OrderViewRS to the Seller/Aggregator containing the details of the confirmed Order.



Post Conditions

The Customer is in possession of a single confirmed Order following their selection of two separate Offers. Payment has not been made nor accountable documents issued.

3.3 Payment & Ticketing

When using NDC, the ORA is responsible for authorizing payment and subsequently issuing accountable documents. This section focuses on those two functions, gives a high level overview of principles and processes, and a description of the messages available. More details will be provided in the Implementation Guide v4.

Note - The ORA's responsibility continues into managing modifications to accountable documents when an Order has been serviced – including any additional collection or residual value/refund processing.

Note - Where reference is made in this section to "industry settlement providers" (and similar), the example used for illustrative purposes is IATA's BSP, however NDC does not prevent implementers from using other local agency settlement providers (e.g. ARC/TCH). Implementers should contact representatives of their chosen providers for information on how NDC transactions are supported by these providers.

3.3.1 Payment

This section does not mention specifics relating to the authorization of payments as this is an internal consideration of the party performing the transaction.

A Seller may transmit payment data to the ORA at the time that it requests Order creation, or it can do so after the Order has been created (if supported by the conditions of the ORA's Offer) in a separate message. This principle also applies during Order servicing, the Seller can transmit payment information to the ORA at the time the change is requested, or it can do so subsequently, if supported by the conditions of the ORA's new Offer.

It is up to the ORA to decide which payment methods it accepts, and whilst the ORA may accept various forms of payment, those accepted may differ per channel and per market, or by other constraints as decided by the ORA. This may form part of the commercial agreement between ORA and Seller, which is out of scope of the NDC Standard.

When the payment details are received from the Seller, the ORA validates the payment method used and performs necessary authorization. The details may be encrypted payment card data, or details relating to a payment from a Seller using an industry settlement plan (e.g. IATA's BSP). Such settlement plan transactions may rely on specific authentication data transmitted in the message (e.g. if using IATA's Secure Token Service, covered in more detail in section 4.1.2.5).

During the life of the Offer/Order, the ORA will validate that the Payment Time Limit is adhered to. If the payment time limit has been exceeded, it is up to the ORA whether to reject or accept the payment. As a result of exceeding the time limit, the ORA may choose to take action, such as releasing any held inventory.

Note - The above also applies to the Deposit Time Limit.

PCI DSS Compliance

PCI DSS stands for “Payment Card Industry Data Security Standard”. This is not part of the NDC standard. It is a standard commonly used by actors involved in handling payment information to ensure the security of data being transmitted.

Parties transmitting payment card data shall be responsible for PCI DSS compliance. It is not in the scope of this document to suggest any particular PCI compliance strategy, methodology or tools, and it is assumed that any party will establish its own compliance strategy as appropriate.

3.3.2 Ticketing

General Principles

As introduced in section 2.4.5, the ORA is responsible for the issuance of accountable documents, and it is the ORA that makes decision as to which documents to issue against a particular NDC Order. This statement applies to the type of document(s) issued (e.g. ET, EMD-A, EMD-S), and to the number of documents issued against a given Order.

Note - This section of the guide has been written under the assumption that an ORA is issuing accountable documents in compliance with IATA Resolutions, although many of the key principles and processes described will apply to other documents an ORA may choose to issue.

Where an ORA is issuing electronic tickets and EMDs it will be bound by existing resolutions, and these documents will be issued on the Airline’s own stock.

Note - For electronic tickets these are primarily Resolutions 722, 722f, 722g, 722h and for EMDs these are primarily 725a, 725f, 725g and 725h.

As it is responsible for issuance, the ORA should manage the relationships between document(s)/coupon(s) and individual Order Items/Services within an Order, storing details of these relationships internally, perhaps in its Order Management System (OMS) and/or its Revenue Accounting System.

In the case of standard issuance, it is a fundamental assumption that a separate coupon will be issued for any Service that can be separately consumed. This would include Services that are to be consumed at different times (e.g. different flights), and also Services that may be consumed at the same time as a related flight (e.g. a premium seat), or separately (e.g. a lounge access).

In servicing scenarios, any changes to an Order must occur before an ORA modifies any accountable document(s), and afterwards it will remain at the ORA's discretion as to which documents to issue against the modified Order.

The Changing Role of the Accountable Document under NDC

At time of issuance or modification under existing processes, a broad range of data is transmitted between parties in ticketing messages. This creates a record which contains sufficient information for all users to determine at face value the parties to the transaction, the passenger's entitlement for services, and how the total price was constructed.

This information is usually sufficient to allow all parties within the distribution lifecycle to perform functions such as:

- Inform of baggage allowance and charges
- Validate rules, conditions, penalties etc.
- sales accounting and audit
- agency settlement
- operational delivery
- revenue recognition
- proration
- interline billing and settlement.

In NDC, Airlines create Offers which may no longer be limited to include products and services sourced from filed content. They may also choose to dynamically price these Offers. The price the Customer pays may no longer rely on fare construction based on filed fares, identifiable using fare basis codes. This applies to ancillaries as it does to flights.

These Offers, and subsequent Orders, are to be stored internally in an Airline's Offer/Order Management System, and the information stored about them will include but is not limited to the price, rules, conditions, any penalties, other inclusions, and legal notices.

If a request is received by an Airline for Customers to make changes to these Orders, the Airline will refer to their Order Management System, rather than the ticket, to assess whether or not the requested change is permissible.

The expectation is that any data that is not sourced from filed content is stored in the Airline's Order Management System, which is in contrast to the existing

distribution model the ticket would make reference to this filed content. The OMS can be queried as needed when it comes to a request for a change to an Order, as well as for audit requirements. For this reason the Order must make reference to any documents issued against it.

Note - the documents do not have to make reference to the Order. If a document number is used as a criteria by which to query an Order Management System, this will always point to one Order. A single Order can point to one or more documents, but a single document will only ever point to a single Order.

Whilst some of the information found on a document today is now moved to the OMS, this does not completely remove the need for a ticket or other documents, and the following functions may continue to require the use of documents as they exist today:

- passenger handling (e.g. check-in, disruption management)
- tracking service consumption
- revenue recognition
- interline billing
- interline settlement

For this reason, many document-centric processes will not have to change to support NDC driven documents.

Note - Further information on the impact of NDC on interline billing and settlement, including the proposal of and calculation of settlement values, is covered briefly in the interline section of the guide, section 3.7, and will be covered in more detail in future versions of the guide.

3.3.4 Payment & Ticketing Messages

AirDocIssueRQ/OrderViewRS

AirDocIssueRQ is used to convey payment information between Seller/Aggregator and ORA related to specified Order Item(s) in advance of accountable document issuance. Once the information has been received and payment has been authorized, the ORA will issue the relevant accountable documents in compliance with applicable resolutions. For every Service in the specified Order Items, there will be an association with one of the issued accountable documents.

The use of AirDocIssueRQ is not limited to transmitting payment information once an Order has been created, but it can also be used within a servicing flow.

OrderViewRS is the response to AirDocIssueRQ and is used to convey details of the issued accountable documents in addition to full details of the Order. For more

information about the OrderViewRS message, please refer to the Order Management Messages Section #3.2.5.

AirDocDisplayRQ/RS

The **AirDocDisplayRQ** transaction set requests an Airline to return document details. If the details provided are not sufficient to uniquely identify a single document, a list of documents meeting the specified criteria may be returned in the response. If the details provided do not match those of any accountable document (that the sender is authorized to receive) the response will indicate no matching document was found.

The data returned as part of an **AirDocDisplayRS** may include document and coupon numbers, the final paid amount (which may come with a breakdown of taxes fees and charges), the issuing Airline etc.

AirDocHistoryRQ/RS

The **AirDocHistory** transaction set allows to request an Airline to return the history of accountable documents related to a specific Order.

CustomerInputRQ/RS

The **CustomerInput** transaction set supports other NDC transactions by providing discrete-but related-functional capabilities for 3D Secure Payment Authentication. Supported functionality includes: PIN Phrasing Scheme Membership, Traveler authentication, 3-D Secure Payment Protocol.

3.3.5 Use Cases – Payment & Ticketing

Principal Actors

The principal actors in each use case are:

- Customer *(please refer to section 3.1.4 for a definition)*
- Seller/Aggregator
- Offer Responsible Airline (ORA)

Common Preconditions & Assumptions

The following preconditions/assumptions are common to each use case:

- The ORA, the Seller/Aggregator, and other parties subject to the data exchange will have valid applicable agreements in place between them.

- All parties have taken steps to ensure that they are compliant with any applicable competition law provisions and regulation, data privacy, confidentiality and protection regulations and any other laws and regulations they may be subject to.
- Seller and Aggregator credentials will be authenticated by the ORA.
- The term “Seller/Aggregator” is used in each use case and is not differentiated. This is because the ORA will receive messages either directly from the Seller, or via an Aggregator. The Seller will have initiated the request and as the Aggregator does not directly impact the content of the messages transferred, so it should not make a difference to each use case whether the ORA receives the message from a Seller directly, or via an Aggregator.

3.3.5.1 Use Case 7 – Payment & Ticketing using a PCI DSS provider

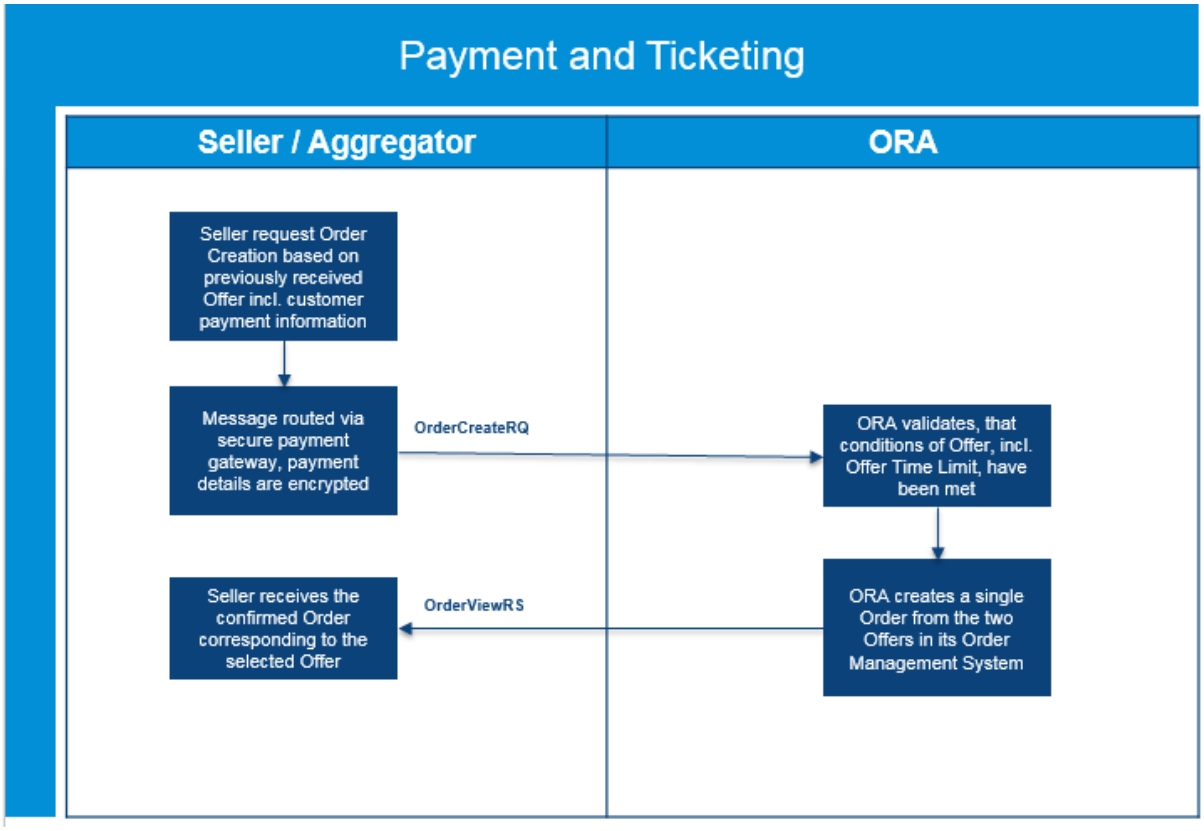
Description

A Customer wants to travel from Buenos Aires to Santiago with a direct flight the following week. He receives an Offer from a Seller that suits him. This Offer requires immediate payment.

This Use Case describes the process of creating an Order and paying for it at the time of creation (commonly known as “instant purchase”). The actors involved follow PCI DSS compliant procedures. Once the Order has been created and payment has been successfully authorized, the ORA issues accountable documents.

Preconditions/Assumptions

- The Seller has already displayed the ORA’s Offer(s) to the Customer.
- The payment time limit was specified as zero by the ORA within its Offers to the Customer.
- The Customer chooses to pay with a single credit card as the form of payment.
- The ORA issues accountable documents on its own stock.
- The Seller/Aggregator is PCI DSS Compliant and uses a secure payment gateway to encrypt the Customer payment data.
- The ORA is not PCI DSS Compliant, but has implemented a PCI DSS Compliant service with a third party to process encrypted payment card data.



Steps to follow in the process

1. The Customer selects one of the ORA's Offers and to meet the Payment Time Limit of zero must pay instantly.
2. The Customer enters the payment card details on the data collection page of the Seller along with other required information such as passenger details and contact information.
3. The Seller/Aggregator sends an OrderCreateRQ to the ORA with the Customer's payment information and other data.
4. The message with payment card details is routed via the Seller's PCI DSS compliant service and the details replaced by encrypted payment card information.
5. The ORA receives the encrypted payment card information along with the other details provided in the OrderCreateRQ and validates that the Offer and Payment Time Limits have not been exceeded.
6. The ORA begins to create the Order (whether or not inventory is temporarily held prior to payment authorization is a decision of the ORA).
7. The ORA decrypts the card information and uses it to authorize the payment through its acquiring bank.
8. Upon receiving authorization, the ORA updates the Order and issues accountable documents.

9. The ORA sends OrderViewRS to Seller/Aggregator with the confirmed Order, confirmation of payment authorization and accountable document number(s).
10. The Seller/Aggregator provides a confirmation and receipt to the passenger for the Order.

Post Conditions

- Payment has been authorized by the issuer.
- The Customer is in possession of a confirmed Order for travel.
- The Customer is in possession of a receipt for payment.
- Accountable documents have been issued for travel.

3.3.5.2 Use Case 8 – Payment & Ticketing with Payment Time Limit applied

Description

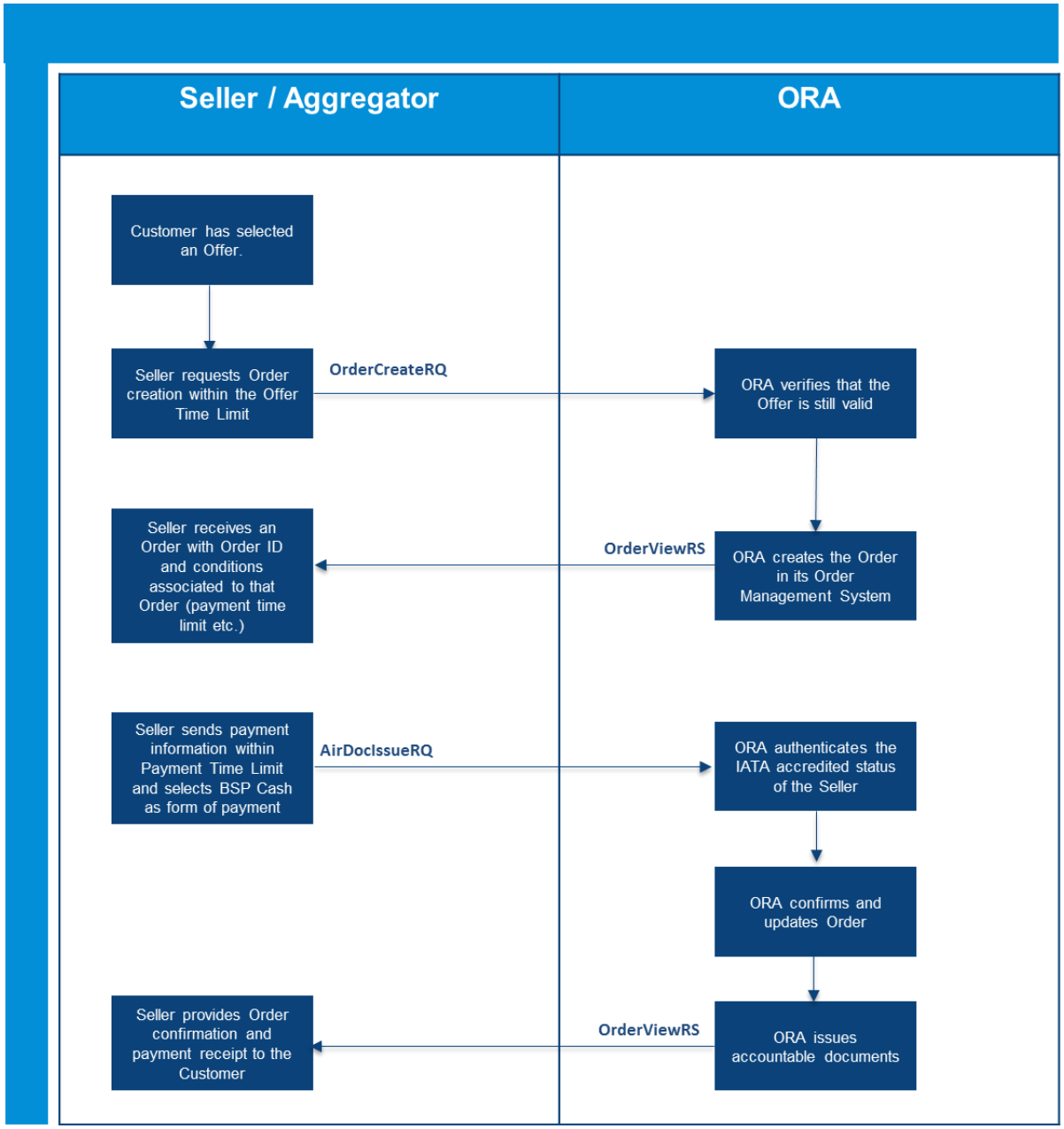
A Customer wants to travel from Seattle to LA with a direct flight. He receives an Offer from a Seller that suits him.

This Use Case describes the process of a Seller requesting the creation of an Order without payment details, subsequently sending payment details to the ORA, and the ORA authorizing the payment, issuing documents, and confirming everything to the Seller.

Once the Order has been created and payment has been successfully authorized, the ORA issues accountable documents.

Preconditions/Assumptions

- The Seller has already displayed the ORA's Offer(s) to the Customer.
- The ORA has set a payment time limit within its Offer(s) to the Customer.
- The Customer chooses to pay by cash to the Seller.
- The ORA issues accountable documents on its own stock.
- The ORA authenticates identity of the Seller.
- Seller is an IATA accredited agent, active in IATA's BSP for the relevant market.



Steps to follow in the process

1. The Customer selects one of the ORA's Offers.
2. The Seller/Aggregator sends an OrderCreateRQ to the ORA within the Offer Time Limit with required information such as passenger details and contact information but without any payment data.
3. The ORA creates the Order but no accountable document is issued.
4. The ORA sends to the Seller/Aggregator an OrderViewRS with an OrderID and conditions associated to that Order. A Payment Time Limit is returned as part of the response.
5. The Customer pays by cash directly to the Seller.

6. The Seller/Aggregator sends an AirDocIssueRQ to the ORA within the payment time limit with payment information, including an indication that the form of payment is BSP cash.
7. The ORA validates that the payment method is acceptable for that Seller.
8. The ORA successfully validates BSP accreditation status of the Seller.
9. The ORA confirms it has sufficient information to issue accountable documents.
10. The ORA issues accountable documents and updates the Order.
11. The ORA sends OrderViewRS to Seller/Aggregator with the confirmed Order, confirmation of payment authorization and accountable document number(s) and data.
12. The Seller/Aggregator provides a confirmation and receipt to the passenger for the Order.

Post Conditions

- Payment will be settled by IATA's BSP.
- The Customer is in possession of a confirmed Order and accountable documents have been issued by the ORA.
- The Customer is in possession of a receipt for payment.

3.4 End to end NDC use case – Initial Shopping, Order Creation, Payment and Issuance

Description

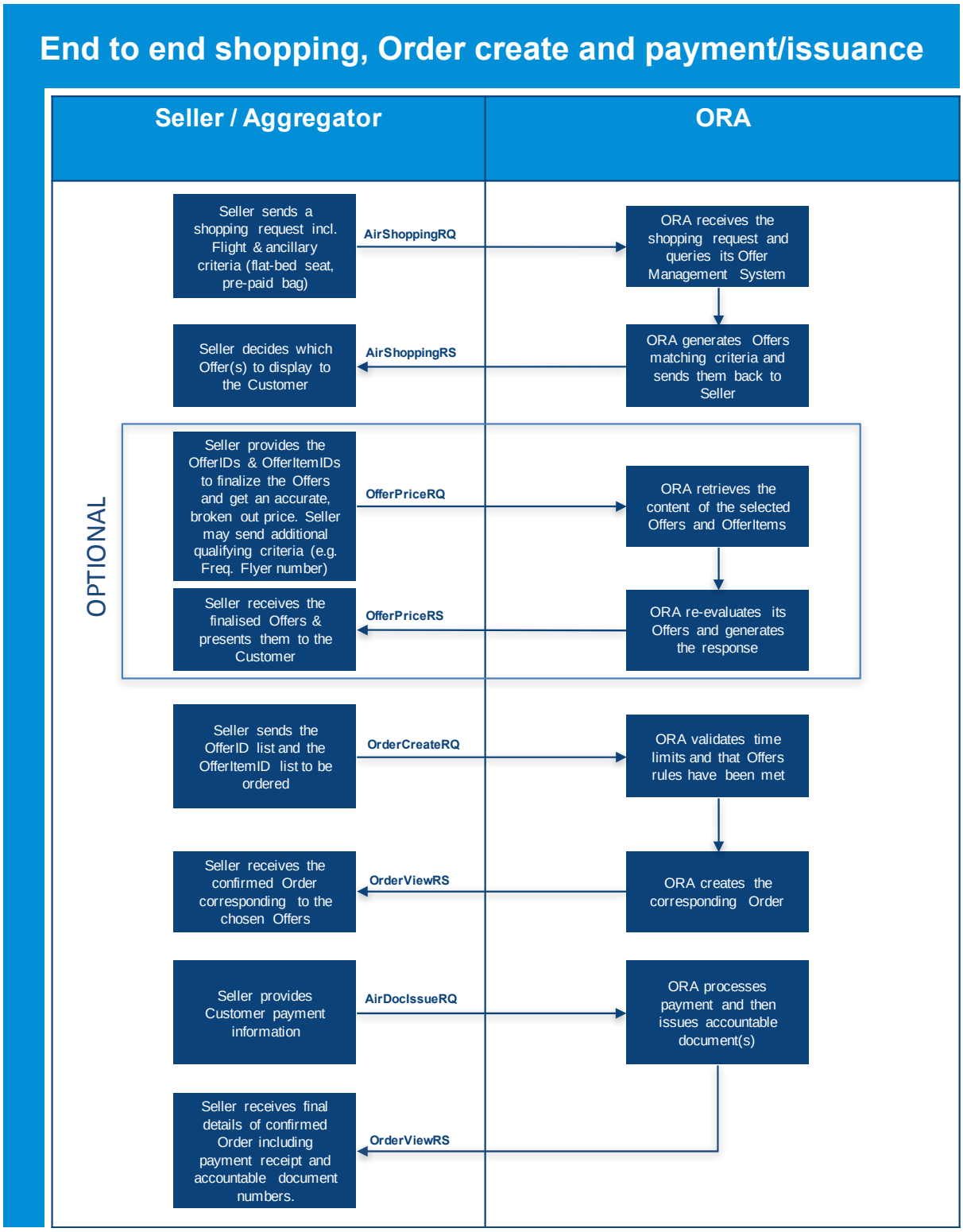
One traveler based in New York would like to buy a round-trip to Paris. He would like to get a flat-bed seat to be able to sleep, and he would also like to get a bag.

This use case describes the process of shopping for flights and ancillaries, followed by the creation of an Order against one or more returned Offers. Payment and the issuance of accountable documents is also described. This shows a possible full NDC transaction lifecycle from initial shopping through to the Customer having a confirmed, paid for Order with accountable documents issued.

Preconditions/Assumptions

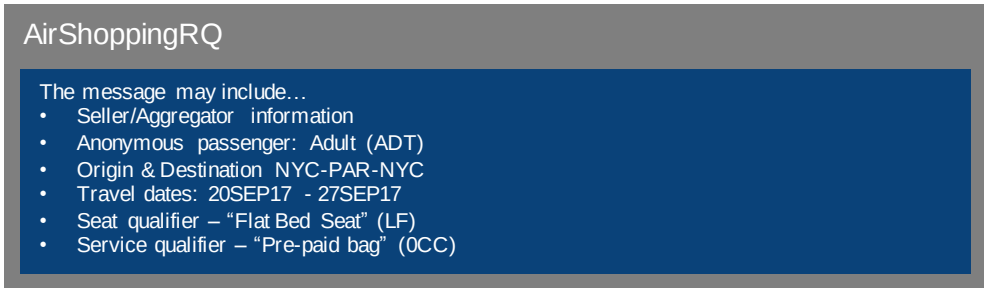
- The Customer has not communicated personal details to the Seller/Aggregator, but it should be noted that personal information could have been transmitted to the ORA.

- The Customer communicates to the Seller /Aggregator their intended travel plan and preferences.
- This illustration focuses on the flow to one particular ORA, but the Seller may have contacted multiple ORAs simultaneously.



Steps to follow in the process

1. The Seller/Aggregator sends an AirShoppingRQ request to the ORA providing Origin & Destination, dates information and qualifiers related to requested ancillary items.



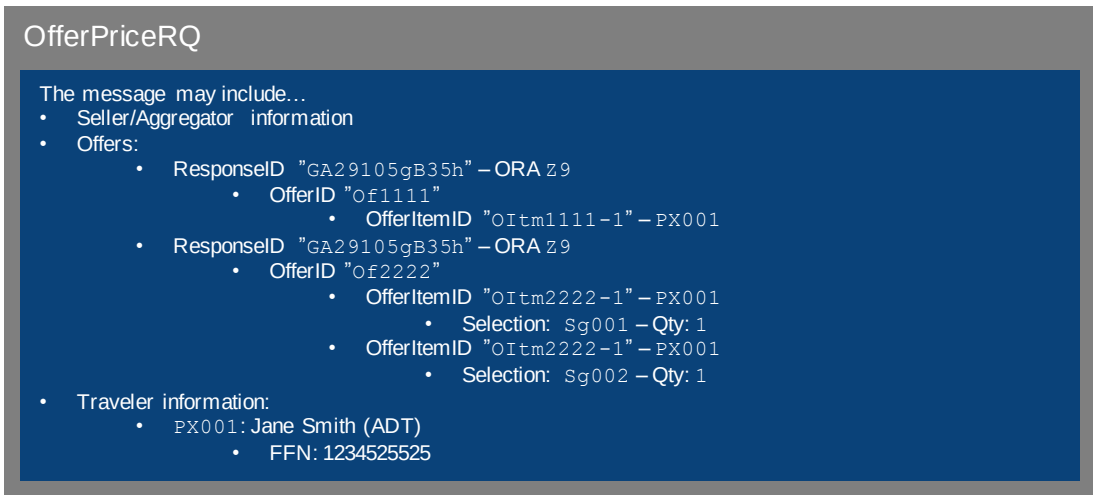
2. The ORA receives the shopping request and builds Offers that match as many criteria as possible.

3. The ORA returns the Offers to the Seller in an AirShoppingRS message.

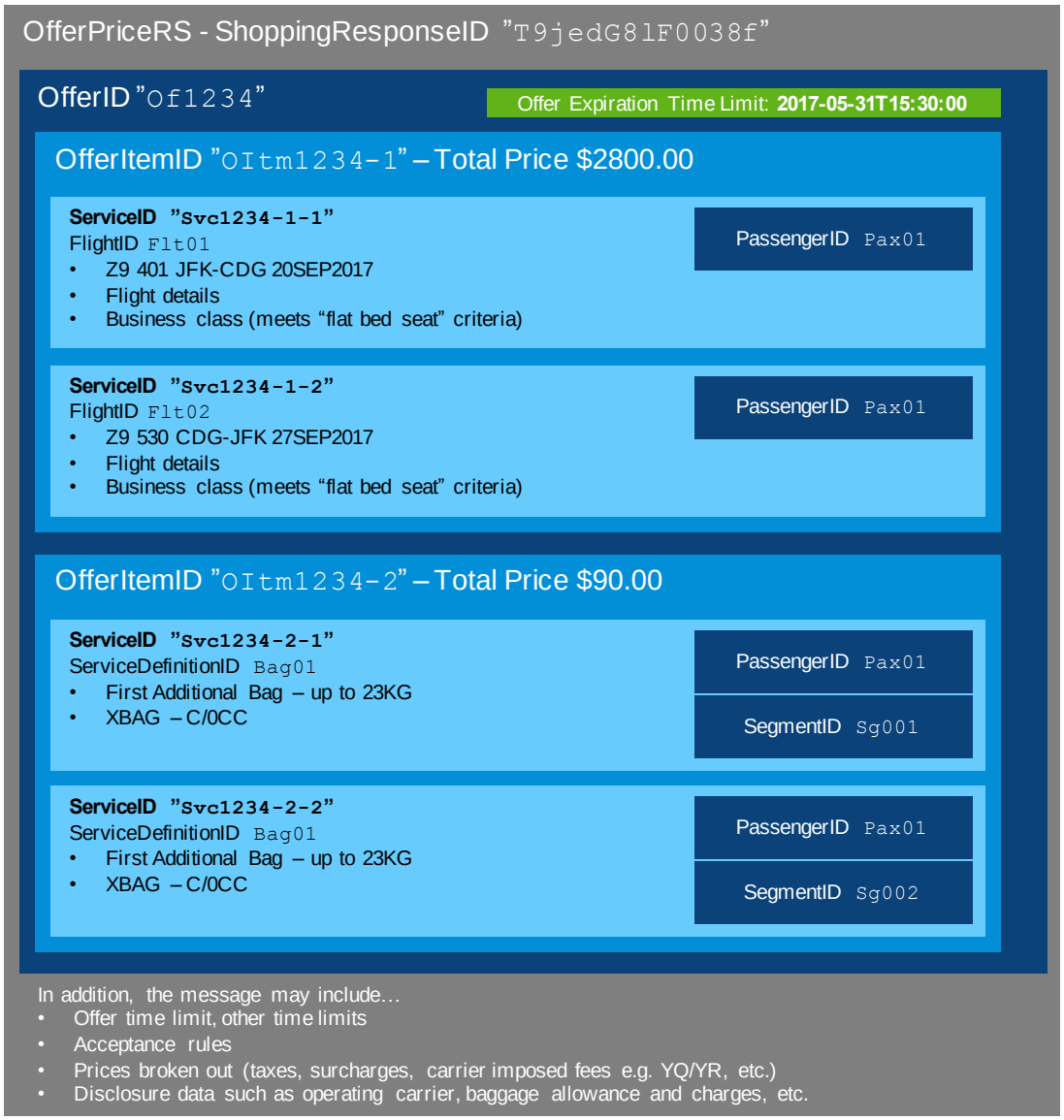
4. The Seller/Aggregator decides which Offer(s) to present to the Customer.

5. The Customer selects the Offer(s) they wish to purchase.

6. [Optional] The Seller/Aggregator provides to the ORA the Offers and the selected OfferItems the Customer has chosen, via OfferPriceRQ, so that the ORA can confirm the price of the selected items, possibly giving additional qualifying criteria, and with the expectation of a full breakdown of any taxes and charges.

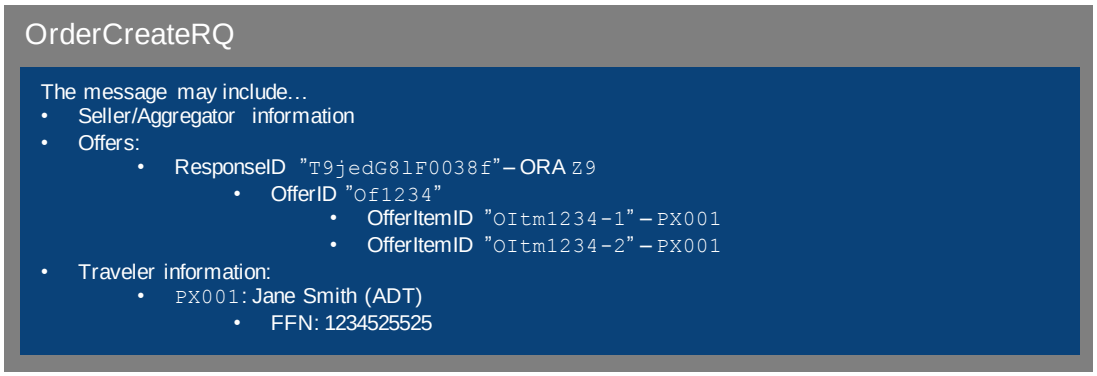


7. [Optional] The ORA will return the final Offer and its OfferItems via OfferPriceRS to the Seller/Aggregator.



8. The Customer wishes to proceed with purchasing the Offer.

9. The Seller/Aggregator sends an OrderCreateRQ to the ORA containing the OfferID and the OfferItemIDs.



10. The ORA creates the Order, creating OrderItems corresponding to the OfferItems and assigning a unique OrderID.

11. The ORA sends an OrderViewRS to the Seller/Aggregator containing the full details of the Order.

OrderViewRS

OrderID "YK225FA199"

Payment Time Limit: **2017-06-01T23:59:59**

OrderItemID "YK225FA199-1" – Total Price $2800.00

ServiceID "YK225FA199-1-1"
SegmentID Sg001
- Z9 401 JFK-CDG 20SEP2017
- Flight details
- Business class (meets "flat bed seat" criteria)

PassengerID Pax01

ServiceID "YK225FA199-1-2"
SegmentID Sg002
- Z9 530 CDG-JFK 27SEP2017
- Flight details
- Business class (meets "flat bed seat" criteria)

PassengerID Pax01

OrderItemID "YK225FA199-2" – Total Price $90.00

ServiceID "YK225FA199-2-1"
ServiceDefinitionID Bag01
- First Additional Bag – up to 23KG
- XBAG – C/0CC

PassengerID Pax01

SegmentID Sg001

ServiceID "YK225FA199-2-2"
ServiceDefinitionID Bag01
- First Additional Bag – up to 23KG
- XBAG – C/0CC

PassengerID Pax01

SegmentID Sg002

In addition, the message may include…
- Traveler information:
  - Pax01: Jane Smith (ADT)
    - FFN: 1234525525
- Other time limits
- Order rules
- Prices broken out (taxes, surcharges, carrier imposed fees e.g. YQ/YR, etc.)
- Disclosure data such as operating carrier, baggage allowance and charges, etc.

12. The Seller/Aggregator collects payment information from the Customer and sends an AirDocIssueRQ to the ORA.

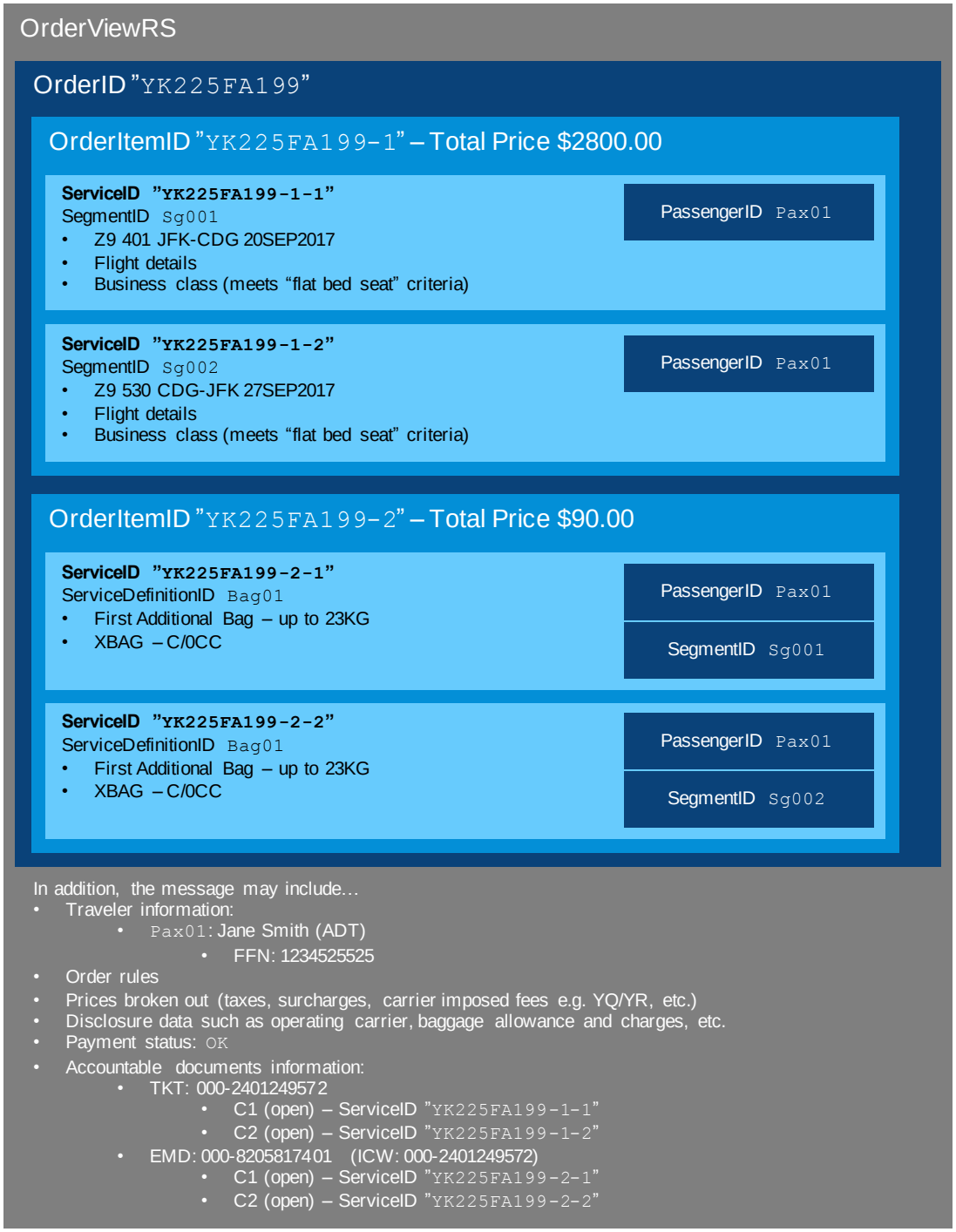
AirDocIssueRQ

The message may include…
- Seller/Aggregator information
- PassengerID Pax01
- OrderID "YK225FA199" – ORA Z9
- Payment information:
  - Type: Cash (CA)
  - Amount: $2890.00
- Traveler information

13. The ORA receives the payment information and processes the payment.

14. When successfully processed, the ORA issues accountable documents and stores their details in its Order Management System.

15. The ORA provides the accountable document details, along with details of the Order to the Seller/Aggregator by sending an OrderViewRS



16. The Seller displays to the Customer details of their confirmed Order.

Post Conditions

The Customer is in possession of a confirmed Order along with accountable document information and receipt of payment.

3.5 Order Management – Servicing

NDC supports the servicing of Orders, and it will be the responsibility of the ORA to facilitate the servicing of the Order, whether the request comes from the Customer (voluntary servicing) or the change is initiated by an Airline, either ORA or POA (involuntary servicing).

Servicing an Order may involve a variety of actions, from the very simple change of Passenger name, the addition of ancillary services to an Order, changes to travel dates, times or routing, to the cancellation of (whole or part of) the Order.

Order servicing is described in this section of this guide alongside the NDC schemas available for use and some use cases to illustrate both voluntary and involuntary servicing.

Payment and Ticketing may or may not have taken place before any subsequent amendments to an Order are requested.

Servicing will be covered in even more detail and further use cases will be illustrated in future versions of the guide.

3.5.1 General considerations

3.5.1.1 Retrieving an Order

Prior to amending an Order, a Seller may retrieve an Order from an ORA, providing them with the most up to date information.

The ORA is responsible to ensure that only those authorized entities are provided access to Orders. Authorization may be given based on the identity of the requestor and/or the amount of information provided in the request. The possession of certain information may give reasonable indication that the requestor is authorized to access an Order. Whilst this also applies at the time of Shopping and Order Create, it bears particular relevance to mention in the context of Servicing, as a Customer may approach a different touch point (the same or a different Seller, the ORA or another Airline whether or not they participate in the Order, or a ground handler at an airport) to attempt to service their Order.

Order retrieval provides mechanisms to retrieve various views of individual or lists of Orders. This includes retrieval of the content of a specified Order along with history of the Order. Order history includes all the amendments previously made to an Order for either voluntary or involuntary changes. Order retrieval is not mandatory prior to initiating a change to an Order.

3.5.1.2 Change and cancellation of an Order

Order Changes

Order amendment provides the means to change existing Orders, this will normally take place using the “Re-Shop” process. Section 3.5.3 provides numerous Use Cases to illustrate this.

Prior to requesting a change to an Order using the **OrderChangeRQ** message, the Seller needs to ask the Airline if any change conditions apply to the Order, and how the change may impact the contents, pricing and conditions of the Order. The **OrderReshopRQ/RS** message pair is used for this purpose, and the Seller will receive Offers based on their proposed changes to the Order. These Offers will effectively be a “preview image” of what the resulting Order will look like if the Customer wishes to proceed with the changes.

If the Customer wishes to proceed with the changes, they will accept one of the Offers presented to them by the Seller from the OrderReshopRS message.

There are three ways of changing an Order:

1. To append product(s) to an existing Order, OfferItems are requested to be “Added” to the Order.
2. To remove product(s) from an existing Order, Order Item(s) are requested to be “Deleted”.
3. To change/replace the OrderItems within an Order, both actions of “Adding” (new shopping parameters) and “Deleting” (referencing the OrderItemID to be replaced) are sent in a single request.

Where new Order Items are added, these are the result of accepted Offers (and their Offer Items) received in an OrderReshopRS message.

It is not possible for an individual Service within an Order Item to be changed. If a Customer wishes to make a change to one or more Services within an Order Item, they must first request a reshop of the entire Order Item. This will return any available Offers (with corresponding Offer Items) in relation to that reshop, and the subsequent request to change the Order will involve removing the original Order Item, and

replacing with the new Order Item (the accepted Offer Item received during the reshop).

The OrderReshopRQ contains functions that allow the Customer to explicitly indicate what is being changed (or the changes being enquired about). This may be a name change or other specific service changes, e.g. changing the date of a return flight. This may be done in the following ways:

- By a specific action to request new Offer Items (Add function) for a specific Order.
- By a specific action to request the removal of Order Items from the specific Order (Delete function). In this case, the Customer can also indicate which service in the existing Order Item it would like the Airline to retain in the resulting Offers.
- By a simultaneous Add and Delete, this indicates to the Airline that whatever is being shopped for as the new itinerary and/or new products, it is these Order Items that the new Offer Items will replace if the Customer proceeds with the change.

In an OrderChangeRQ message, the Customer accepts the Offers received from the Airline in the OrderReshopRS.

Note - To cancel an entire Order where no individual Service has yet been consumed, instead of using an OrderChangeRQ, many implementers will choose to use the OrderCancelRQ/RS pair. This is described below and in this instance an Action Type is not required. Implementers that wish to use the OrderChangeRQ/OrderViewRS message pair can do so to achieve an Order cancellation, and can either apply the Action Type "Cancel" at Order level, or to each individual Order Item.

As a principle, the OrderReshopRQ/RS pair is to be used in advance of an OrderChangeRQ being sent to the Airline. The reason for this is that the Airline needs to assess the nature of the changes and their impact on the contents, pricing and conditions of the Order, even though the Seller may already be aware of basic change conditions against the existing Order. There is an exception for passenger updates e.g. contact, Loyalty program details which may be done directly using the OrderChangeRQ message. However if the Airline determines that there is an associated cost as a result of this change, it may return an error message in the OrderViewRS.

As a final point to note, it is important when adding and removing Order Items from an Order that inventory is held/released appropriately. How Airlines choose to do this is outside the scope of NDC.

Order Cancellation

Order cancellation provides the means to cancel an entire Order, and as a principle should include the process of advising the Seller of any conditions relating to the cancellation, prior to the Airline's acceptance of the cancellation. The cancellation of an Order may trigger a refund process. If the Seller is already aware of conditions and/or wishes to proceed with the Cancellation regardless of the conditions, it is not mandatory for it to check these, or request a calculation of any residual value, prior to initiating the cancellation.

However, as a principle, the Seller is advised to begin the cancellation process by first sending an **OrderReshopRQ** to the Airline. This will allow the Airline to respond in an **OrderReshopRS** message with any conditions relating to the cancellation.

The Seller, if the Customer wishes to proceed, can then send an **OrderCancelRQ** message to the Airline. The Airline will follow this up with a confirmation in an **OrderCancelRS** message.

It is only possible to use the OrderCancelRQ/RS message pair where all Services within an Order are unconsumed. If any Service within an Order has already been consumed, the OrderChangeRQ/OrderViewRS message pair should be used.

Involuntary changes to an Order

Order Change Notifications provide a way for the Airline to inform a Seller/Aggregator in an unsolicited manner of involuntary changes to Orders, for instance schedule changes. The Airline will send the **OrderChangeNotif** message when they have already made changes to an Order, and will indicate what changes have been made.

Action types are also used in the OrderChangeNotif message to identify which Order Items have been removed from the Order (Action Type "Cancel") and which have been added to the Order (Action Type "Create").

Note - This description applies to an ORA. In an Interline scenario, a POA may use these to inform an ORA of any involuntary changes it has had to apply to the Order. It remains the responsibility of the ORA to inform the Seller of these changes.

3.5.2 Servicing and accountable documents

When using NDC, the ORA is responsible for authorizing payment and subsequently issuing accountable documents. This is described in Section #3.3.

In any servicing scenario, the ORA is responsible for managing all changes to their Order, and also for managing all changes to any accountable documents that they have issued. No other party initiates changes to the accountable documents.

Accordingly, where a document has been identified as relating to an NDC Order (using the Fare Calculation Mode Indicator of “3”), a Seller is unable to initiate an Exchange/Reissue or Refund transaction with reference to the document. Instead, the Seller must initiate a change request to the Order, and the ORA is then responsible for managing changes to any related documents.

Changes to accountable documents are internal to the ORAs electronic ticket server or EMD server. The ORAs own OMS will trigger each transaction once the change to the Order has been confirmed.

The ORA also manages the relationship between accountable documents (document and coupon numbers) and Services within their Order. This relationship is stored within the OMS, and may also be stored within the electronic ticket or EMD server. When a servicing scenario requires a change to accountable documents, the ORA ensures that the new document and coupon numbers related to any Service are updated within their OMS. This is critical to ensure that the correct supporting data can be obtained from the OMS to drive revenue accounting processes.

The ORA may also communicate these changes to accountable documents (and the relationship between document and coupon numbers and Services) to the Seller or to any other carriers.

The ORA may also record within their OMS the details of any document and coupon numbers that were previously related to Services within the Order, but which have been reissued or refunded.

It is important to note that under NDC, the ORA is responsible for determining the conditions under which the Customer may change their Order. This may be established upfront in the conditions of the original Offer. Accordingly, the Seller is no longer responsible for validating and applying rules related to refunds or reissue transactions, or for recalculating pricing following a voluntary change. The ORA may continue to rely on filed information to drive automation of this repricing, but this is internal to their own system, and the repricing is not performed by the Seller.

Examples of circumstances which may necessitate different changes to accountable documents are discussed below.

Exchange

When an Order involving entirely un-consumed Services is changed, the ORA may Exchange a completely unused accountable document for a new document. The electronic ticket or EMD server will record the Exchange transaction (the new document is issued in Exchange for the original document), and the OMS will record

that the previous document / coupon numbers related to the Services are no longer valid, and that the new document / coupon numbers now apply to each Service.

Reissue

When some non-consumed Services are changed on an Order where some Services have already been consumed, the ORA may have an accountable document with some Flown / Used coupons and some Open For Use coupons. Accordingly, the ORA may reissue the Open coupons to a new document. The electronic ticket server will record the Reissue transaction (the new document is issued in Exchange for the Open coupons on the original document), and the OMS will record that the previous document / coupon numbers related to the Services are no longer valid, and that the new document / coupon numbers now apply to each Service.

In this example there can be no update to the document / coupon numbers for the Services that have already been consumed, as revenue accounting processes (such as revenue recognition, and possibly interline billing) will have already occurred on the basis of the original document / coupon numbers. Sales accounting and revenue recognition of the new reissued document will then be on the basis of the internal values associated with the applicable Services, which is obtained from the OMS with reference to the new document and coupon numbers.

Refund

When an Order involving wholly un-consumed Services is cancelled, and where the value of the Order is entirely refundable, the ORA may refund the accountable document. The electronic ticket server will record the Refunded document, and the OMS will record that the document / coupon numbers related to the Services are no longer valid, following the refund.

Where the value to be refunded is less than the value of the documents, the ORA may Exchange the original documents into a new document to record the consumption of a penalty, and a separate document for the refundable balance.

Other Internal Processes

Where the accountable document relates to the ORA's own marketed and operated segments (ie. no interline interaction is involved), the ORA may determine that they are able to maintain the original document and coupons, even if the Order has changed. In this scenario the ORA may simply update the information within their electronic ticket or EMD server, and maintain the same document and coupon numbers within the OMS. This process may be referred to as an internal revalidation. This is entirely at the ORAs discretion.

3.5.3 Servicing messages

OrderRetrieveRQ/OrderViewRS (as often being the first step for servicing, see Section #3.5 for a detailed description)

OrderReshopRQ/RS

The OrderReshop transaction set passes new shopping requests from a Seller to an ORA to replace existing specified Order Items in an Order or for new shopping requests to add to an existing Order. The ORA responds with new Offers within the context of the existing Order. The response will include details of any additional collection or refund due against proposed changes (including a full cancellation).

OrderChangeRQ/OrderViewRS

The OrderChange/View transaction set requests modifications to an Order by specifying which Order Items to change and which Offer Items to replace them with. When the ORA has applied the change, the updated view of the Order is returned.

OrderCancelRQ/RS

The OrderCancel transaction set requests the cancellation of a specified Order, and returns confirmation of cancellation.

Note - Cannot be used when any individual Service within the Order has already been consumed.

OrderChangeNotif/Acknowledgement

The OrderChangeNotif transaction sends an unsolicited notification of an involuntary change to an Order. The Acknowledgement message may be returned to acknowledge receipt of the notification.

3.5.4 Use cases - Servicing

Principal Actors

The principal actors in each use case are:

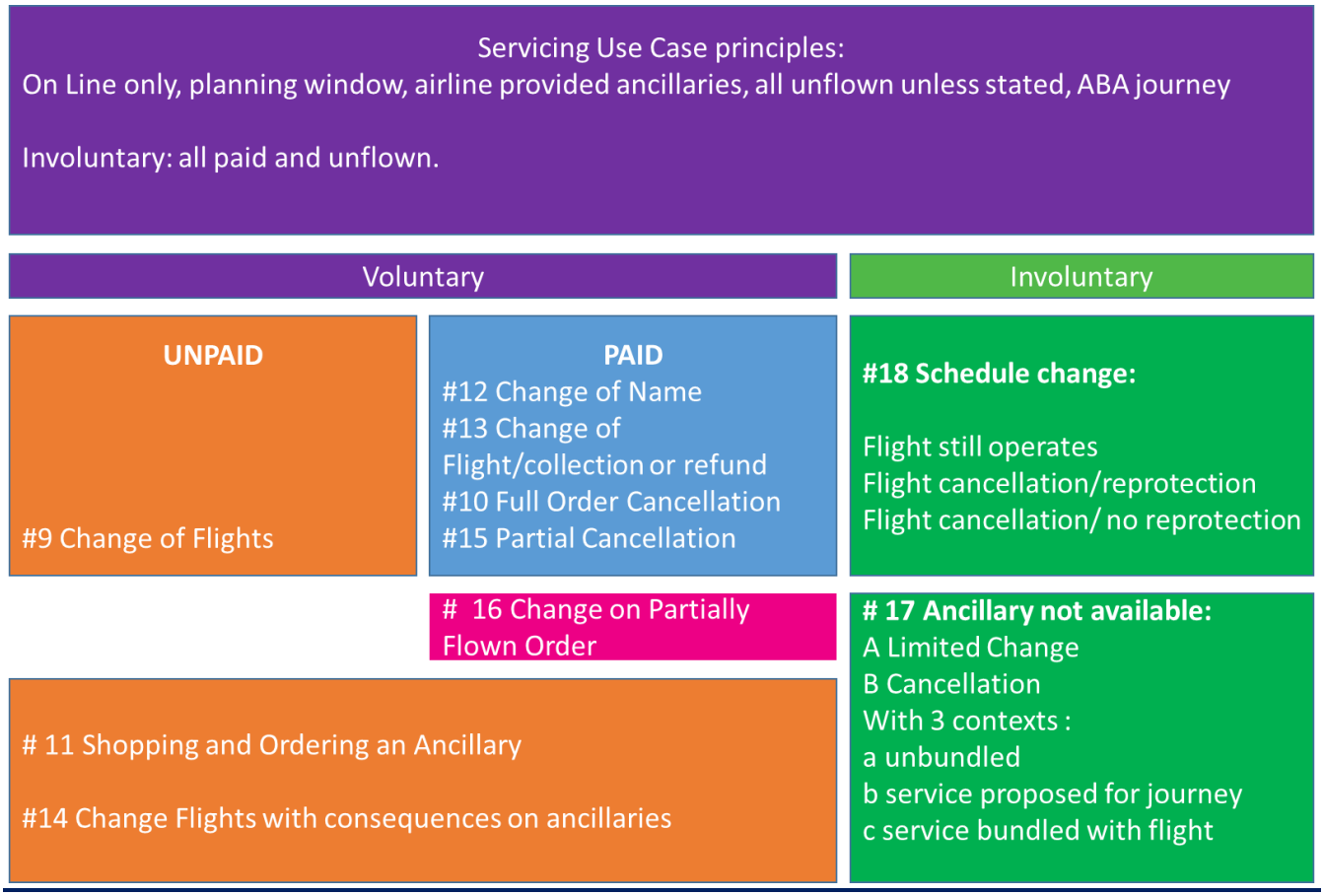
- Customer *(please refer to section 3.1.4 for a definition)*
- Seller/Aggregator
- Offer Responsible Airline (ORA)

Common Preconditions & Assumptions

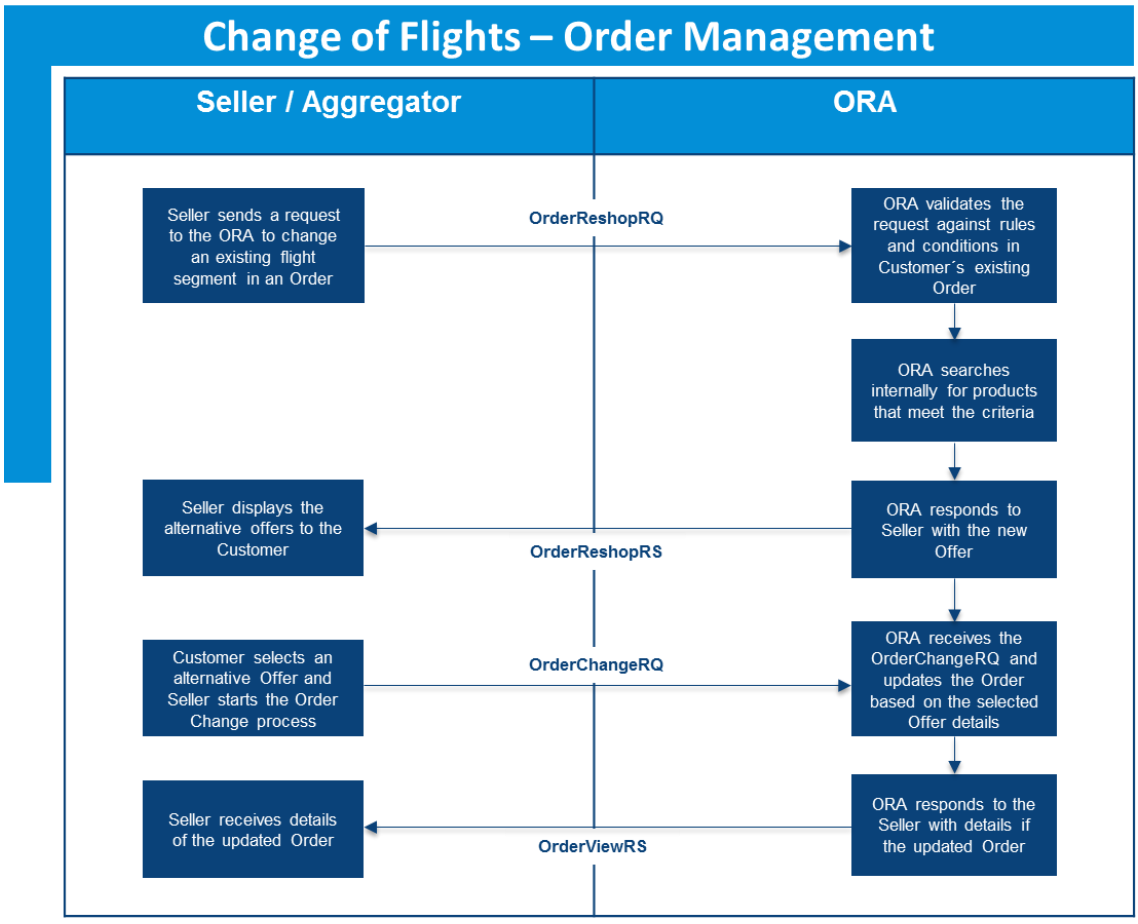
For each of these use cases, the following common assumptions/preconditions apply:

- Travel has not commenced
- When servicing an Order, the process may start with by retrieving the Master Order however this step is optional.
- The Seller/Aggregator may choose to send separate shopping requests to other ORAs, either to increase the range of options they can present to the Customer alongside those of the original ORA, or in the situation where the ORA does not return a satisfactory response.
- Any ORAs and the Seller/Aggregator have valid commercial agreements in place between them and have taken steps to ensure that they are compliant with any applicable competition law or regulation.
- The Form of Payment initially used is still valid (e.g. payment card not expired).
- The Traveler is in possession of an Order and has the corresponding OrderID.

Use Cases: general scope



3.5.4.1 Use Case 9 – Re-shopping to change flights in an unpaid Order



Change of Flights – Order Management

Description

A Customer based in Paris in possession of a confirmed Order for traveling from CDG to LHR needs to change his time of departure. The ORA's OrderID is 45V45T87.

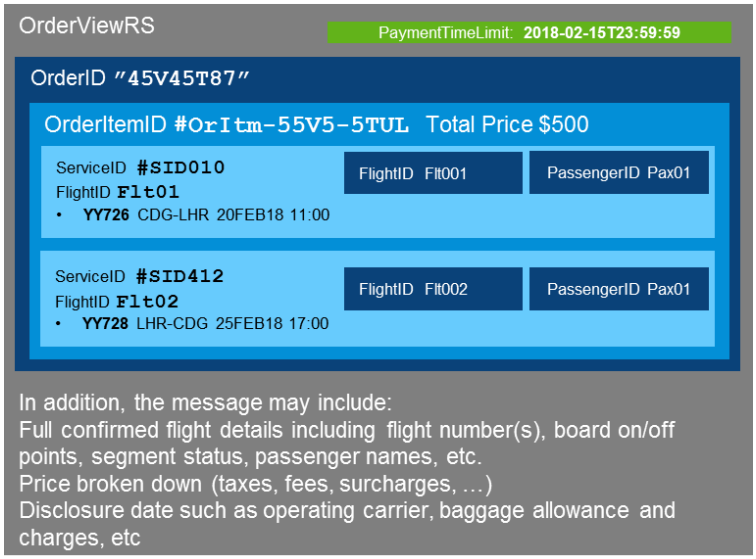
This Use Case describes the process of a Customer initiating a change to his travel time prior to the departure of the first flight. There are no changes to routing or carriers. The ORA returns an alternative to the Seller/Aggregator per the re-shop request.

Preconditions/Assumptions

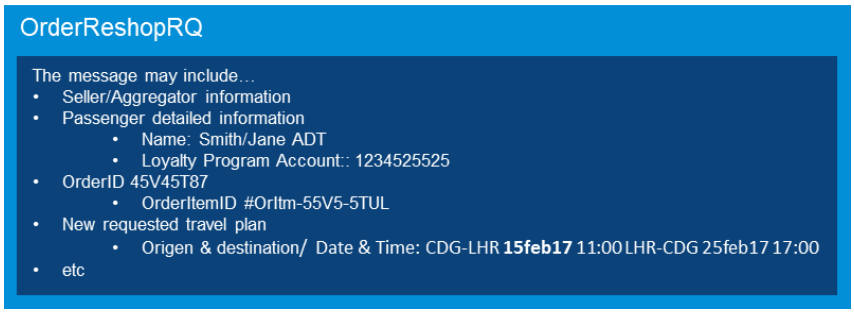
- There are no change restrictions for the ORA on this Order
- The Order has not yet been paid nor accountable documents issued

Steps to follow in the process

1. The Seller/Aggregator retrieves Customer`s Order details from the ORA using the OrderRetrieveRQ & OrderViewRS message pair.



2. The Seller/Aggregator initiates an OrderReshopRQ to change the outbound flight to an earlier date. The message will include the ORA's OrderID, the new proposed itinerary (e.g. new travel dates) and Seller/Aggregator Information amongst other data.



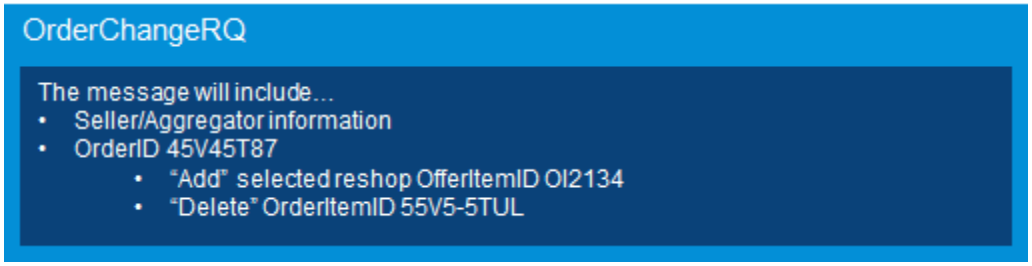
3. The ORA retrieves the Master Order in its Order Management System.

4. The ORA determines that it can fulfill the re-shop request, performs a check that the request does not generate any violations of appropriate competition laws or regulations, and creates the Offers that satisfy the request.

5. The ORA transmits its consolidated Offer(s) to the Seller/Aggregator via OrderReshopRS, which includes all of the flight Offers it wishes to make in response to the re-shop request. The message will include:

6. The Customer decides to change their existing itinerary and selects one of the new Offers.

7. The Seller/Aggregator sends an OrderChangeRQ to the ORA and the message will include information to reflect the requested change, based on the information returned in the OrderReshopRS:
8.



9. The ORA receives the OrderChangeRQ, validates that conditions of the reshop Offers have been met (e.g. time limits have not been exceeded) and makes the changes to the Order.

10. The ORA responds to the Seller/Aggregator with an OrderViewRS, which includes a full view of the Order and confirmation of the changes applied.

Post Conditions

The Seller/Aggregator, acting on behalf of the Customer, is in possession of an updated Order.

3.5.4.2 Use Case 10 – Full Order Cancellation

Description

One traveler based in Podgorica has an Order to travel to London. Before the start of the journey, the traveler needs to cancel his travel plans, so he would like to cancel the existing Order and get any refundable amount back.

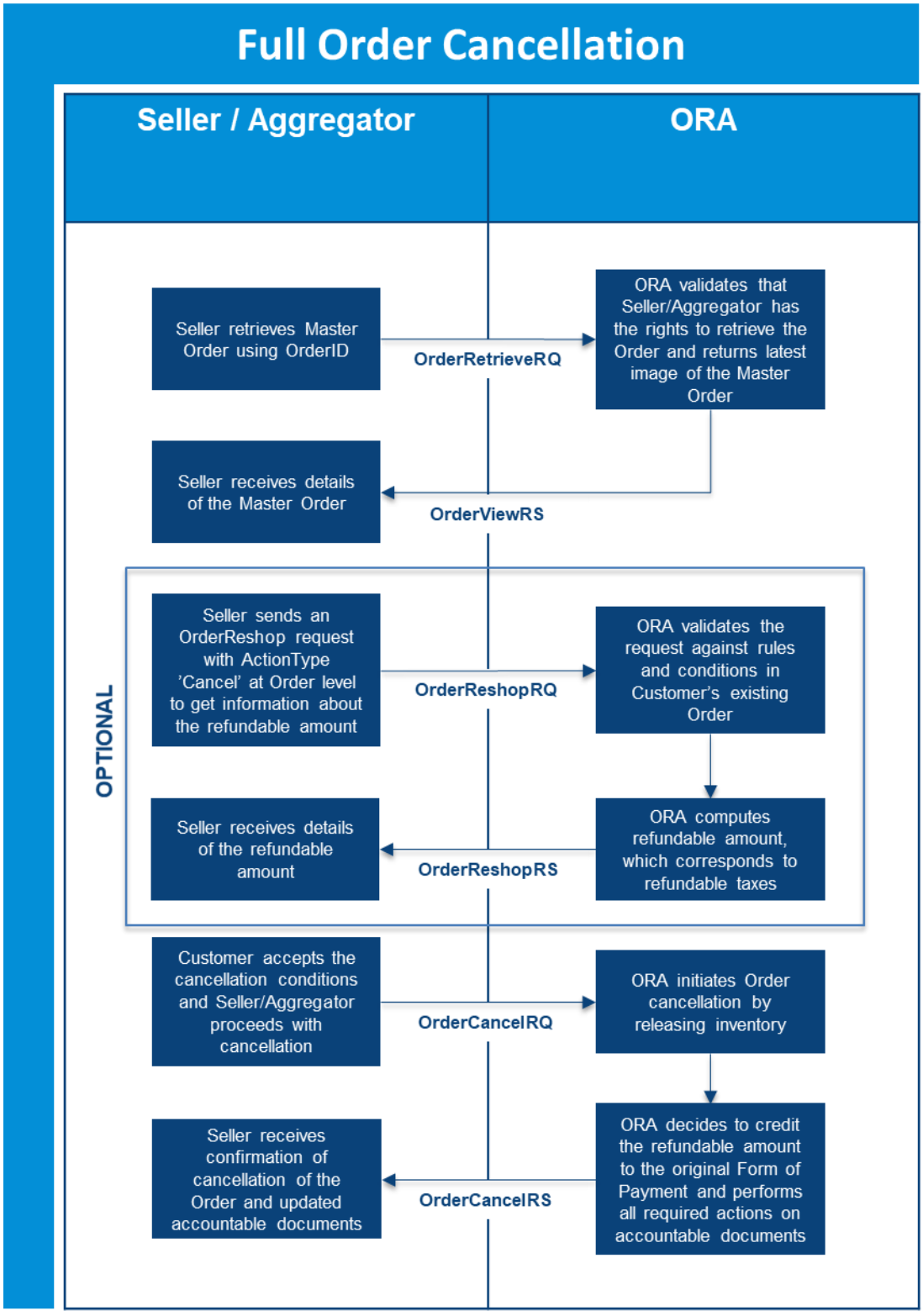
This Use Case describes the process of full cancellation of an existing Order, where no segments are flown.

Preconditions/Assumptions

- The Order has been paid in full.
- The Order is non-refundable except for taxes.
- Accountable documents have already been issued
- Amount will be refunded in original form of payment
- Airline will process documents following their internal process

Note: This use case is focusing on use of the OrderCancelRQ/RS pair. However, full cancellation of the Order may be achieved by use of OrderChangeRQ. In case when this option is used, message pair OrderReshopRQ/RS is mandatory and it should contain request for deleting every single OrderItem related to the Order in question.

Full Order Cancellation



Note: OrderReshopRQ/RS pair is optional in full cancellation flow, but it is recommended to exchange these messages before the OrderCancelRQ/RS pair so that the Seller can make sure that the Customer is making well informed decision to cancel the created Order.

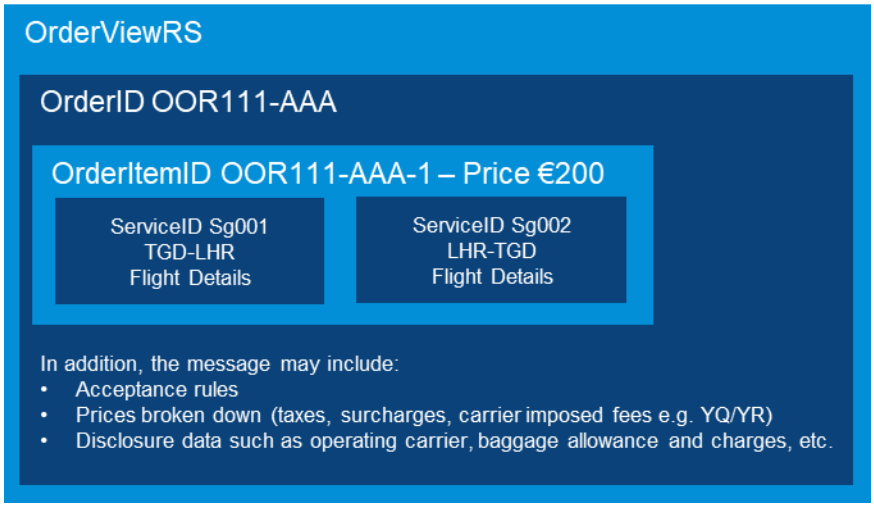
Steps to follow in the process

1. The Seller/Aggregator retrieves the Master Order using OrderID that was provided by the Customer (note, this step is optional).

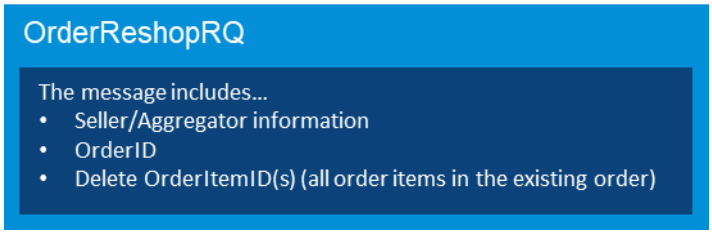
2. The ORA receives an OrderRetrieveRQ message, and validates that the Seller/Aggregator has the rights to retrieve the Order.

3. The ORA queries its Order Management system to retrieve the Order.

4. The ORA sends details of the Order to the Seller/Aggregator using the OrderViewRS message.



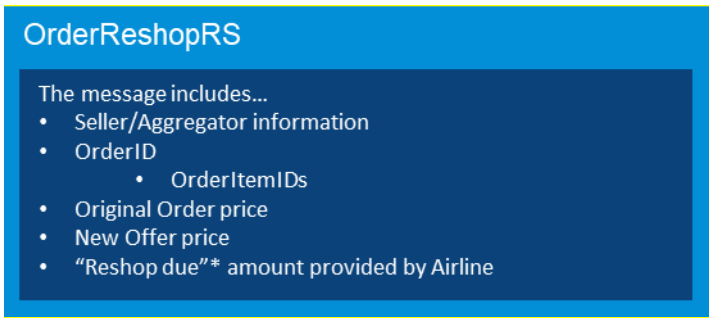
5. [optional] The Seller/Aggregator sends an OrderReshopRQ message to the ORA requesting full cancellation of the non-consumed Order to get information about the refundable amount.



6. [optional] The ORA validates the request against rules and conditions that apply for the existing Order.

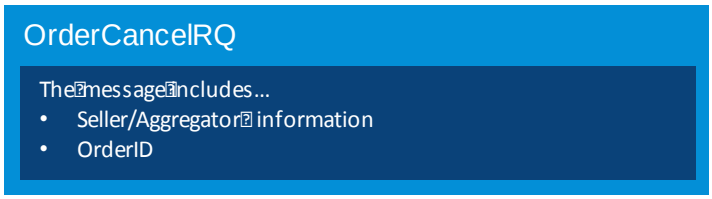
7. [optional] ORA determines that the fare is non-refundable and that only taxes are refundable. The ORA computes the total refundable amount.

8. [optional] ORA responds to the Seller/Aggregator with OrderReshopRS with details of the refundable amount. The ORA may choose to illustrate this as a new Offer for selection, or may simply provide the amount that will be refunded if the Customer proceeds with the cancellation.



**Note - The "Reshop Due" is the element name in the OrderReshopRS to inform the Seller of the difference between the original Order price/amount paid, and the new price based on the re-shop criteria. In this case it is used to inform the Seller of how much is due to the Customer as a refund if they proceed with the cancellation.*

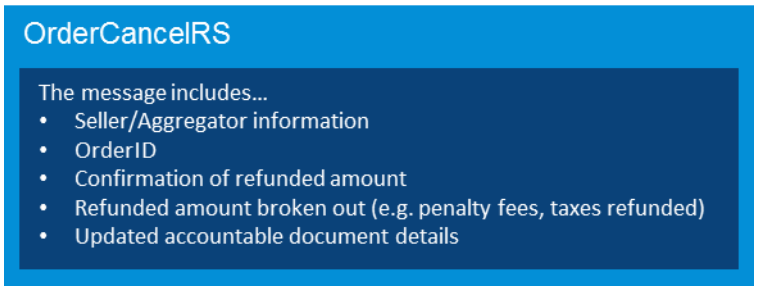
9. The Customer accepts the cancellation conditions from the original Order, and the Seller/Aggregator proceeds with cancellation by sending an OrderCancelRQ message to the ORA which contains the OrderID.



10. The ORA initiates the process of Order cancellation which may involve releasing any held inventory.

11. The ORA triggers the refund process by crediting the refundable amount to the Customer's original Form of Payment and by updating the accountable documents as refunded.

12. The ORA responds to the Seller/Aggregator with an OrderCancelRS message which contains confirmation about the cancellation of the Order, which includes confirmation of the refund, and the updated accountable documents



Post conditions

The Customer has successfully cancelled the Order and will receive the refunded amount to their original Form of Payment.

3.5.4.3 Use Case 11 – Shopping For and Ordering An Ancillary After An Order Has Been Created

The following use case describes the process of shopping for and ordering an ancillary service after an Order has been created. With 17.2, there is only one flow using the OrderReshopRQ/RS pair.

A shopping flow for an ancillary (whether this be initially as part of the original Offer), or when adding to an existing Order will often start with a ServiceListRQ/RS, which effectively presents a catalogue of the ORA's available Services for a given Offer/Order.

Note - Depending on the ancillary, other message pairs may be used during this process and these are described in the Shopping section of this guide, 3.1. For example, the shopping flow for adding a Seat to an Order is likely to begin with a SeatAvailabilityRQ/RS.

Services are presented in ServiceList as independent OfferItems, with price. Those could be directly used in an OrderChange independently of the other Order Items already in the Customer's Order.

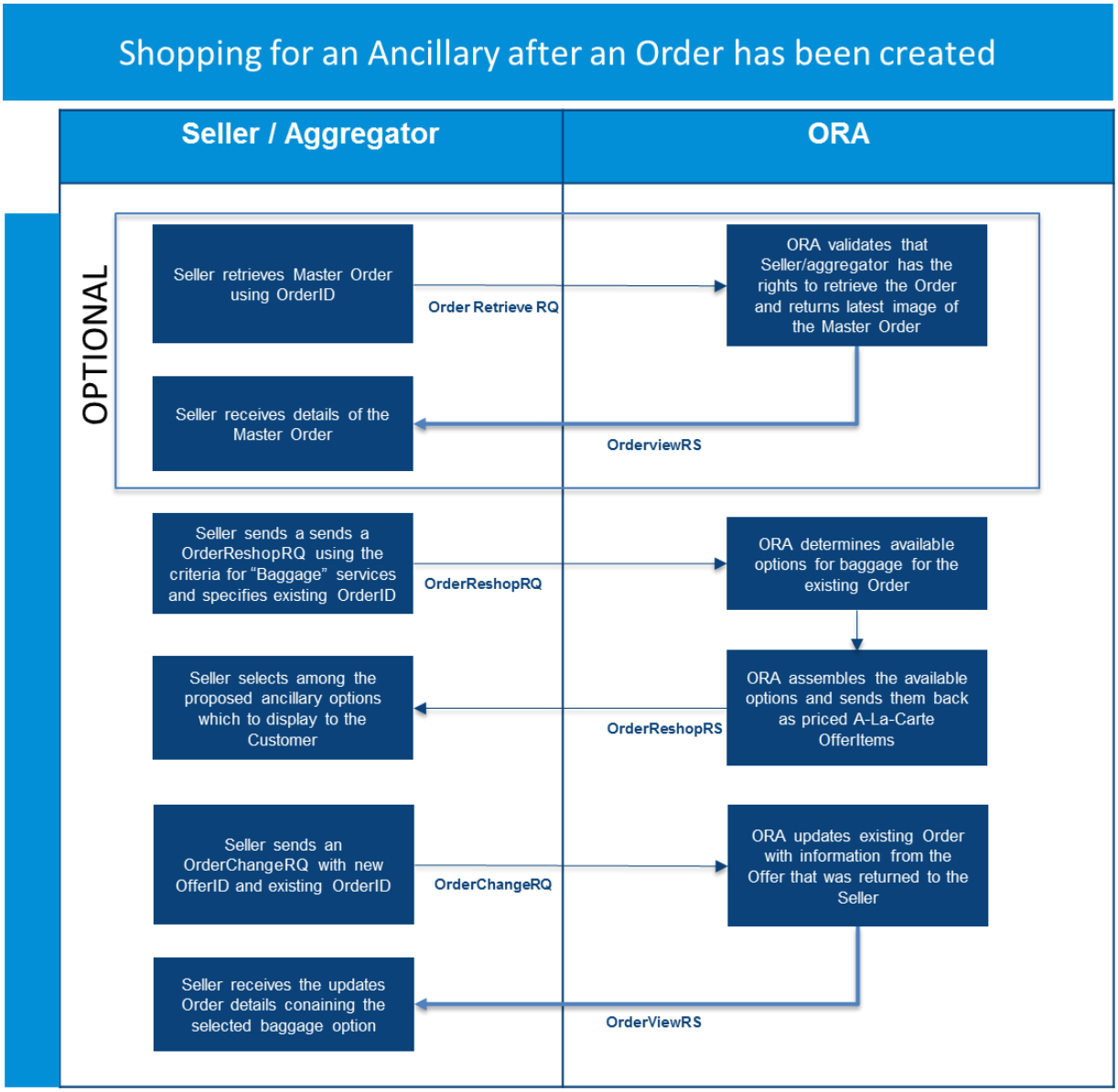
Nevertheless, the usage of OrderReshopRQ/RS effectively re-prices the entire Order, giving the opportunity for the ORA to structure the Offer to the Customer, including the ancillary, in whichever way it chooses.

Scenario

One traveler (Jane Smith, FQTV) based in London has an Order to travel to New York. She would like to buy a bag for the journey.

Description

This Use Case describes one possible process of adding an ancillary service to an existing Order, by doing the Shopping using the OrderReshopRQ/RS message pair.



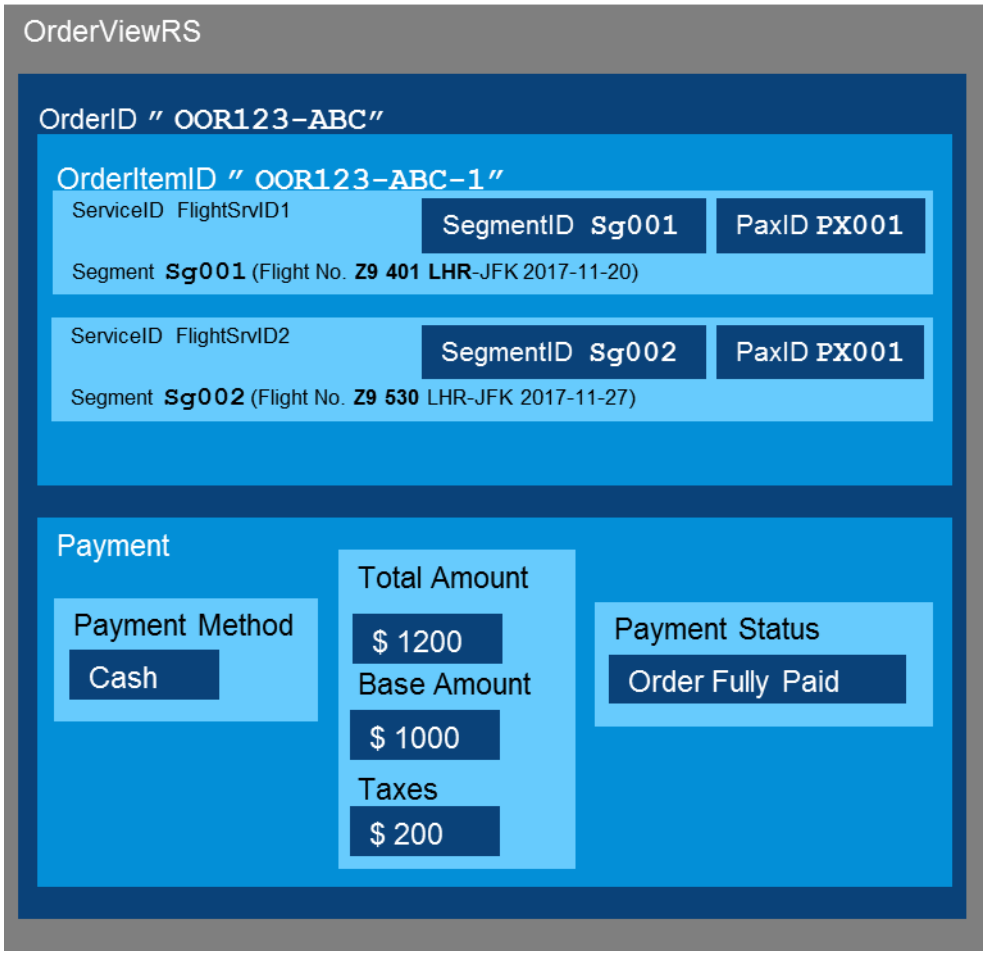
Steps to follow in the process

1. The Seller/Aggregator retrieves the Master Order using OrderID that was provided by the Customer.

2. The ORA receives an OrderRetrieveRQ message, and validates that the Seller/Aggregator has the rights to retrieve the Order.

3. The ORA queries its Order Management system to retrieve the latest image of the Order.

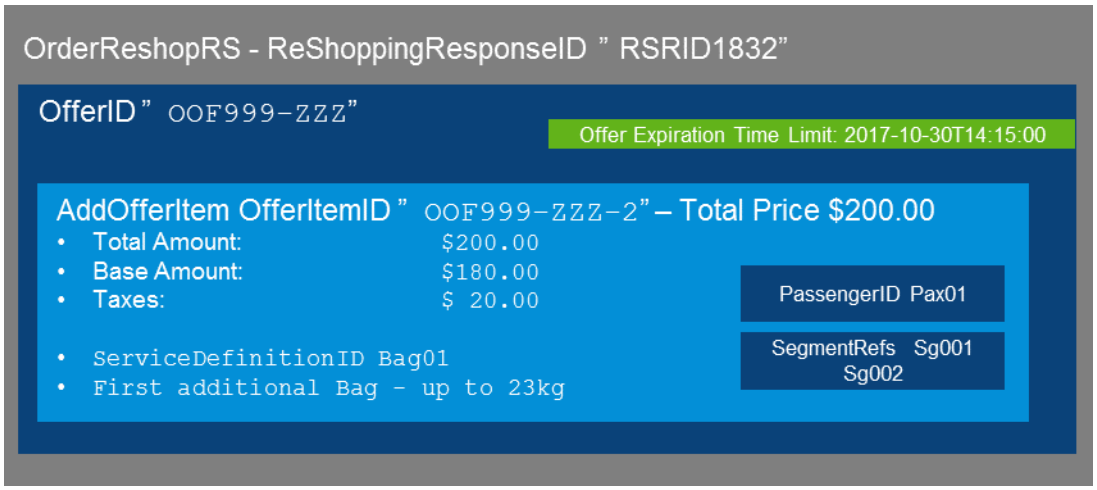
4. The ORA sends details of the Order to the Seller/Aggregator using the OrderViewRS message.



5. The Seller/Aggregator sends a OrderReshopRQ message to the ORA using criteria “Baggage” and existing OrderID to get the list of baggage options that are available for the existing Order.

6. The ORA determines the available baggage options for the itinerary in the Master Order.

7. The ORA assembles the available baggage options and prepares a OrderReshopRS message to return all the details, including description and prices.



8. The Seller/Aggregator confirms the Offer by sending an OrderChangeRQ to the ORA containing the existing OrderID and the new OfferID/OfferItemID.

9. The ORA updates the existing Order by creating a new Order Item corresponding to the baggage option. This Order Item is created from the new Offer Item that was returned in the previous step.

10. The ORA sends an OrderViewRS to the Seller/Aggregator containing the details of the updated Order, which contains a new Order Item for the selected baggage option.

Post conditions

The Customer has successfully changed the original Order and has an updated Order which contains an Order Item for the selected baggage option. As the new Order Item has not yet been paid, the Customer will have to provide payment information to the Seller/Aggregator, which will be transmitted to the ORA for issuance of related accountable documents. In the sample, flights had been previously paid.

3.5.4.4 Use Case 12 – Change of Name in a paid Order

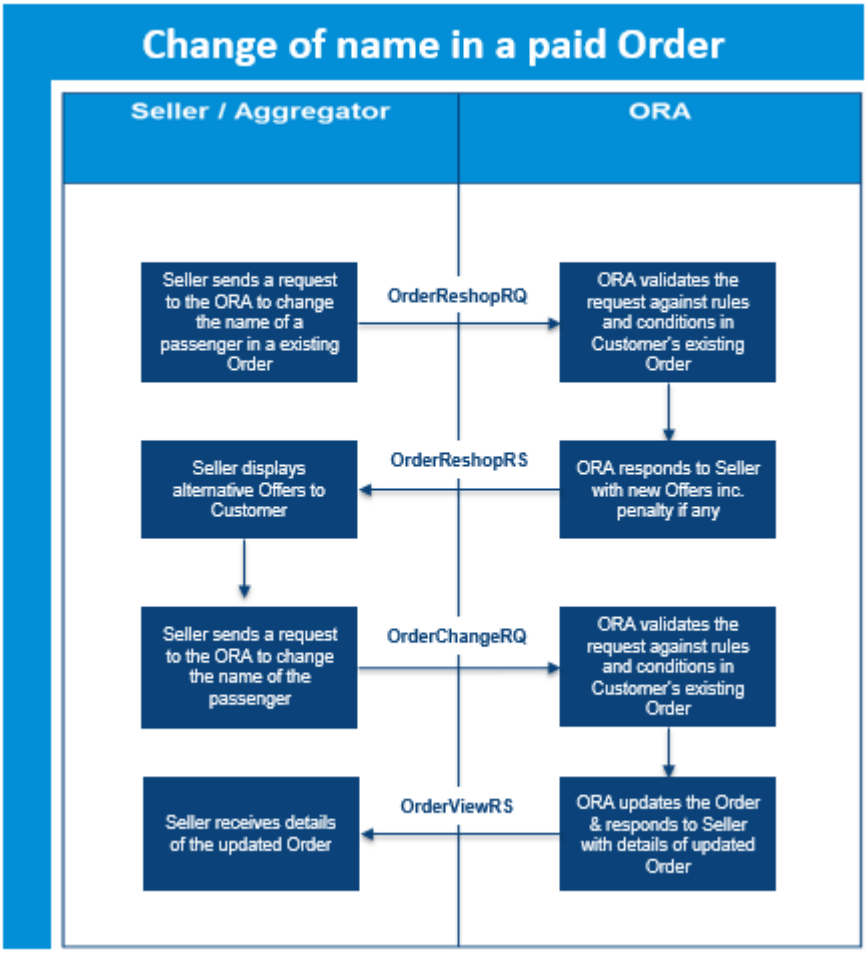
Description

A Customer has an Order for a round-trip travel to New York from London departing on the 10th December and returning on the 20th. He would like to change the name of the passenger or simply correct a spelling mistake. This change does not involve a change of flights.

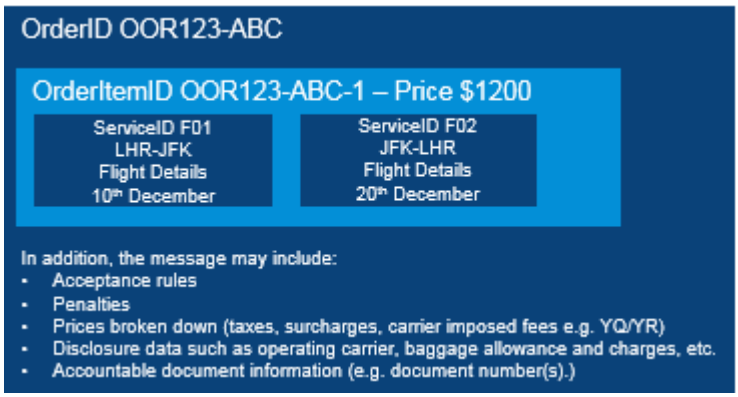
This Use Case describes the process flow of modifying or changing a name on a previously created reservation, where a changing fee might be applicable.

Preconditions/Assumptions

- The Order has already been paid and accountable documents have been issued.
- Travel has not commenced.

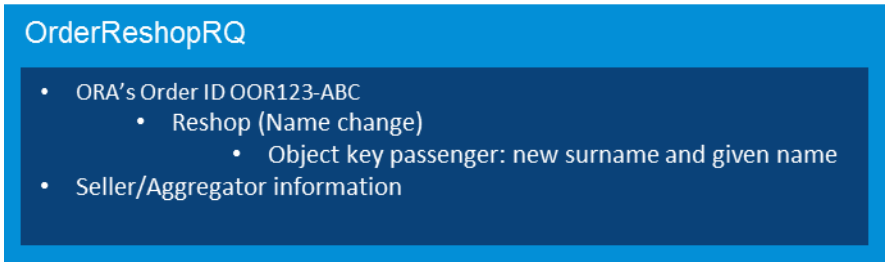


Existing Order



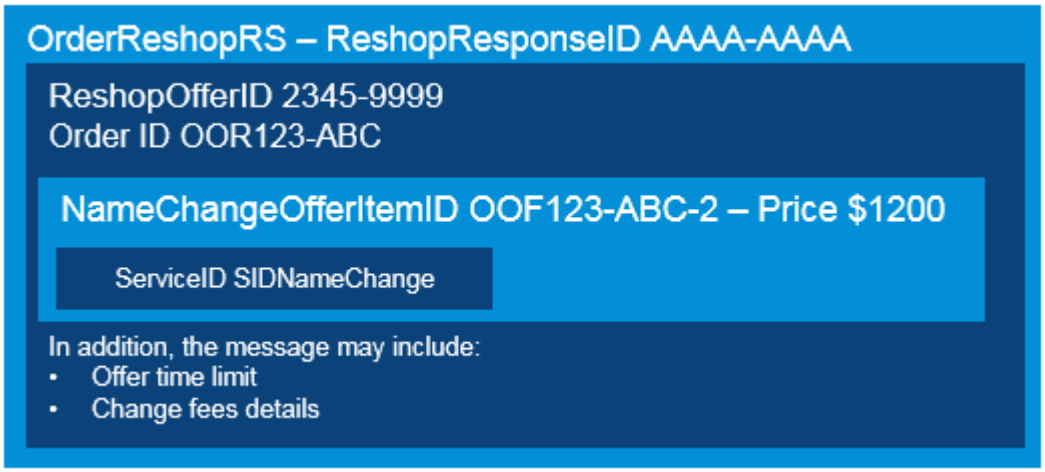
Steps to follow in the process

1. The Seller/Aggregator sends an OrderReshopRQ message to the ORA, requesting a change of Name and to enquire if there are any penalty fees for the change.



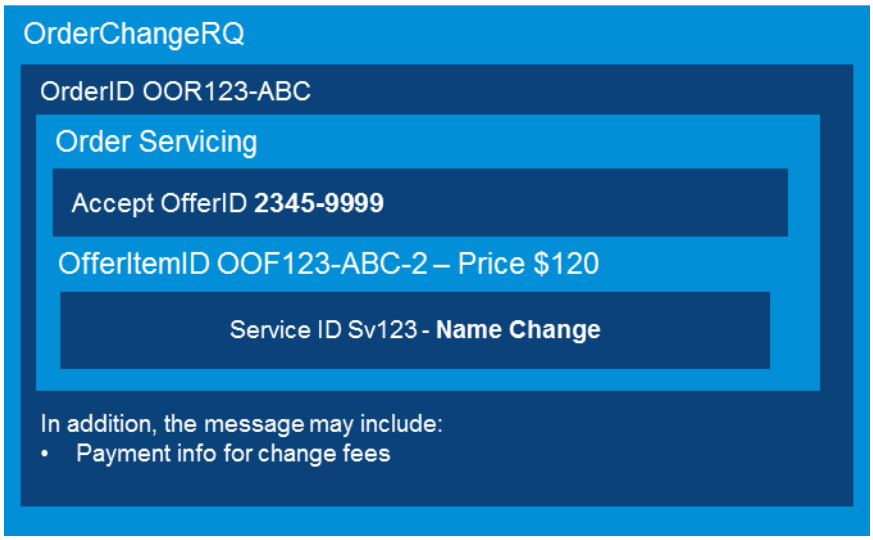
2. The ORA receives the request, validates that a change to the Order is permissible, and builds a new Offer in its Offer Management System. A penalty fee is due to change the name.

3. The ORA generates and sends an OrderReshopRS to the Seller/Aggregator.



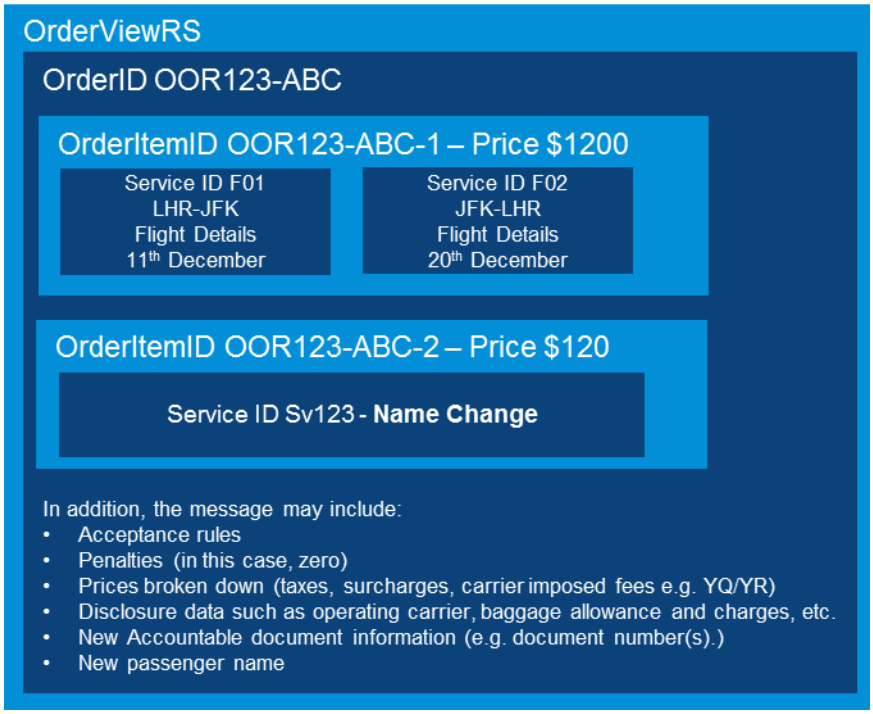
Note - Where a bilateral agreement exists between the ORA and the Seller, the Seller can directly send an OrderChangeRQ instead of an OrderReshopRQ. In this case we assume that the Seller already knows if penalty fees apply or not.

4. The Seller/Aggregator sends an OrderChangeRQ to the ORA requesting a change of the name of the passenger, including payment information for penalty fees.



5. The ORA updates accountable documents as necessary.

6. The ORA sends an OrderViewRS to the Seller/Aggregator containing the details of the updated Order, along with new accountable document information.



Post conditions

The Customer has successfully changed the original Order and their Order now contains the name of the new passenger. The booking is modified in the Airlines system.

3.5.4.5 Use Case 13a – Changing flights in a paid Order with additional collection and change fee

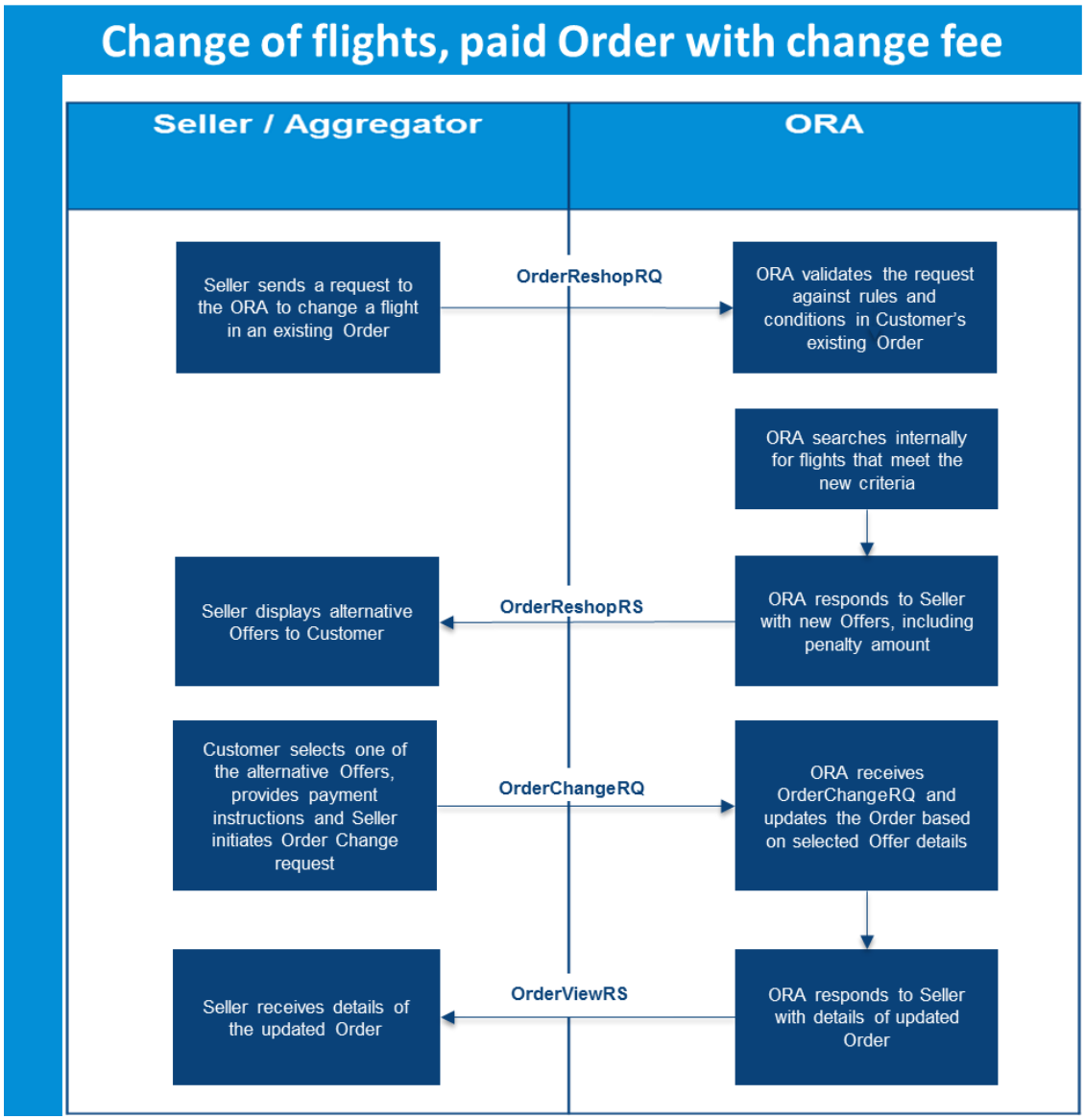
Description

A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. They would now like to depart on the 11th December.

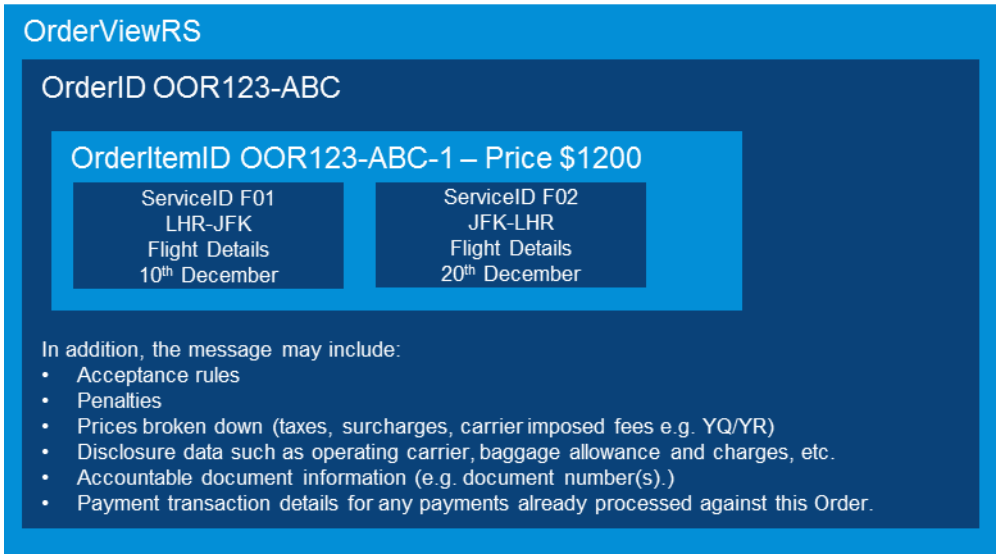
This Use Case describes making a change to one flight from a round trip, where both existing flights are contained within a single Order Item.

Preconditions/Assumptions

- The Order has already been paid, and accountable documents have been issued.
- There are no ancillaries associated with the Order
- There is a difference in the price for the new flight which requires an additional collection and a penalty fee.
- Any related accountable documents are generated and/or amended by the Airline as a consequence of actions taken at the Order level.
- Travel has not commenced.



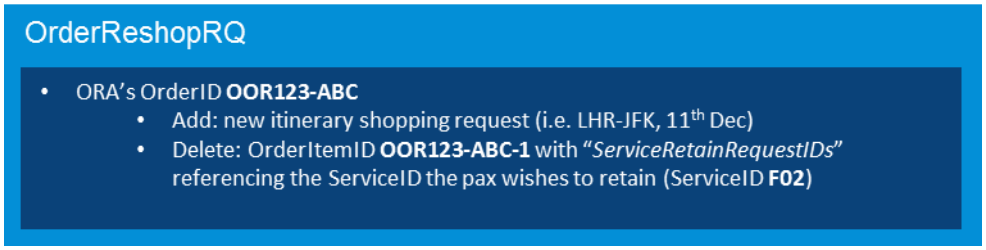
Existing Order



Steps to follow in the process

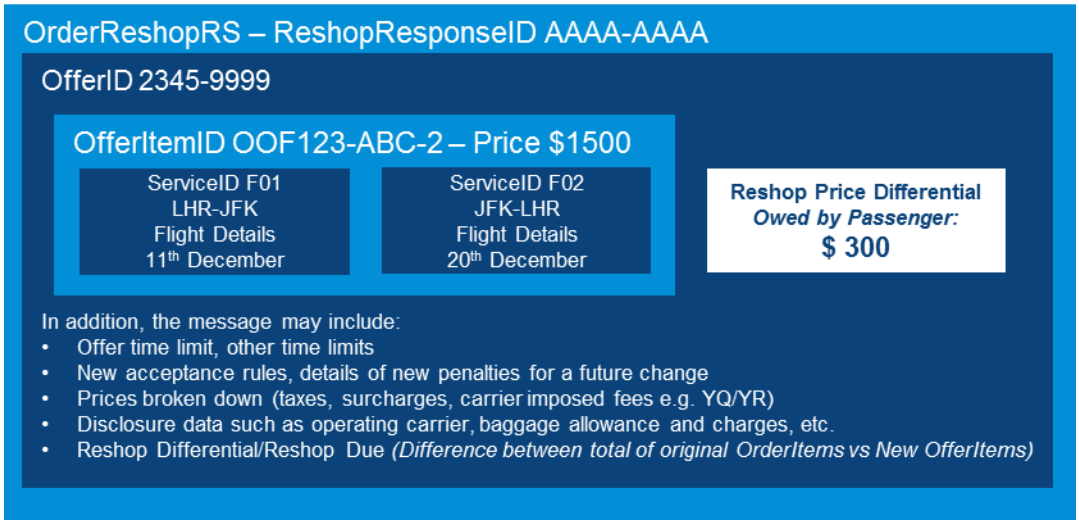
1. The Seller/Aggregator sends an OrderReshopRQ message to the ORA, requesting a change to the outbound LHR-JFK flight (the Customer would like to move the flight one day later).

   Since OrderItems have to be re-shopped, repriced and replaced entirely, the Pax can use the "ServiceRetainRequest" feature to indicate which of the Services in the OrderItem they do not intend to reshop (i.e. to retain them in the proposed new proposed Offers). If this is not supported by the Airline, the passenger can always re-shop the entire itinerary to obtain the same results.

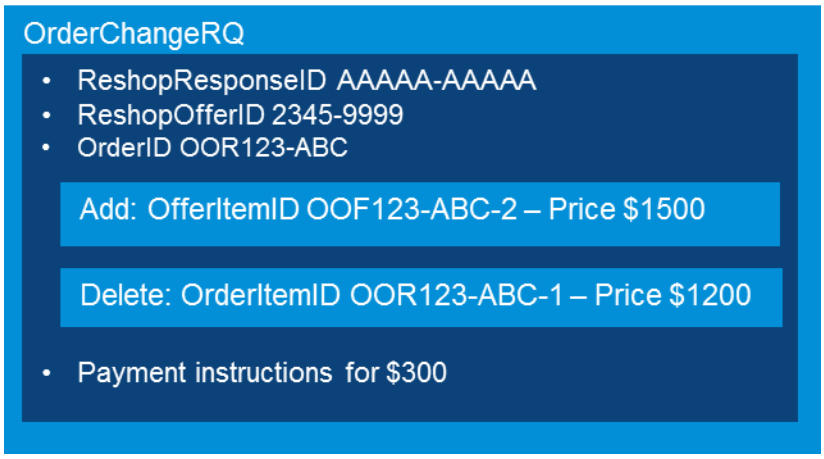


2. The ORA receives the request, validates that a change to the Order is permissible, and builds Offers in its Offer Management System for the new requested itinerary.

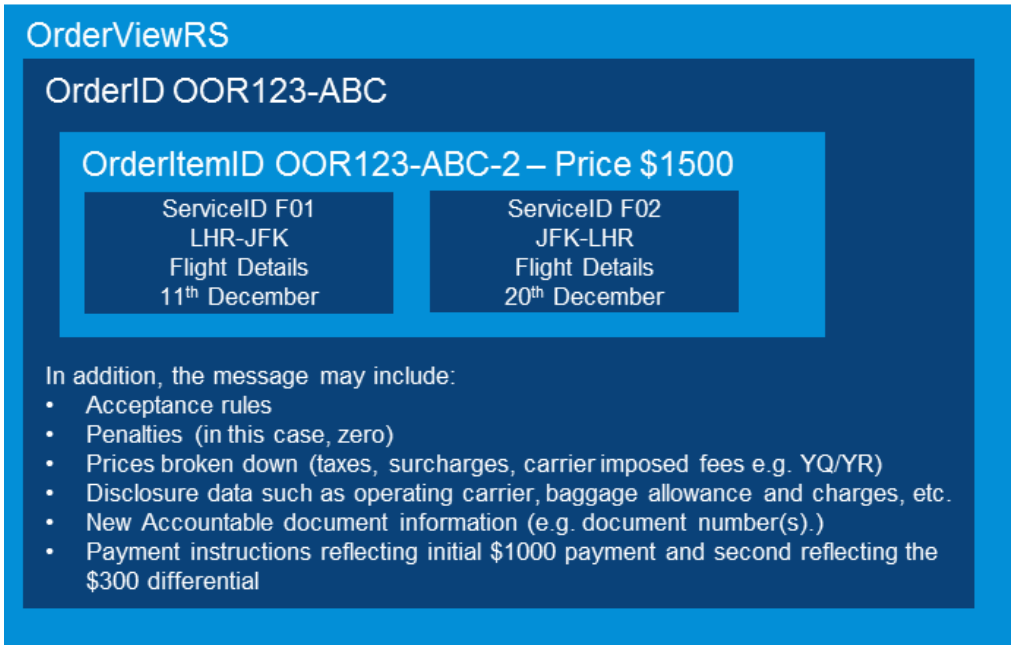
3. The ORA generates and sends an OrderReshopRS to the Seller/Aggregator.



4. The Seller displays the options to the Customer and the Customer decides to proceed with the proposed change, as presented in the ORA's Offer. The Seller/Aggregator sends an OrderChangeRQ to the ORA. This includes payment instructions for the outstanding amount detailed in the price differential.



5. The ORA updates the existing Order by creating a new Order Item corresponding to the proposed OfferItem (OOF123-ABC-2), originally sent to the Seller in the OrderReshopRS. The ORA also cancels the existing OrderItem from the Order.



Post conditions

The Customer has successfully changed the original Order and their Order now contains a new Order Item, featuring a round-trip from LHR to JFK, the outbound flight being one day later than in the original Order. The ORA issued new accountable documents for the additional amount due for the changed flight, and for the change fee. The ORA has communicated these details to the Seller.

3.5.4.6 Use Case 13b – Changing flights in a paid Order with refund

Description

A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. He would now like to depart on the 11th December.

This Use Case describes making a change to one flight from a round trip, where both existing flights are contained within a single Order Item.

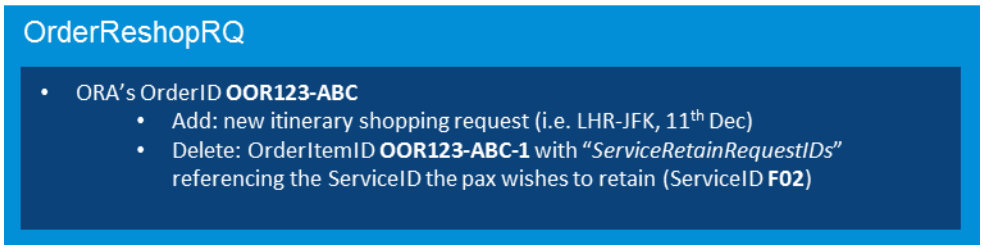
Preconditions/Assumptions

- The Order has already been paid, and accountable documents have been issued.
- The new flight date change requests results in a refund.
- Any related accountable documents are generated and/or amended by the Airline as a consequence of actions taken at the Order level.
- Travel has not commenced.

Existing Order

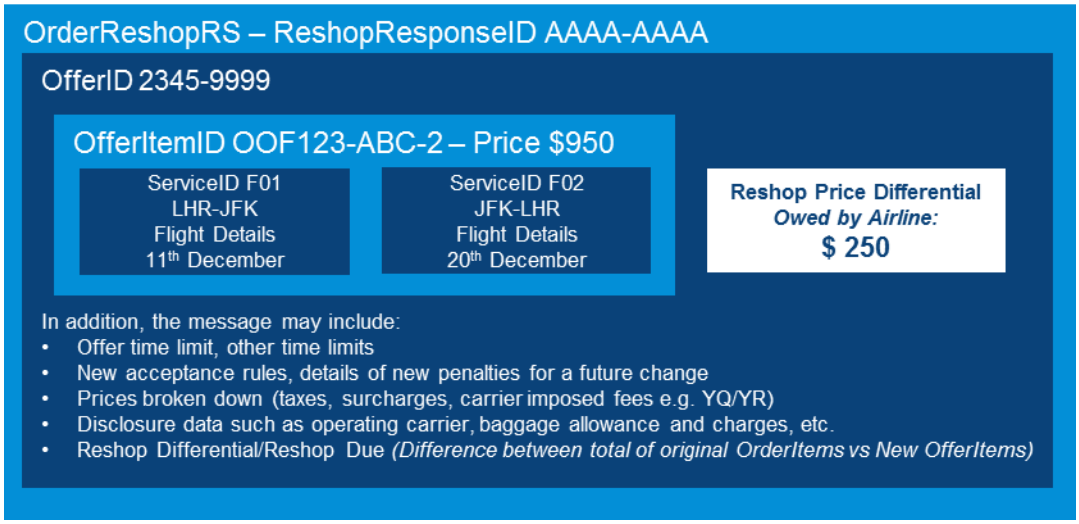
Steps to follow in the process

1. The Seller/Aggregator sends an OrderReshopRQ message to the ORA, requesting a change to the outbound LHR-JFK flight (the Customer would like to move the flight one day later).

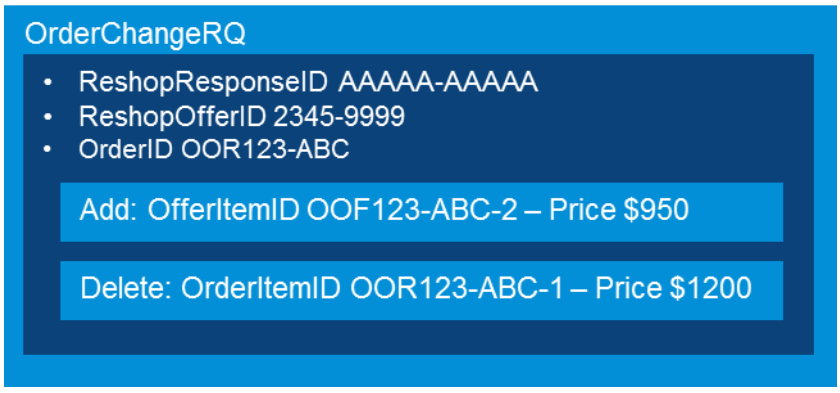


2. The ORA receives the request, validates that a change to the Order is permissible, and builds Offers in its Offer Management System for the new requested itinerary.

3. The ORA generates and sends an OrderReshopRS to the Seller/Aggregator.



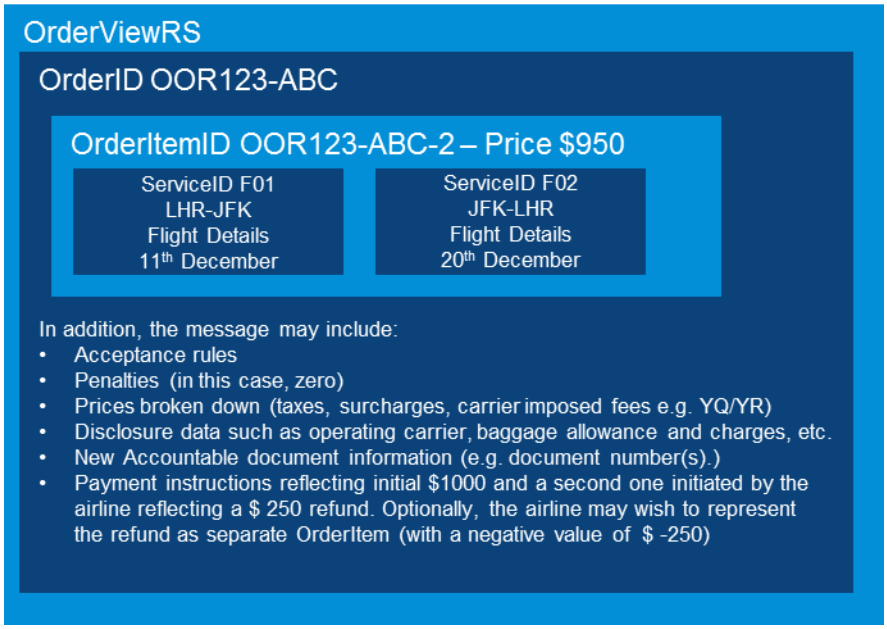
4. The Seller displays the options to the Customer and the Customer decides to proceed with the proposed change (which include a refund), as presented in the ORA's Offer. The Seller/Aggregator sends an OrderChangeRQ to the ORA.



5. The ORA updates the existing Order by creating a new Order Item corresponding to OfferItem OOF123-ABC-2, originally sent to the Seller in the OrderReshopRS. The ORA then cancels the existing OrderItem from the Order and processes the refund.

Note – in this instance, the Airline applies the refund to the Customer's original form of payment. However, provision exists in the OrderChangeRQ message to carry a different form of payment. In the future, the messages expect to be able to support both from the Seller and from the Airline, the ability to indicate which form of payment (e.g. existing or new) to apply a refund to.

6. The ORA sends an OrderViewRS to the Seller/Aggregator containing the details of the updated Order, which contains the new Order Item for the new flights, along with new accountable document information and confirmation that the refund is being processed.



Post conditions

The Customer has successfully changed the original Order and their Order now contains a new Order Item, featuring a round-trip from LHR to JFK, the outbound flight being one day later than in the original Order. The ORA issued a new accountable document for the refund, and the refund is being processed to the Customer's original form of payment. The ORA has communicated these details to the Seller.

3.5.4.7 Use Case 14a – Changing flights in a paid Order – Refund unbundled premium seats – Warning: This UC does not reflect the v17.2 schemas

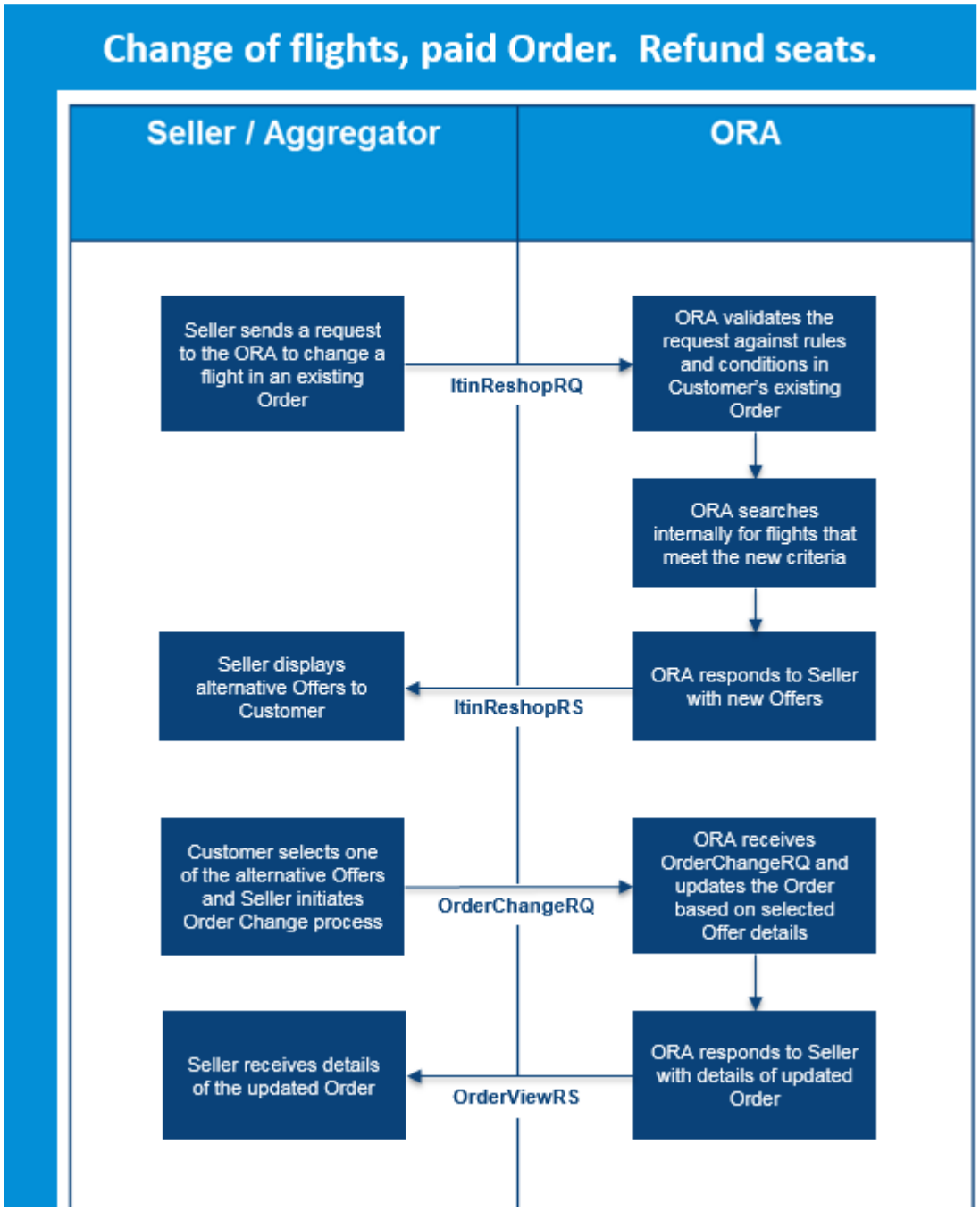
Description

A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. He would now like to depart on the 11th December. This Order also includes unbundled premium seat assignments.

This Use Case describes making a change to one flight from a round trip, where both existing flights are contained within a single OrderItem, the premium seats are in a different OrderItem, and the seats charge is refunded.

Preconditions/Assumptions

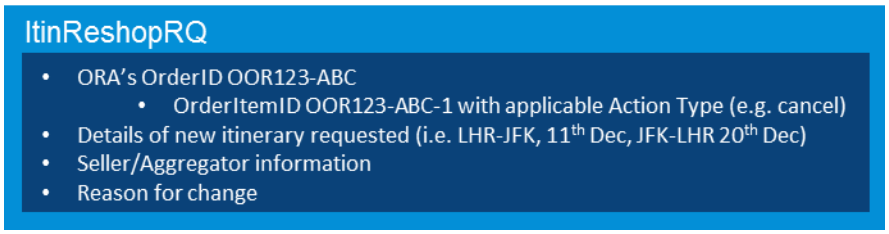
- The Order has already been paid, and accountable documents have been issued.
- There are no change restrictions, change fees nor penalties.
- Travel has not commenced



Existing Order

Steps to follow in the process

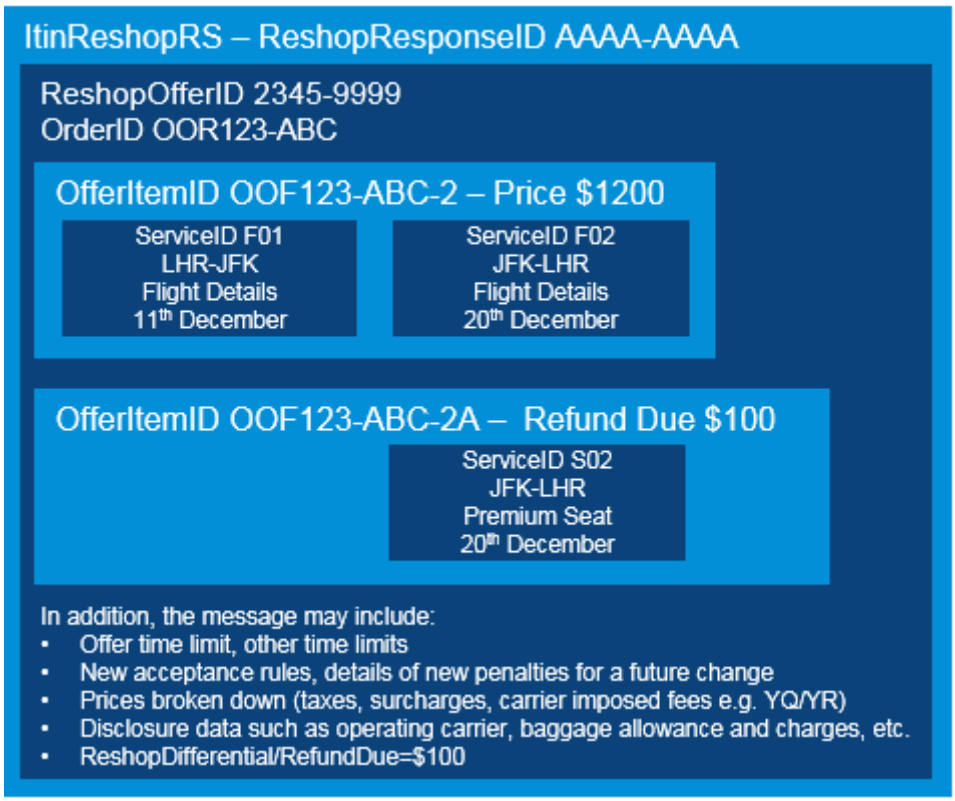
1 The Seller/Aggregator sends an ItinReshopRQ message to the ORA, requesting a change to the outbound LHR-JFK flight (the Customer would like to move the flight one day later).



2. The ORA receives the request, validates that a change to the Order is permissible, and builds Offers in its Offer Management System for the new requested itinerary.

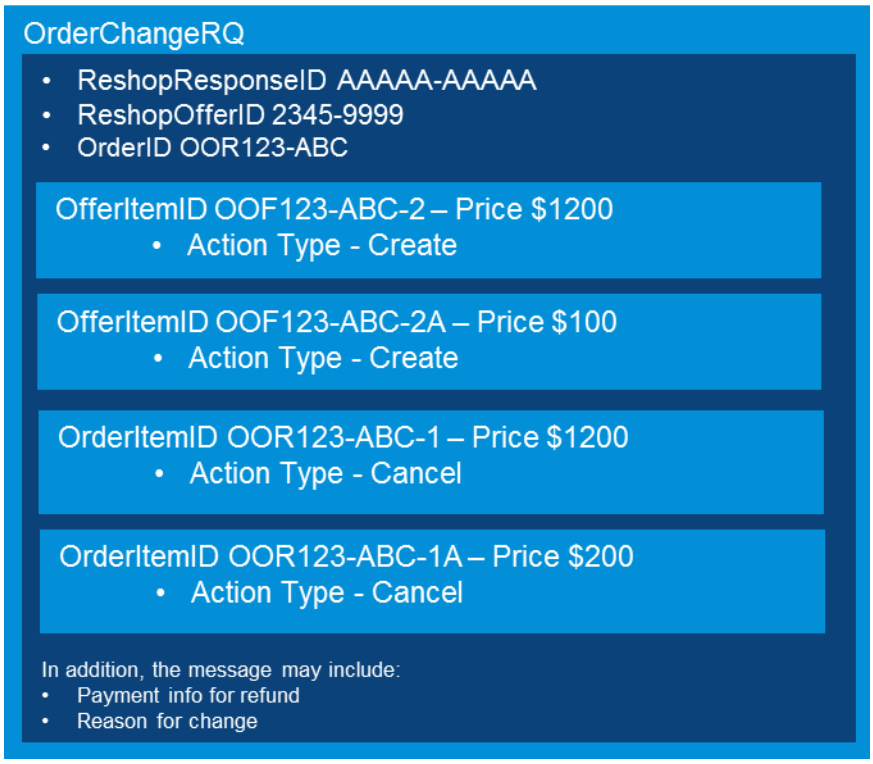
3. The ORA generates and sends an ItinReshopRS to the Seller/Aggregator.

Note - Premium seats are not available on the new flight, therefore, if customer selects this Offer, a refund is due.



4. The Seller displays the options to the Customer and the Customer decides to proceed with the proposed change, as presented in the ORA's Offer. The Seller/Aggregator sends an OrderChangeRQ to the ORA.

Note - A refund is due since no premium seats are available on new flight, so message may include preference for form of payment on which to apply the refund.



5. The ORA updates the existing Order by creating two new OrderItems corresponding to OfferItem OOF123-ABC-2 and OfferItem OOF123-ABC-2A, originally sent to the Seller in the ItinReshopRS. The ORA then cancels the existing two OrderItems from the Order.

6. The ORA updates accountable documents as necessary.

7. The ORA sends an OrderViewRS to the Seller/Aggregator containing the details of the updated Order, which contains the new Order Item for the new flights, and a premium seat on the return flight only, along with new accountable document information.

Post conditions

The Customer has successfully changed the original Order and their Order now contains two new OrderItems, featuring a round-trip from LHR to JFK, the outbound flight being one day later than in the original Order. A separate OrderItem houses a premium seat for the return flight. A refund was applied to the original form of payment, and the ORA has already updated the accountable documents, and communicated these details to the Seller.

3.5.4.8 Use Case 14b – Changing flights in a paid Order – Reshop flights and bundled premium seats - Warning: This UC does not reflect the v17.2 schemas

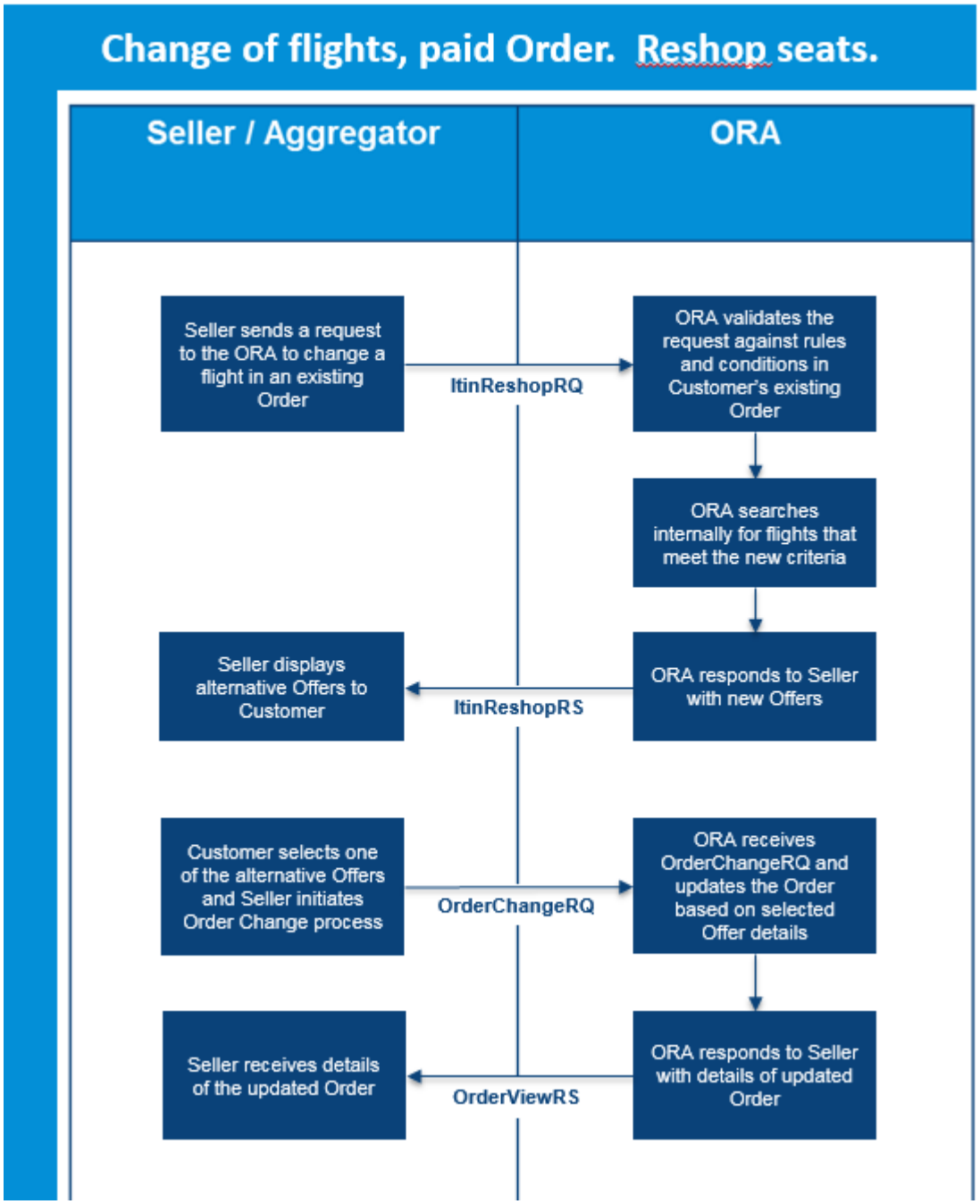
Description

A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. They would now like to depart on the 11th December. This Order also includes bundled premium seat assignments.

This Use Case describes making a change to one flight from a round trip, where both existing flights and bundled premium seats are contained within single OrderItems. The outbound trip OrderItem (flight and seat) requires reshopping.

Preconditions/Assumptions

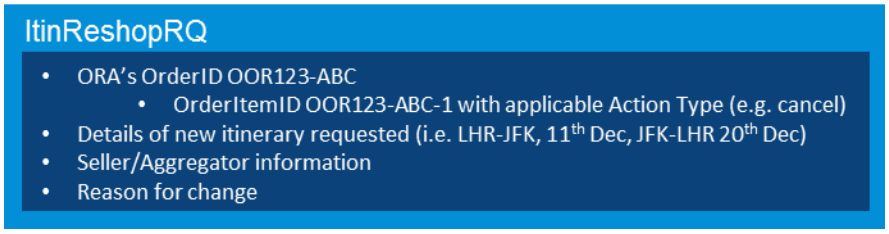
- The Order has already been paid and accountable documents have been issued.
- There are no change restrictions, change fees nor penalties.
- Travel has not commenced.



Existing Order

Steps to follow in the process

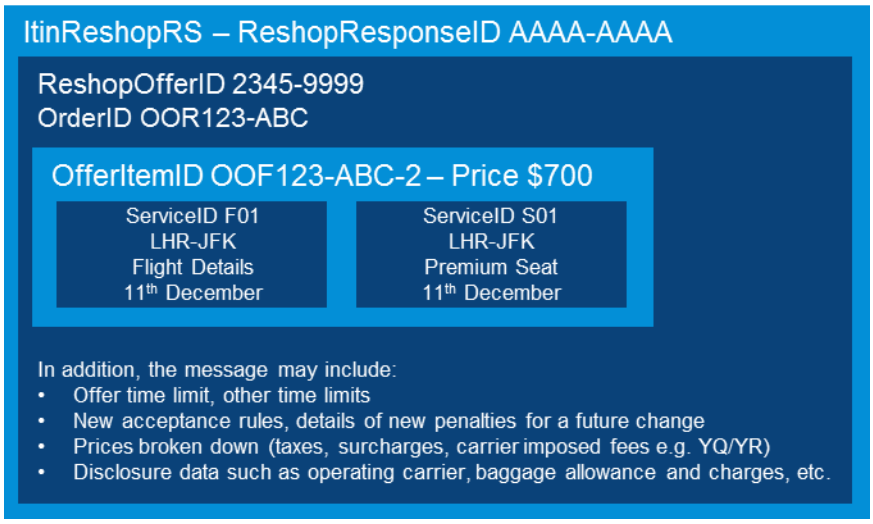
1. The Seller/Aggregator sends an ItinReshopRQ message to the ORA, requesting a change to the outbound LHR-JFK flight (the Customer would like to move the flight one day later).



2. The ORA receives the request, validates that a change to the Order is permissible, and builds Offers in its Offer Management System for the new requested itinerary.

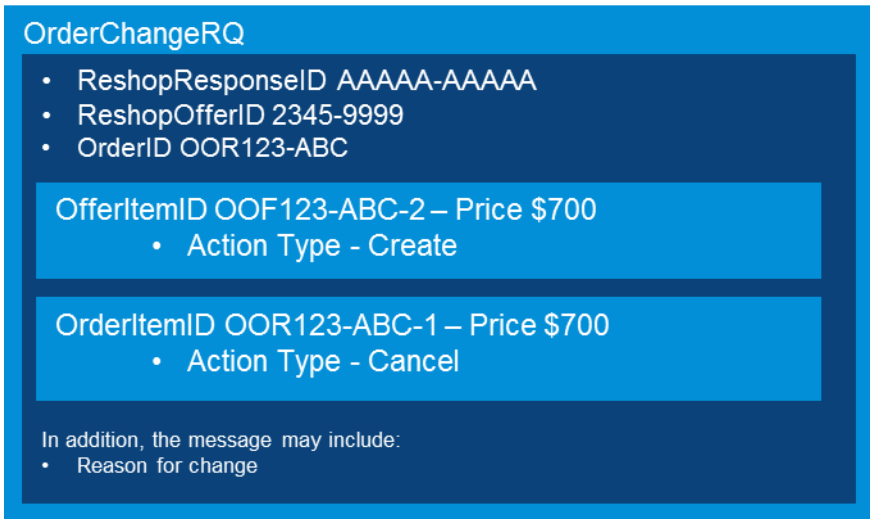
3. The ORA generates and sends an ItinReshopRS to the Seller/Aggregator.

Note - Flight and premium seats for new departure date are reshopped and presented in a single bundled OfferItem



4. The Seller displays the options to the Customer and the Customer decides to proceed with the proposed change, as presented in the ORA's Offer. The Seller/Aggregator sends an OrderChangeRQ to the ORA.

Note - Payment information is not included since there are no price changes nor penalties for the change.



5. The ORA updates the existing Order by creating two new OrderItems corresponding to OfferItem OOF123-ABC-2 and OfferItem OOF123-ABC-2A, originally sent to the Seller in the ItinReshopRS. The ORA then cancels the existing two OrderItems from the Order.

6. The ORA updates accountable documents as necessary.

7. The ORA sends an OrderViewRS to the Seller/Aggregator containing the details of the updated Order, which contains the new Order Item for the new flights, and a premium seat on the return flight only, along with new accountable document information.

Post conditions

The Customer has successfully changed the original Order and their Order now contains one new OrderItem containing a flight and premium seat for the new departure date.

3.5.4.9 Use Case 15a – Cancelling one flight from an itinerary (partial order cancellation), no ancillaries - Warning: This UC does not reflect the v17.2 schemas

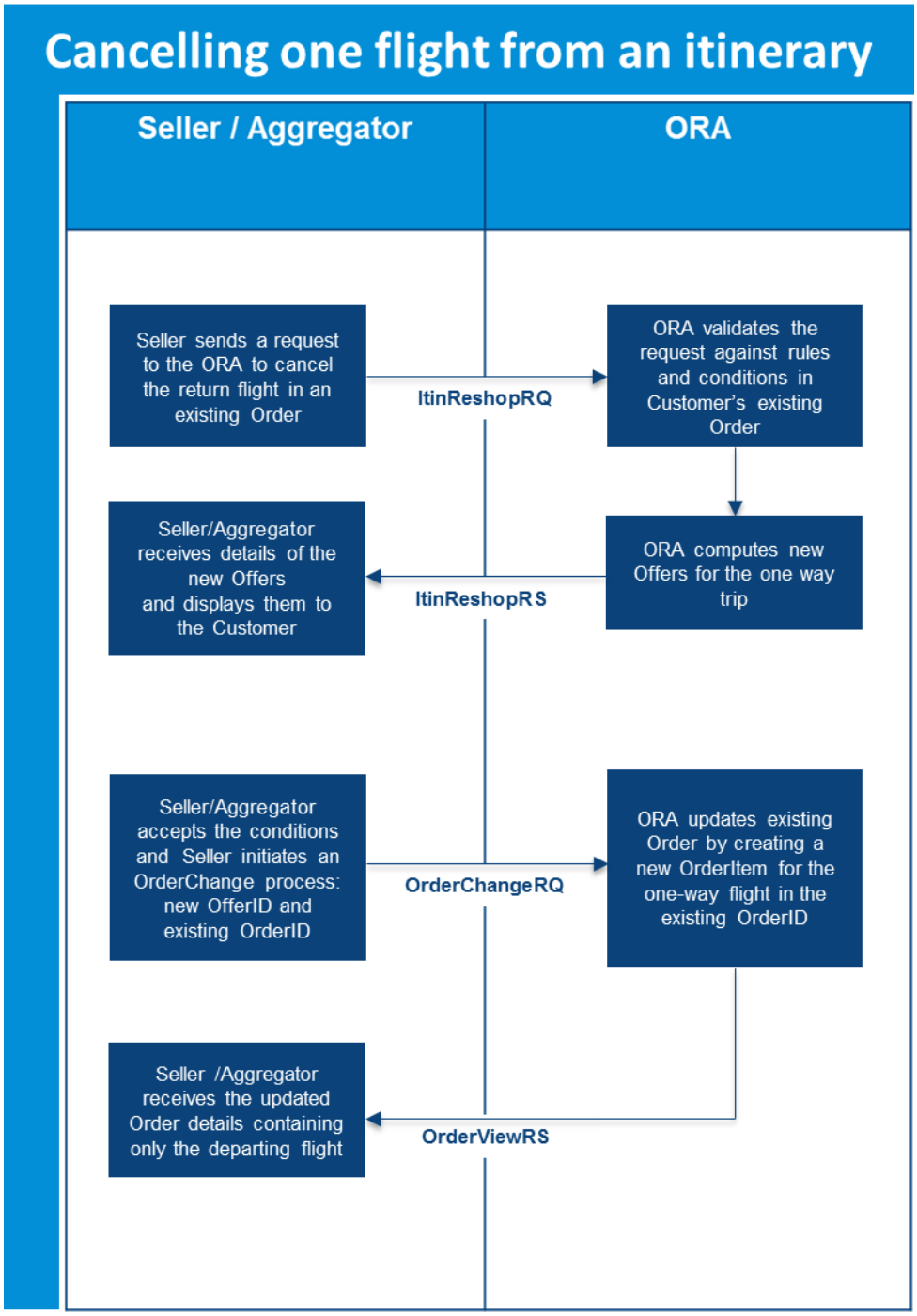
Description

A Customer has an Order for a round trip travel to London from New York, departing on the 10th of December and returning on the 20th. They would now like to cancel the flight for 20th of December.

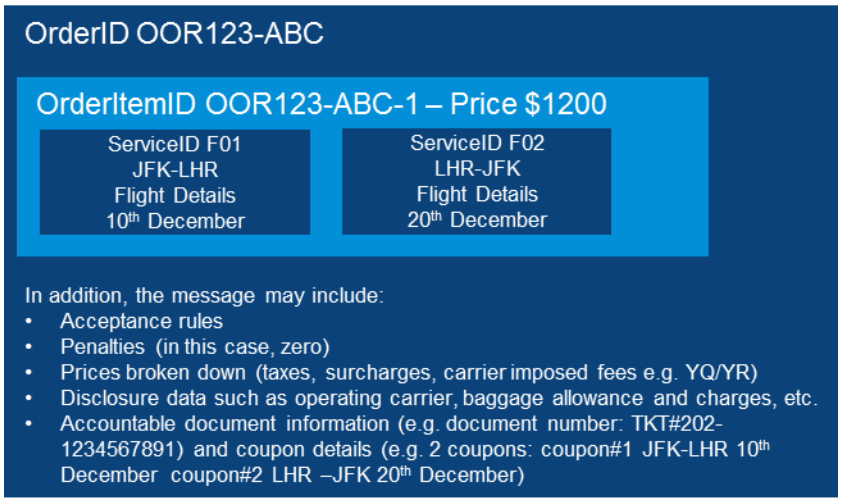
This Use Case describes cancelling one flight from a round trip, where both existing flights are contained within a single Order Item.

Preconditions/Assumptions

- The Order has already been paid, and accountable documents have been issued.
- There are no ancillaries associated with the Order.
- There are no change restrictions, change fees nor penalties.
- Travel has not commenced.

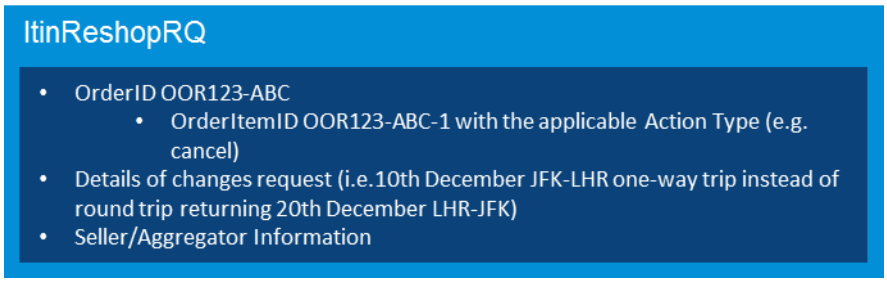


Existing Order



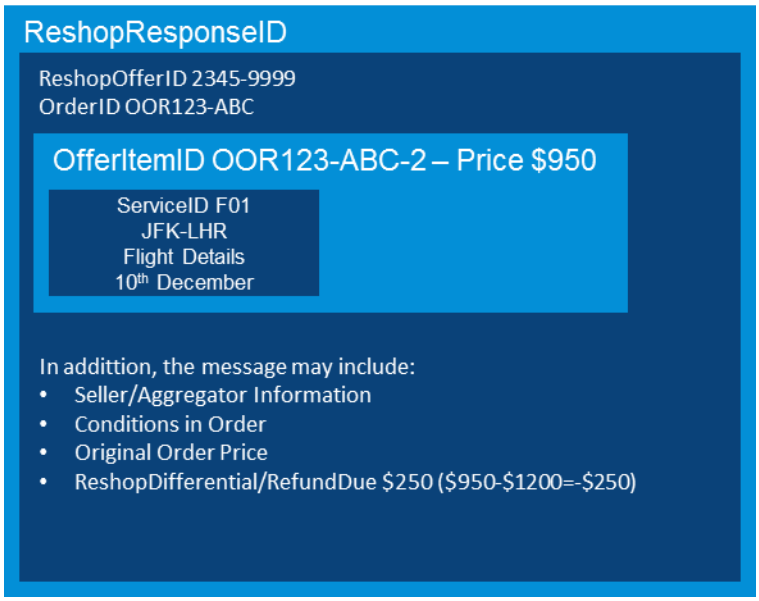
Steps to follow in the process

14. The Seller/Aggregator sends an ItinReshopRQ message to the ORA, requesting the cancellation of the return flight: LHR-JFK 20th December.

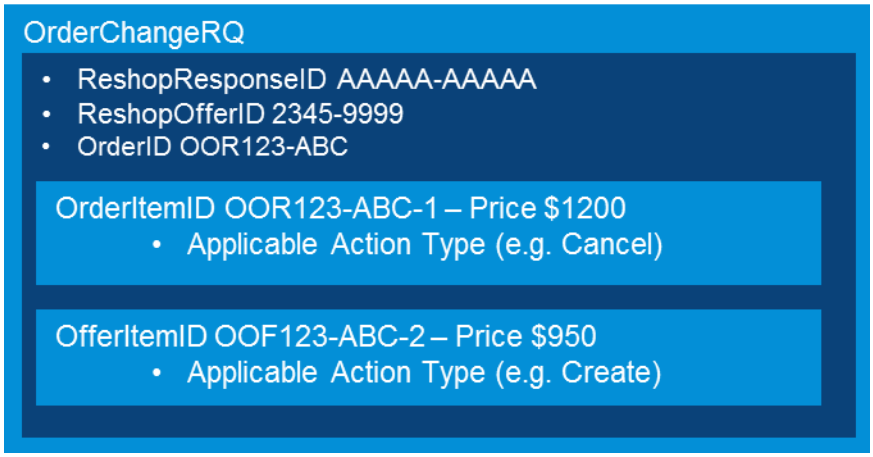


15. The ORA receives the request and validates that a change to the Order is permissible, in that case at no cost, and builds Offers for the new itinerary (i.e. One way instead of round trip).

16. ORA responds to the Seller/Aggregator with the ItinReshopRS sending the details of the new Offers.

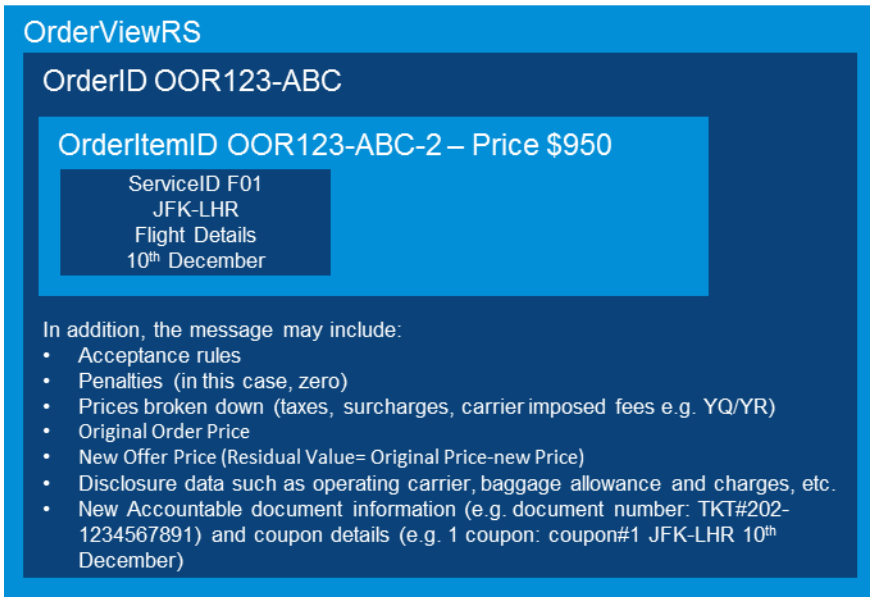


17. The Customer wishes to proceed with the change and the Seller/Aggregator sends the OrderChangeRQ accordingly.

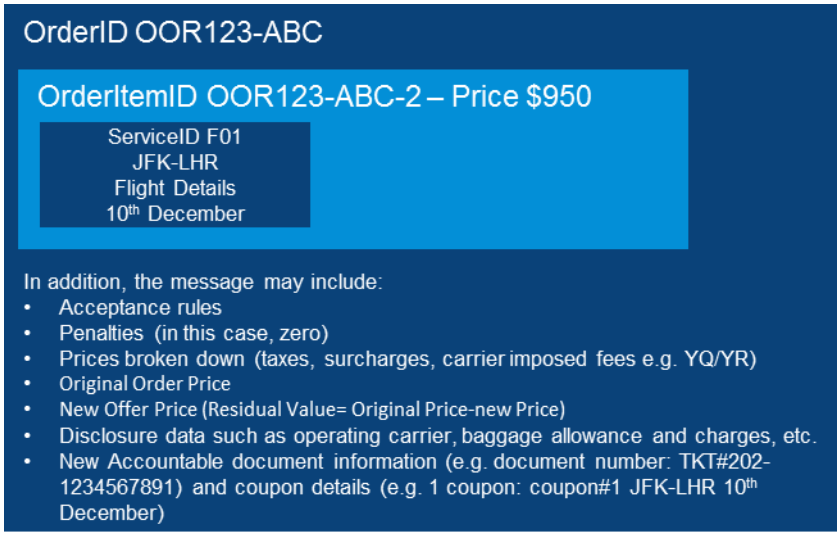


18. ORA updates existing Order by creating a new OrderItem corresponding to the OfferItem proposed by the ItinReshopRS for the one-way flight, cancels the existing OrderItem from the Order and modifies accountable documents as necessary. It then initiates a refund to the Customer.

19. The ORA sends an OrderViewIRS to the Seller/Aggregator containing the one-way flight and the updated information about the accountable documents.



New Order



Post conditions

The Customer has successfully changed the original Order, featuring a one way-trip from JFK to LHR instead of a round-trip flight from JFK-LHR-JFK. The ORA has already updated the accountable documents, and communicated these details to the Seller. Residual value (calculated as difference between initial and new value of the Order) refund process has been performed by the ORA.

3.5.4.10 Use Case 15b – Cancelling an individual ancillary (partial Order cancellation) Warning: This UC does not reflect the v17.2 schemas

Description

A Customer has an Order for one-way trip travel to London from New York, departing on the 10th of December with a premium seat bundled. They would now like to cancel the premium seat assigned.

This Use Case describes cancelling one ancillary from a one-way trip, when flight and ancillary are bundled within a single Order Item.

Flow

The process is very similar to the previous use case; each step is largely the same (the inbound flight in the previous example is analogous to the Seat Assignment in this example) and uses these messages/follows these steps…

1. ItinreshopRQ/RS - to obtain an Offer from the ORA to make the change (in this case removing the seat assignment from the Order).

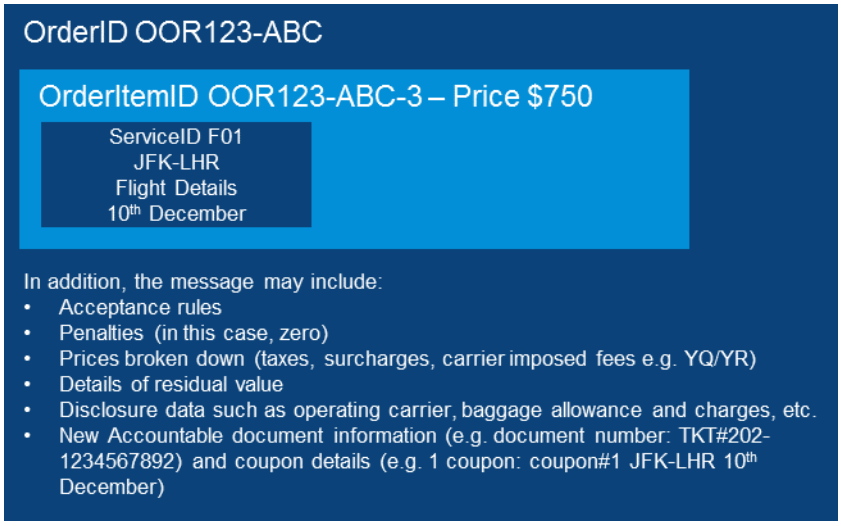
   Note – to achieve this, as the Seat Assignment is contained within the same Order Item as the flight, the entire Order Item needs to be reshopped and replaced with a new Order Item featuring just the flight).

2. OrderChangeRQ/OrderViewRS – This asks for the creation of a new OrderItem (flight without ancillary) and cancellation of the existing OrderItem (flight bundled with ancillary).

The existing and resulting changed Order are presented here for illustration.

Existing Order

New Order



Post conditions

The Customer has successfully cancelled the assigned for the premium seat, and the changed Order now features just a one way-trip from JFK to LHR, without any ancillary. The ORA has already updated the accountable documents, and communicated these details to the Seller. Residual value (calculated as difference between initial and new value of the Order) refund process has been performed by the ORA.

3.5.4.11 Use Case 16 – Partially flown itinerary, remainder of itinerary being cancelled

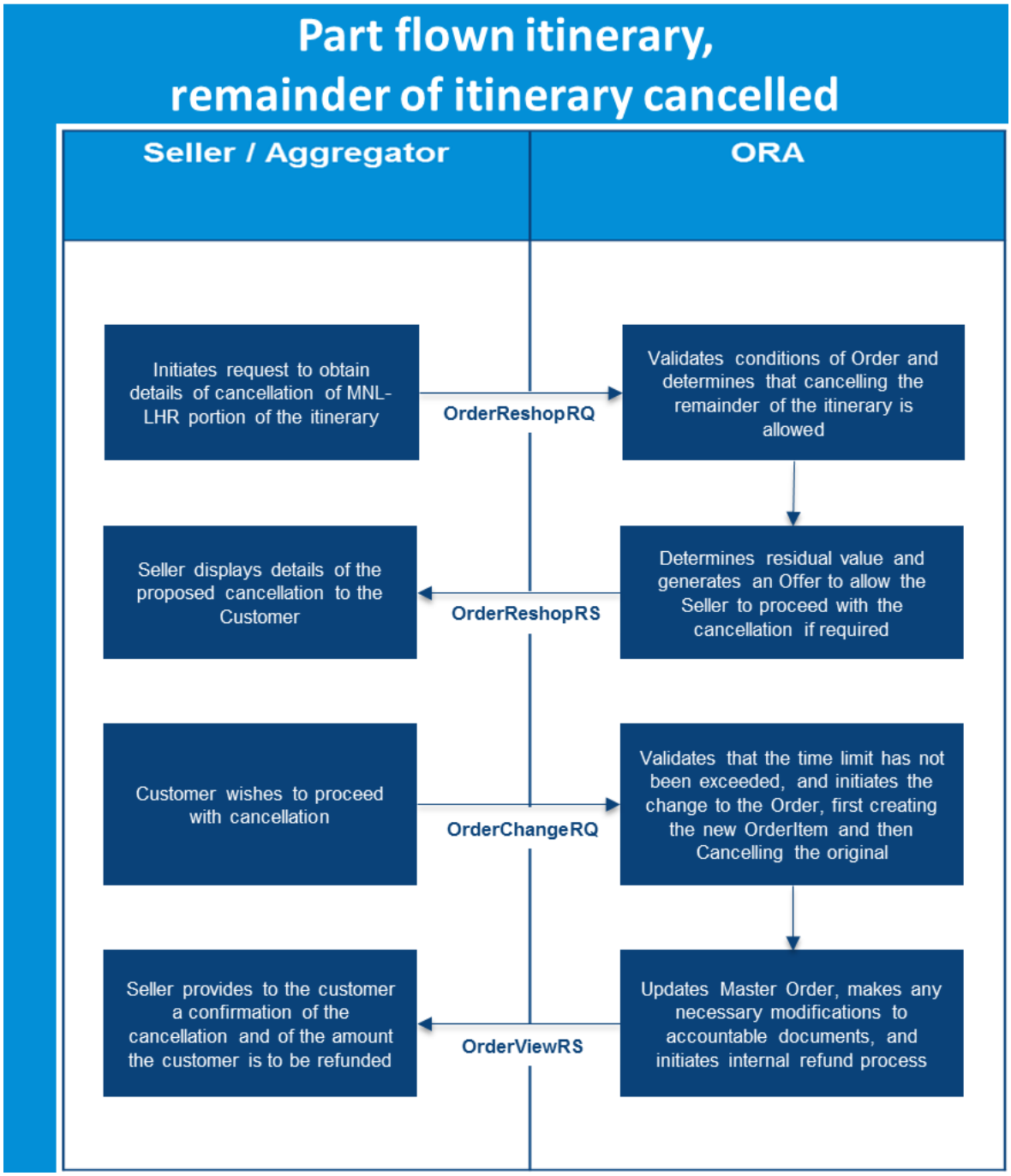
Description

This Use Case describes the process of a Seller/Aggregator (acting on behalf of the Customer) initiating a change to an existing Order (OrderID 1234-5678) after travel has commenced. The Customer has already travelled on the outbound portion of their itinerary (LHR-HKG-MNL) and does not want to fly the return portion (MNL-HKG-LHR).

Preconditions/Assumptions

- An OrderCancelRQ is only used when an entire Order is being cancelled. It cannot be used when cancelling the remainder of a part-flown itinerary, because the Order must persist the consumed Services (albeit within a new Order Item).

- The Customer or the Seller/Aggregator (on behalf of the Customer) is in possession of a confirmed Order for travel LHR-HKG-MNL-HKG-LHR, with the LHR-HKG and HKG-MNL segments having been consumed.
- There are no change restrictions for the ORA on this Order.
- Accountable documents have already been issued against this Order.
- The ORA makes any required modifications to accountable documents after the Order has been updated, but before returning their OrderViewRS to the Seller.
- The ORA returns any residual value to the Customer in the form of a Refund to their original form of payment, and does so automatically when the Order has been updated, but before returning its OrderViewRS to the Seller.
- Whenever a change is being made to an Order (other than a full Cancellation of a completely unflown Order), an OrderReshopRQ/RS should be used in advance of an OrderChangeRQ between ORA and any POAs that already participate in the Order.
- This workflow means that regardless of how an Order is being changed (adding, removing or replacing OrderItems, unflown/part flown), the same workflow can be implemented.

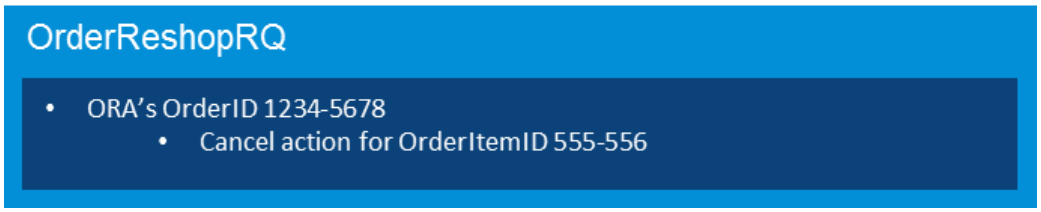


Existing Order

Note - This is an internal representation of the Order. Not all data will necessarily be sent to all parties in a message.

Steps to follow in the process

1. The Seller/Aggregator initiates an OrderReshopRQ to request a solution relating to the cancellation of the MNL-HKG-LHR segments of the Customer's itinerary (Services H02 and B02 in the Order).



2. The ORA receives the OrderReshopRQ and validates the conditions relating to changes/cancellation of the Order.

3. The ORA determines the residual value (if applicable) relating to cancellation of Services B02 (the MNL-HKG flight) and H02 (the HKG-LHR flight).

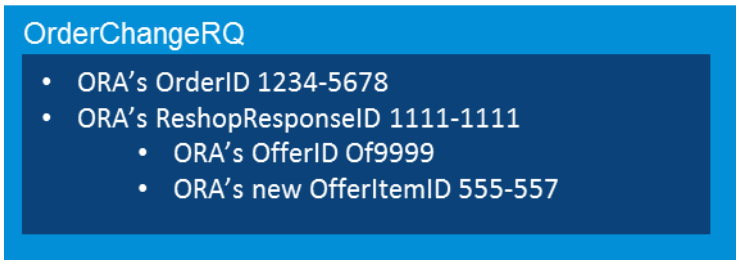
4. The ORA generates and sends an OrderReshopRS to the Seller/Aggregator. The message will include:

**Element used for communicating refund amount by Airline - OrderReshopRS/Response/ReshopOffers/ReshopOffer/DeleteOfferItem/ReshopDifferential/ReshopDue/ByAirline/Total/Amount*

5. The OrderReshopRS is received by the Seller/Aggregator and details of the cancellation along with the differential value are provided to the Customer.

6. The Customer decides to proceed with the cancellation.

7. The Seller/Aggregator sends an OrderChangeRQ to the ORA.



8. The ORA receives the OrderChangeRQ, validates that the Offer Time Limit has not been exceeded, and updates the Master Order (OrderID 1234-5678) with new ORA OrderItemID 555-557 (for OfferItemID 555-557) which only contains a "refund" Service R01. The acceptance of OfferItem 555-557 triggers the cancellation of OrderItem 555-556 as well as the refund associated with the new OfferItem 555-557.

9. The ORA makes any necessary modifications to Accountable Documents and initiates the process that results in a refund being applied to the Customer's initial form of payment.

10. The ORA responds with an OrderViewRS to the Seller/Aggregator which includes but is not limited to:

Post Conditions

The Seller/Aggregator, acting on behalf of the Customer, is in possession of a changed Order which features the ORA's LHR-HKG and HKG-MNL flown services, accountable document(s) have been updated and their numbers communicated to the Seller, and the Customer has had any residual value refunded the original form of payment, presented as a second OrderItem.

3.5.4.12 Order Repricing when Price Guarantee Time Limit has been exceeded, after Order has been created

Description

One traveler based in New York is in possession of an unpaid Order for a round-trip to Paris. The ORA's OrderID is YK225FA199.

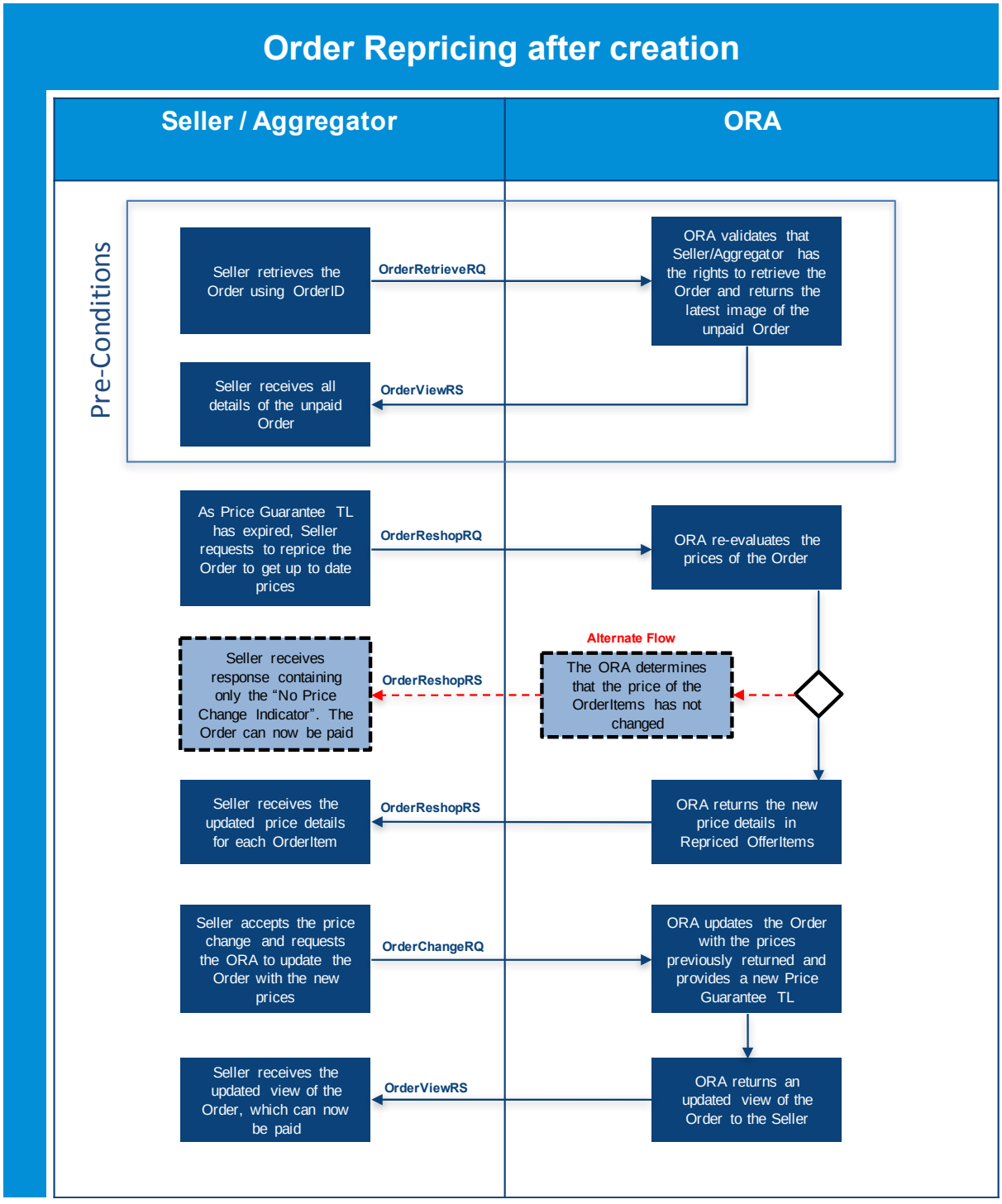
This use case describes the process of repricing an Order when the Price Guarantee Time Limit has been exceeded, and before the Payment Time Limit has expired. Two different outcomes are described:

- The first scenario in which the price has not changed.

- A second scenario in which the ORA has re-evaluated the price of an OrderItem and the new price has to be accepted by the Customer.

Preconditions/Assumptions

- The Order has been created but has not been paid yet, nor have accountable documents been issued.
- The Price Guarantee Time Limit has been exceeded.
- The Payment Time Limit has not expired yet: the Order is still present in the ORA's Order Management System.



Steps to follow in the process

17. The Seller/Aggregator retrieves the Master Order using the OrderID provided by the Customer.

OrderRetrieveRQ

The message may include…
- Seller/Aggregator information
- OrderID "YK225FA199" – ORA Z9

18. The ORA receives the OrderRetrieveRQ message, and validates that the Seller/Aggregator has the rights to retrieve the Order.

19. The ORA returns the latest image of the Order to the Seller/Aggregator using OrderViewRS message. The Order is unpaid and Price Guarantee Time Limit has been exceeded.

OrderViewRS

OrderID "YK225FA199"

Price Guarantee TL: **2017-05-30T23:59:59 (expired)**

Payment TL: **2017-06-01T23:59:59**

OrderItemID "YK225FA199-1" – Total Price $2800.00

ServiceID "YK225FA199-1-1"
SegmentID Sg001
- Z9 401 JFK-CDG 20SEP2017
- Flight details
- Business class (meets "flat bed seat" criteria)

PassengerID Pax01

ServiceID "YK225FA199-1-2"
SegmentID Sg002
- Z9 530 CDG-JFK 27SEP2017
- Flight details
- Business class (meets "flat bed seat" criteria)

PassengerID Pax01

OrderItemID "YK225FA199-2" – Total Price $90.00

ServiceID "YK225FA199-2-1"
ServiceDefinitionID Bag01
- First Additional Bag – up to 23KG
- XBAG – C/0CC

PassengerID Pax01

SegmentID Sg001

ServiceID "YK225FA199-2-2"
ServiceDefinitionID Bag01
- First Additional Bag – up to 23KG
- XBAG – C/0CC

PassengerID Pax01

SegmentID Sg002

In addition, the message may include…
- Traveler information:
  - Pax01: Jane Smith (ADT)
    - FFN: 1234525525
- Other time limits
- Order rules
- Prices broken out (taxes, surcharges, carrier imposed fees e.g. YQ/YR, etc.)
- Disclosure data such as operating carrier, baggage allowance and charges, etc.

20. As the Order's Price Guarantee Time Limit has been exceeded, the Seller/Aggregator sends an Order Repricing request to the ORA to get up to date prices. The Seller/Aggregator does this by using the "Reprice" function of OrderReshopRQ message.

OrderReshopRQ

The message may include…
- Seller/Aggregator information
- OrderID "YK225FA199"
- "Reprice"

**Note – By default, the complete Order is repriced, unless specific OrderItems are specified.*

21. Upon reception of OrderReshopRQ message with "Reprice" functionality, the ORA re-evaluates the prices of each of the OrderItems in the Order.

22. [Alternate Flow – no price change]

Although Price Guarantee Time Limit has been exceeded, it is possible that the prices of the OrderItems remain unchanged. If that's the case, the ORA returns an OrderReshopRS message containing only the "No Price Change Indicator".
No further action is required by the Seller/Aggregator, who can initiate the standard payment process.

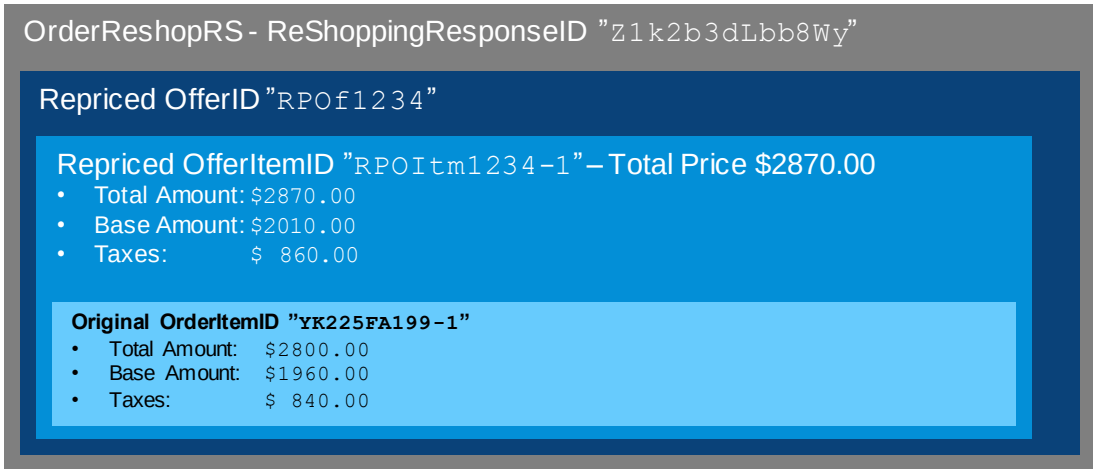
OrderReshopRS - ReShoppingResponseID "A9k2bs0Lbb2Se"

The message may include…
- NoPriceChangeInd = "true"

[End of Alternate Flow – no price change]

6. [Price change]

On the other hand, if the original price is not available anymore, the ORA returns an OrderReshopRS message containing a Repriced Offer with the details of the new prices.



**Note 1 – The Repriced Offer concept has been introduced to let the Customer accept the change of price before any modifications are done to the Order (acceptance is achieved with OrderChange message).*
**Note 2 – The Repriced Offer contains Repriced OfferItems which only include price information, and each Repriced OfferItem references a single OrderItem (one-to-one relationship).*
**Note 3 – If the price of a given OrderItem remains unchanged, a Repriced OfferItem should not be returned by the ORA (the original OrderItem remains valid). In this example, only the OrderItem containing the flights has a new price.*

7. The Seller/Aggregator presents the new prices to the Customer. After acceptance of the new price by the Customer, the Seller/Aggregator sends an OrderChangeRQ message to the ORA to update the Order with the new prices previously returned.

**Note 1 – The ResponseID in input of OrderChangeRQ is enough because only one Repriced Offer can be returned in each OrderReshopRS message.*
**Note 2 – There is no possibility to accept the price change for part of the Order only.*

8. ORA updates the relevant OrderItems with the new prices previously presented to the Customer. ORA may also re-assess the Price Guarantee Time Limit and return it to the Seller/Aggregator in the OrderViewRS.

3.5.4.13 Use Case 17 – Involuntary changes – Airline cannot provide an individual ancillary

Description

A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. His Order contains premium seat assignments for both inbound and outbound flights, with precise seats assignments.

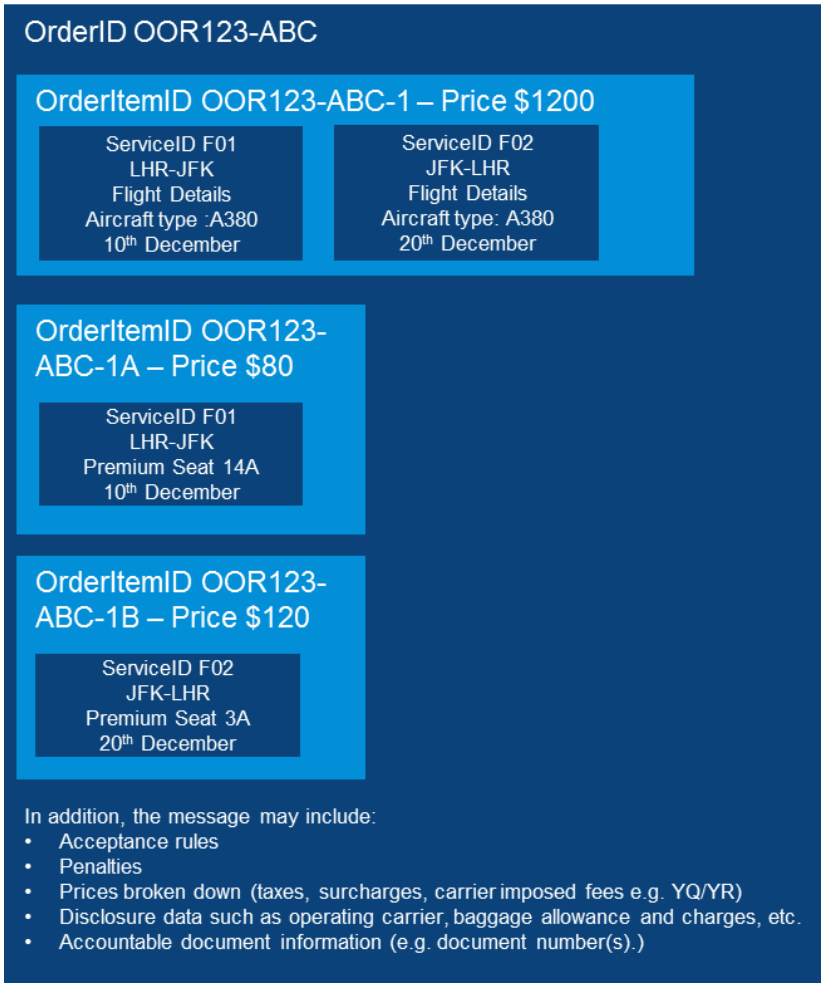
This Use Case describes a situation where a punctual operational situation (change of aircraft or broken seat) has a direct impact of the service proposed, premium seat in this example. The Order needs to be adjusted and the Seller notified.

Preconditions/Assumptions

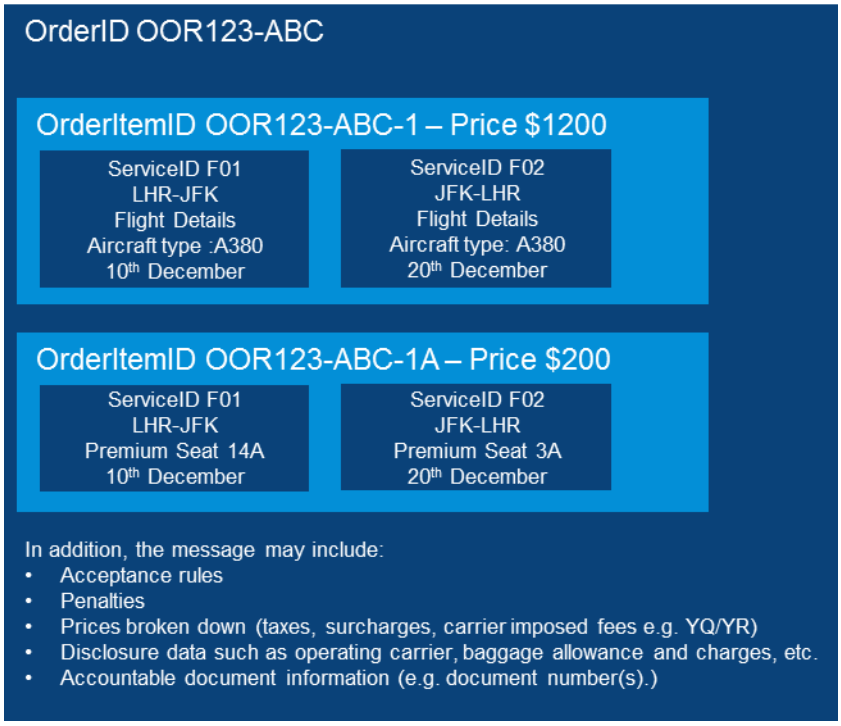
- The Order has already been paid, and accountable documents have been issued.
- This change occurs during the planning window - Travel has not commenced.
- There are no connecting flights in the original Order and only the ORA participates in the journey.
- Each illustration focuses on the flow from an ORA to one particular Seller for this particular Order, but the ORA should contact all Sellers that are impacted by the schedule change (i.e. for a given flight, the ORA will have many Orders for many different Passengers on that flight, and any Orders impacted by this involuntary change need processed in a similar way).

Existing Order: three potential situations:

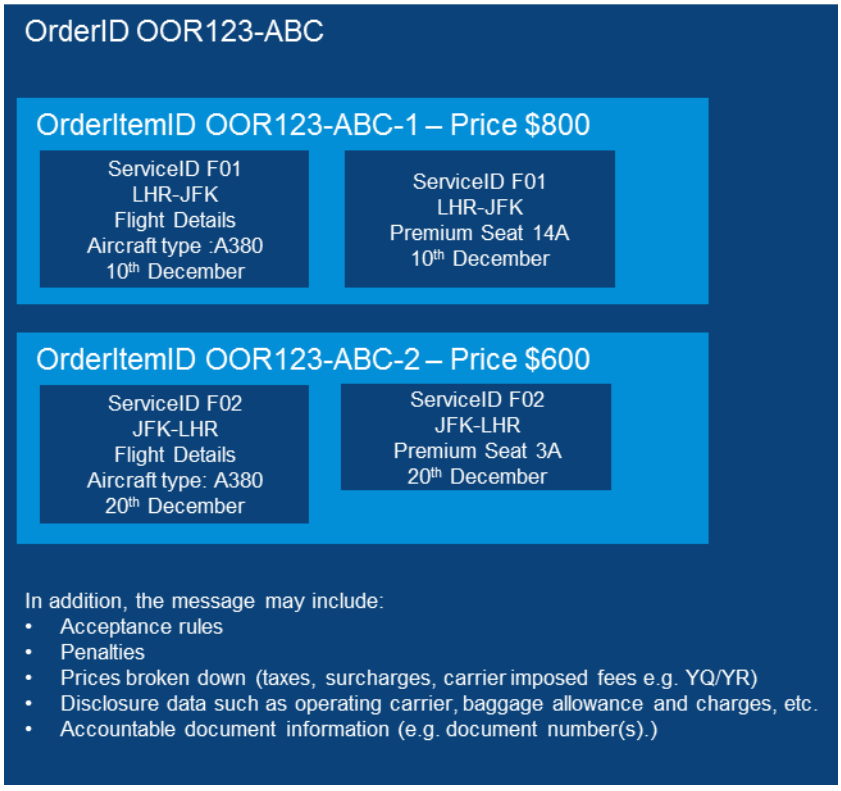
17 i) Premium seats are unbundled AB+BA



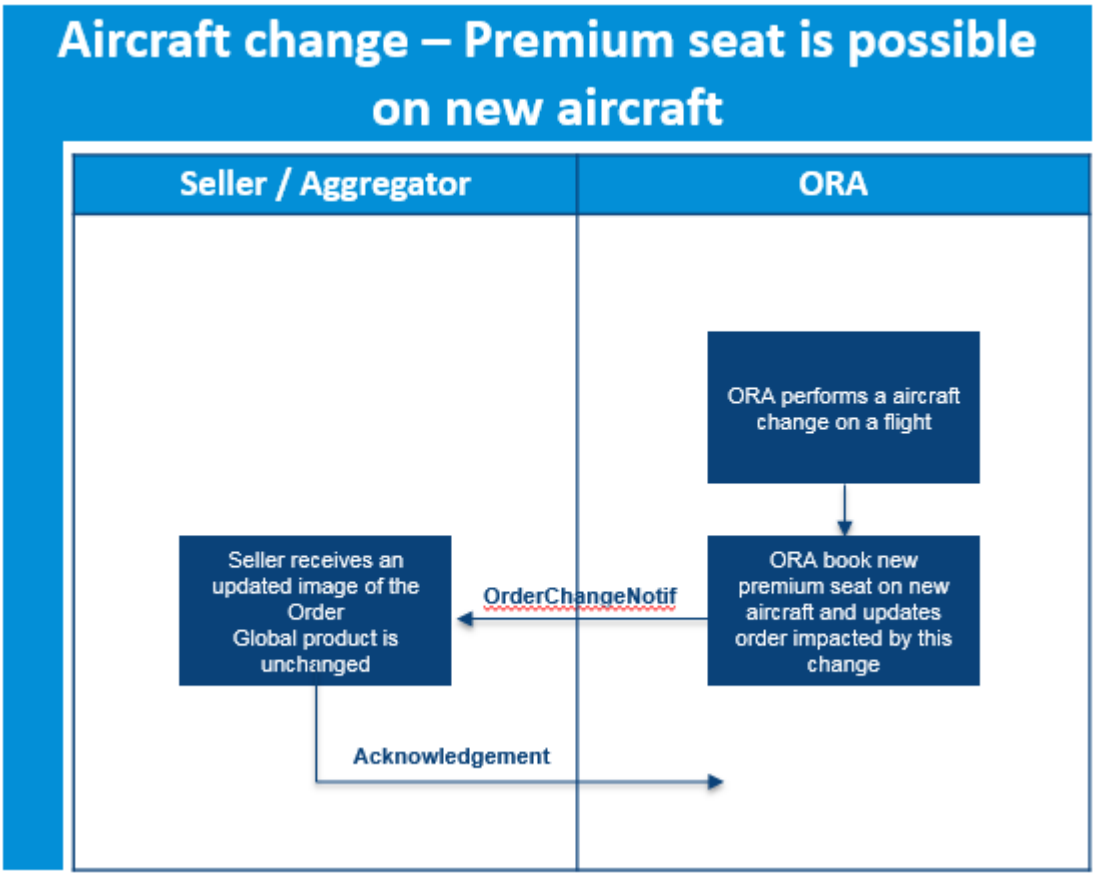
17 ii) Premium seat is a service independent from flight and proposed for the whole journey ABA



17 iii) Premium seat is bundled with flight on each leg



Scenario 17 a) Change of aircraft. Premium seat is possible on the new aircraft:



Steps to follow in the process

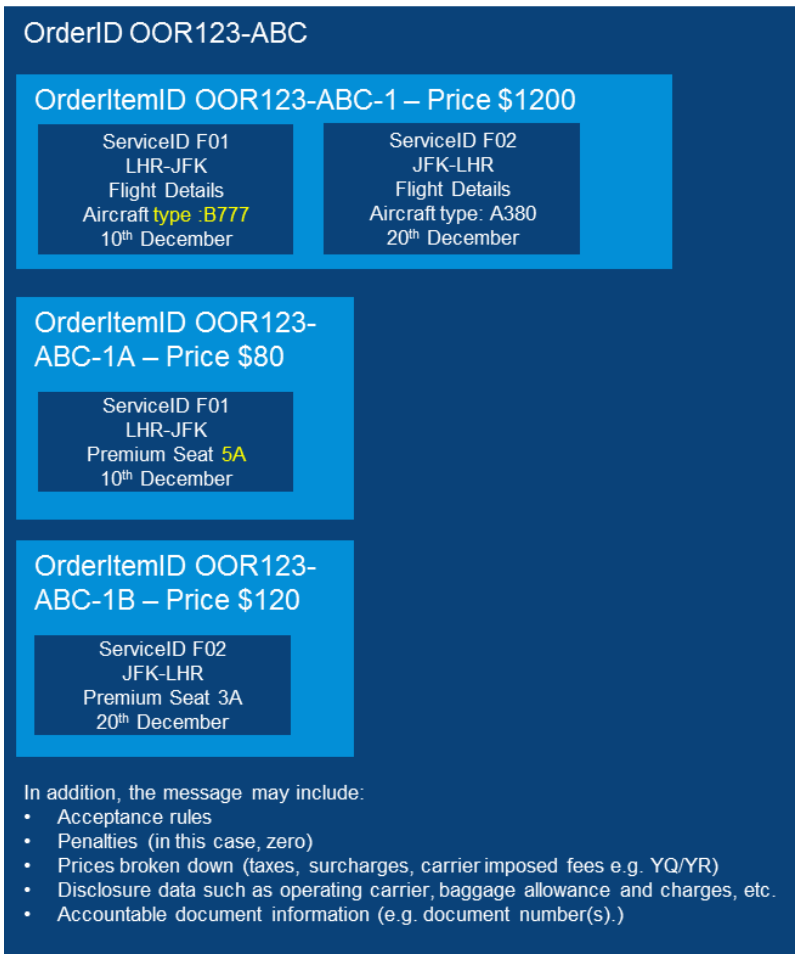
1. The ORA changes the outbound flight aircraft type (or the one that was booked turns out to be broken).

2. Premium seat is available on the new aircraft. (or another premium seat is available) The ORA changes the seat assignment, and the aircraft type on the Order.

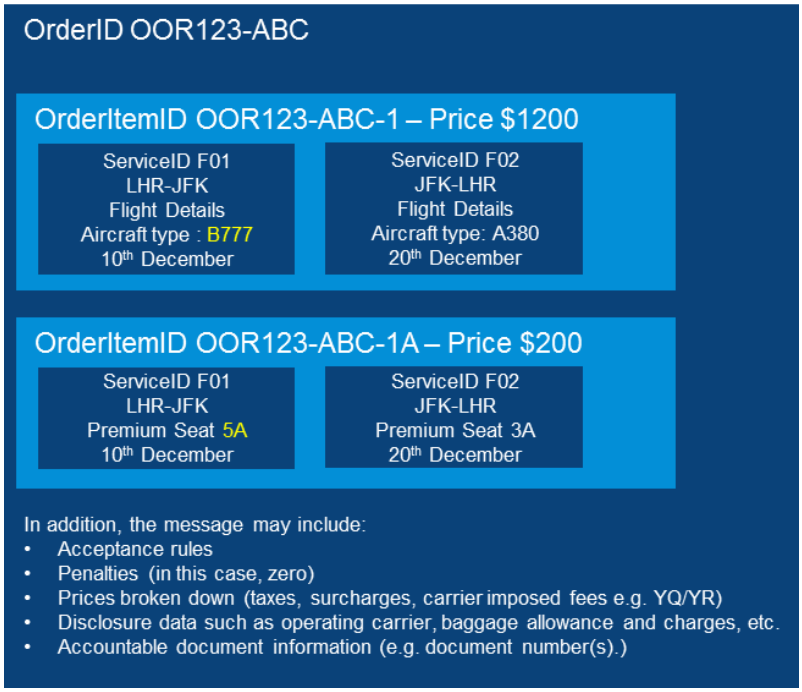
3. The ORA advises the Seller of the changes via OrderChangeNotif. In that case the OrderChangeNotif is mainly for information. No choice is needed, no refund either. The service can still be provided.

New Orders:

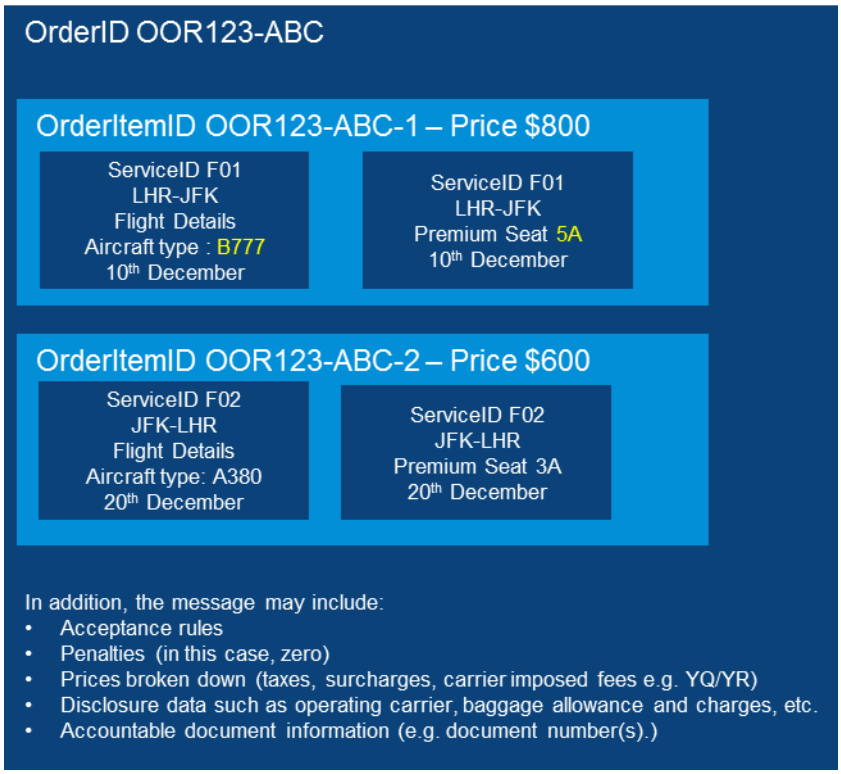
17 a) i) premium seats are unbundled AB+BAa



17 a) ii) Premium seat is a service independent from flight and proposed for the whole journey ABA



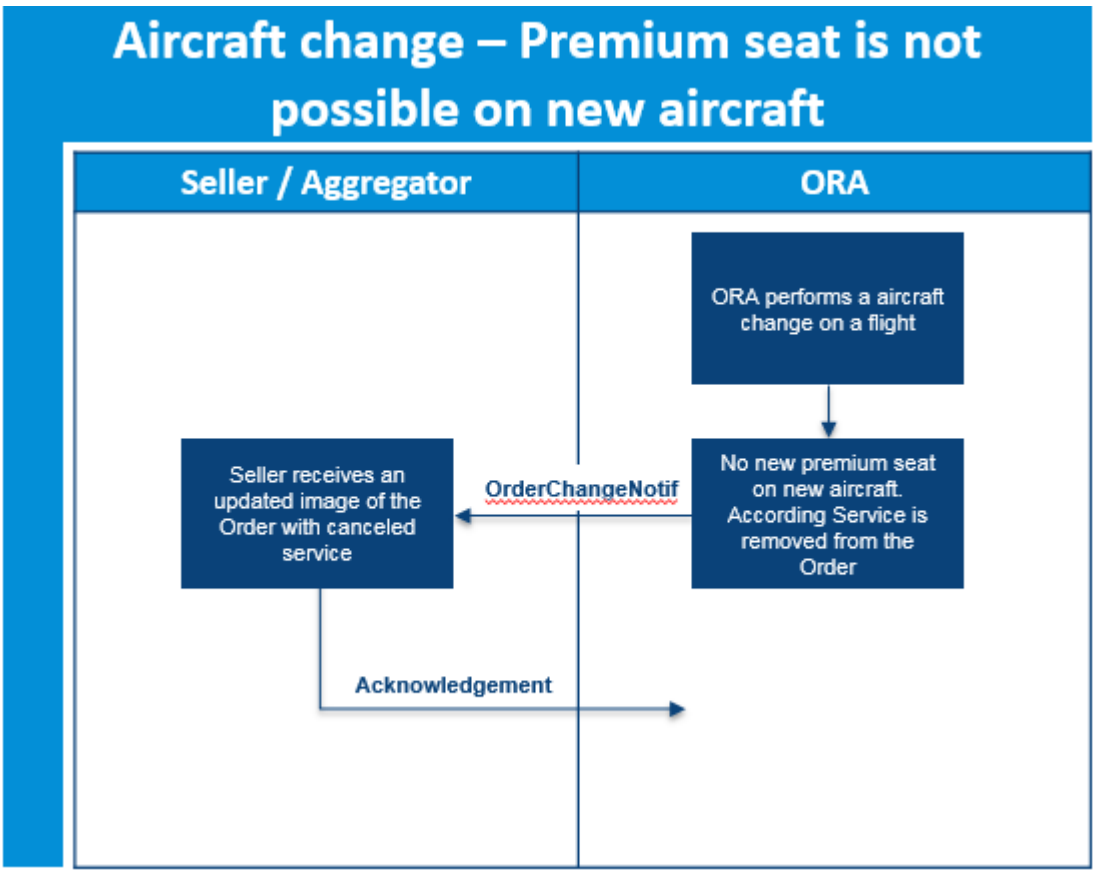
17 a) iii) Premium seat is bundled with flight on each leg



Post conditions (valid for all cases)

The ORA has successfully notified the Seller about the schedule change, and the Order has been modified accordingly.
For those light changes, OrderItemIDs are kept as in the initial Order.

Scenario 17 b) Change of aircraft. Premium seat is not possible on the new aircraft anymore. Premium seat needs to be canceled on outbound flight.



Additional Preconditions/Assumptions

- In OrderChangeNotif, no alternative Offers are presented to the Customer. We assume the Customer accepts the change.

Steps to follow in the process (the first steps are shared)

1. The ORA changes the outbound flight aircraft type. (or seat is broken on the outbound flight).

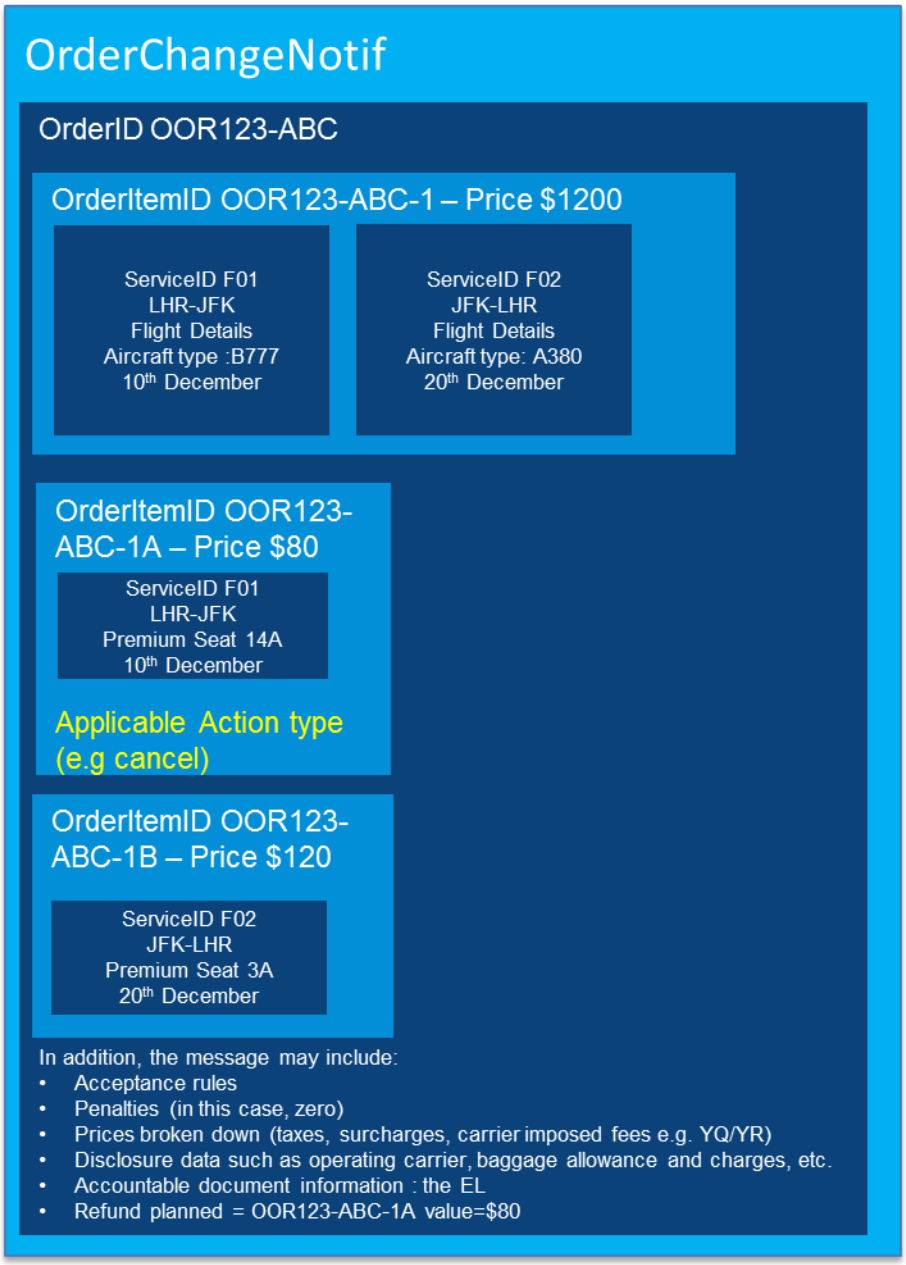
2. Premium seat is not available on the new aircraft. The ORA needs to cancel the premium seat on that flight.

3. Consequences are different depending on the scenario:

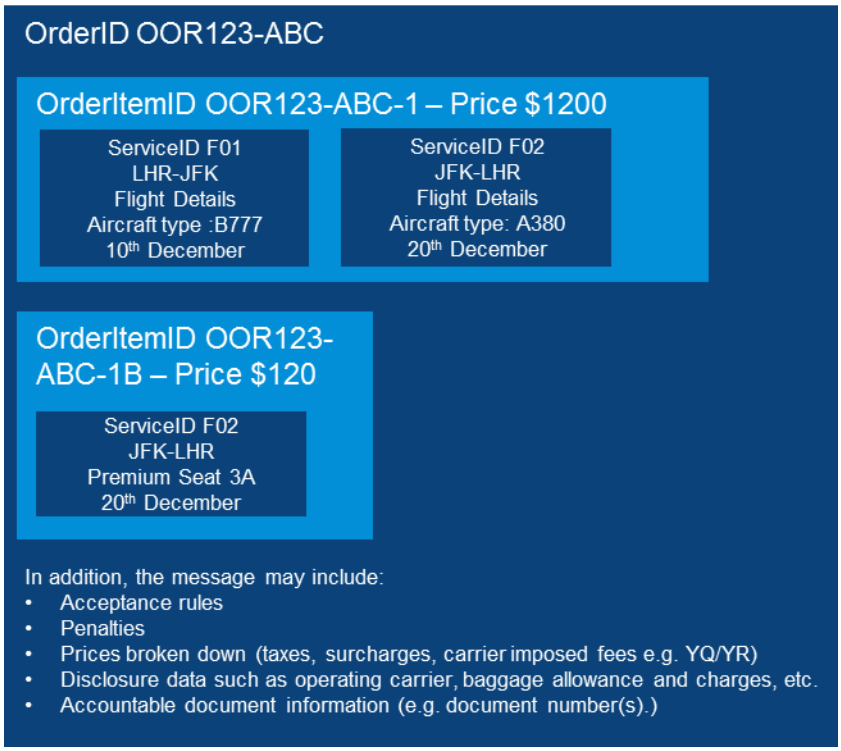
17 b) i) premium seats are unbundled AB+BA

1. The ORA suppresses the corresponding OrderItem in the Order. The rest of the Order remains the same.

2. The ORA advises the Seller via OrderChangeNotif, with an updated image of the Order, also mentioning the following step.



3. As there is a loss in the total value, equivalent to the one of the Order Item that was canceled, the ORA initiates a refund of that amount.



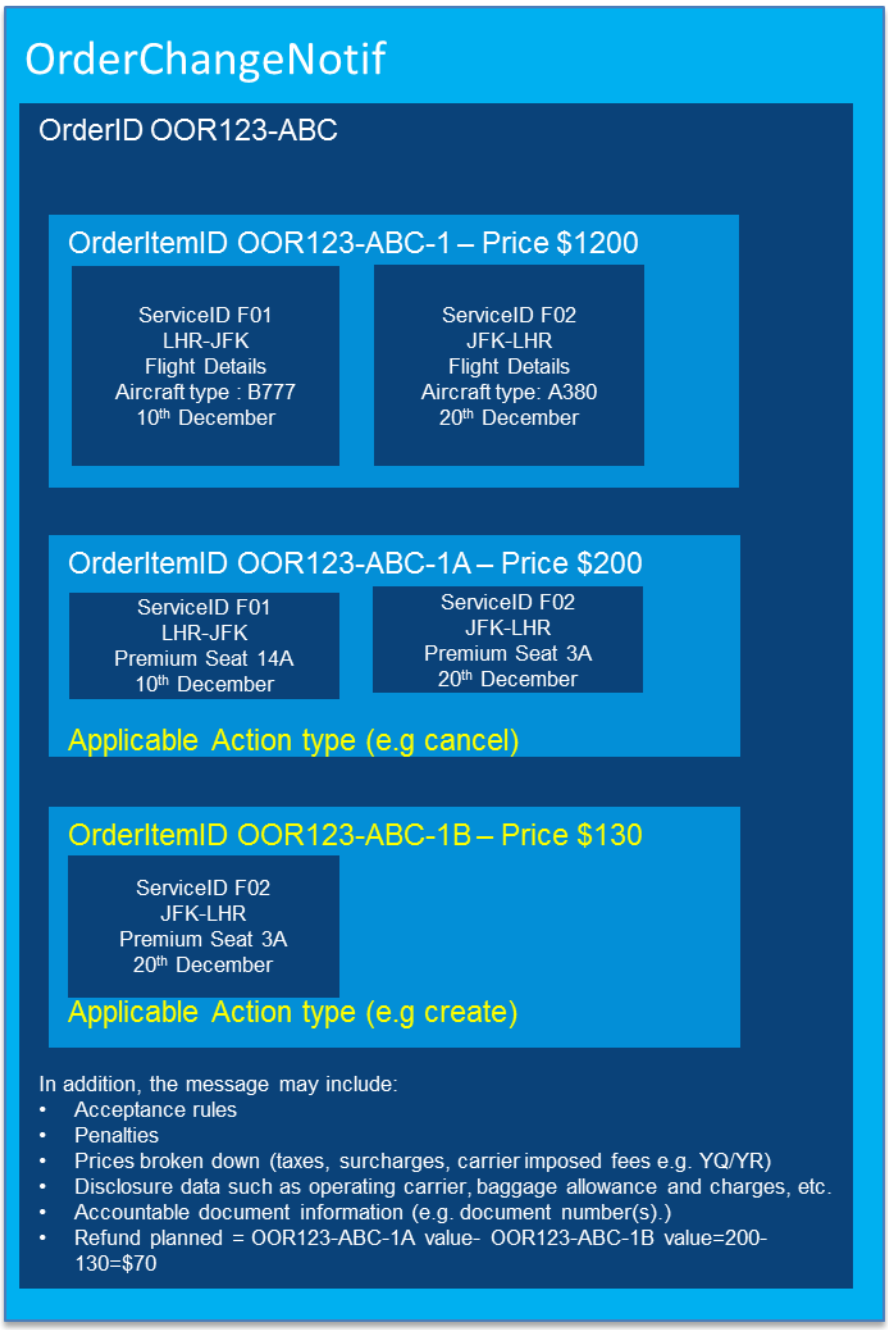
Post conditions

The ORA has successfully notified the Seller about the Order change. The accountable document corresponding to the canceled service has been suppressed.

17 b) ii) Premium seat is a service independent from flight and proposed for the whole journey ABA

The ORA cancels the existing OrderItem (with premium seat on both flights) and creates a new OrderItem (with premium seat on the inbound flight only)-new OrderItemID, new price-

1. The ORA advises the Seller via OrderChangeNotif, with an updated image of the Order, also mentioning the following step.



2. As there is a loss in the total value, equivalent to the difference between the one of the Order Item that was created and the one that was canceled, the ORA initiates a refund of that amount.

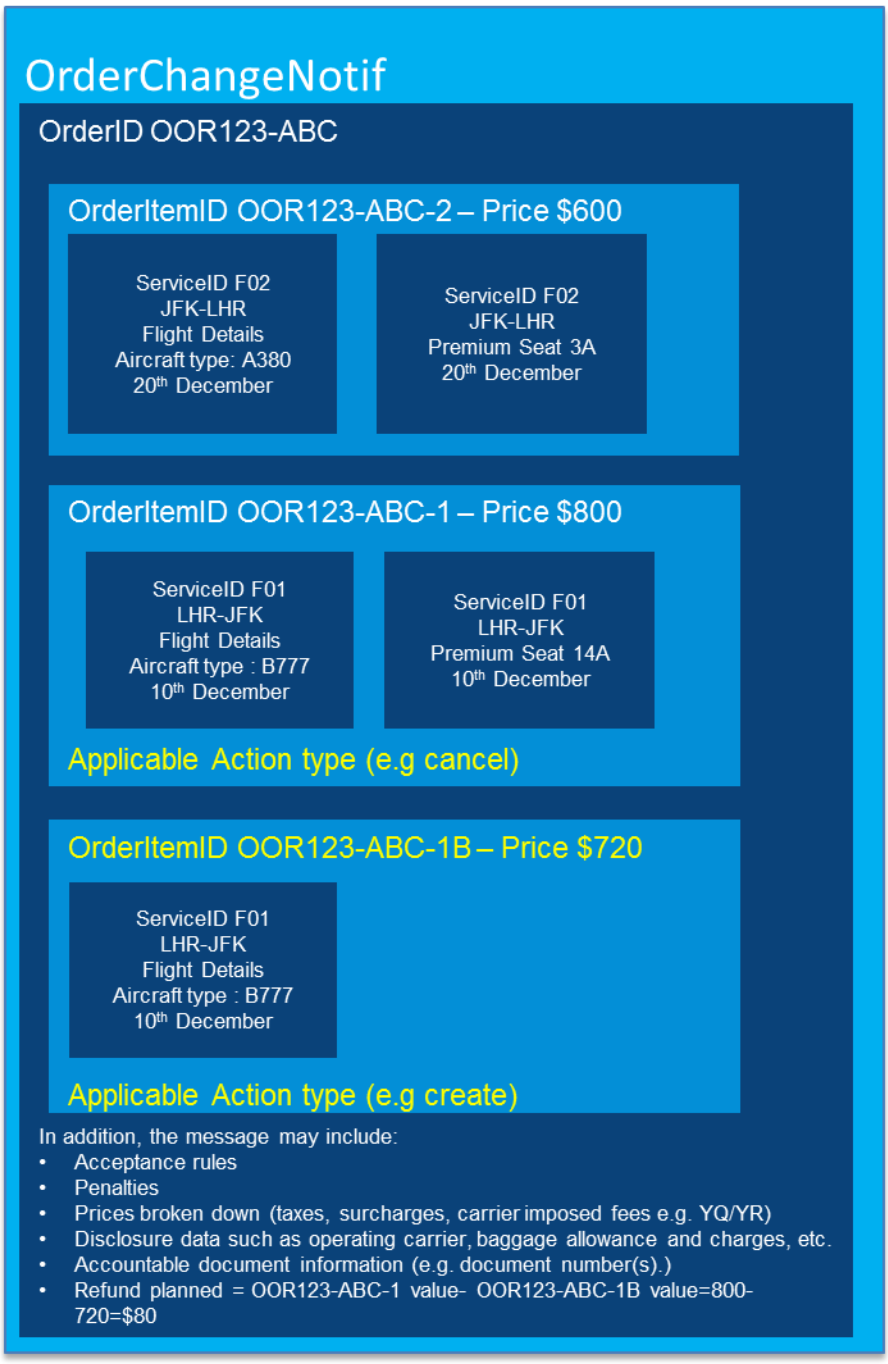
Post conditions

The ORA has successfully notified the Seller about the Order change. The accountable documents corresponding to the service have been adjusted (one coupon EMD vs 2; or 1 EMD vs 2 depending on the Airline setting).

17 b) iii) Premium seat is bundled with flight on each leg

The ORA cancels the existing OrderItem for outbound flight and creates a new OrderItem (with flight only)-new OrderItemID, new price-

3. The ORA advises the Seller via OrderChangeNotif, with an updated image of the Order, also mentioning the following step.



4. As there is a loss in the total value, equivalent to the difference between the one of the Order Item that was created and the one that was canceled, the ORA initiates a refund of that amount.

Post conditions

The ORA has successfully notified the Seller about the Order change. The accountable documents corresponding to the service have been adjusted.

3.5.4.14 Use Case 18a – Involuntary changes – Schedule change - Flight still operates with new time

Description

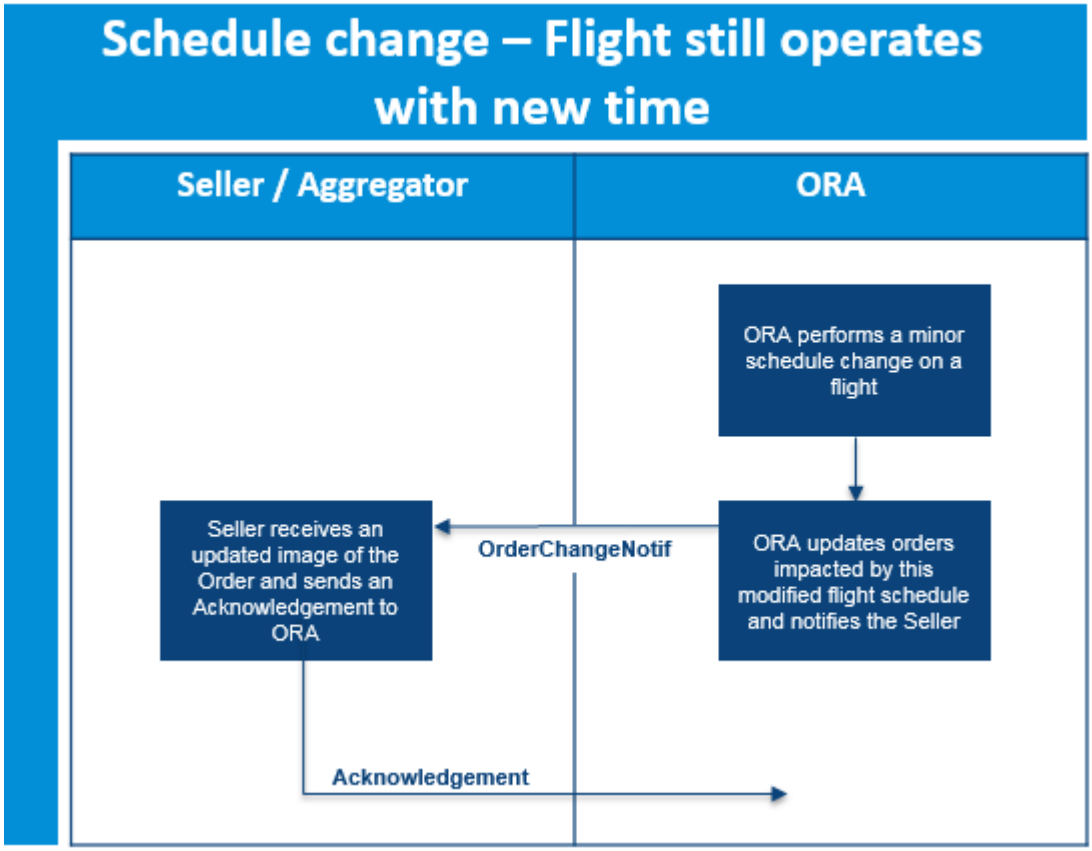
A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. Due to a schedule change, the ORA has to update the Order impacted by the modified flight.

This Use Case describes the way the ORA will notify the Seller about the change following the change to the Order.

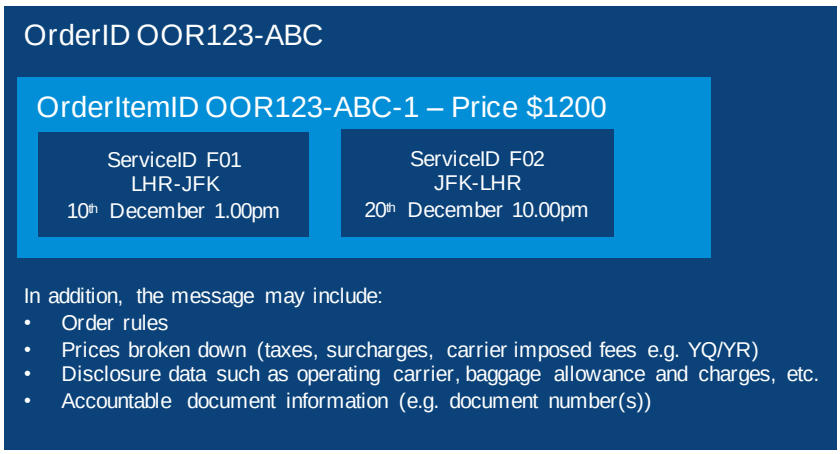
Preconditions/Assumptions

- The Order has already been paid, and accountable documents have been issued.
- Travel has not commenced; schedule change occurs during planning window.
- There are no connecting flights in the original Order and only the ORA participates in the journey.

- Each illustration focuses on the flow from an ORA to one particular Seller, regarding a particular Order, but the ORA should contact all Sellers that have Customers that are impacted by the schedule change.
- In OrderChangeNotif, no alternative Offers are presented to the Customer.
- We assume the Customer accepts the change.



Existing Order

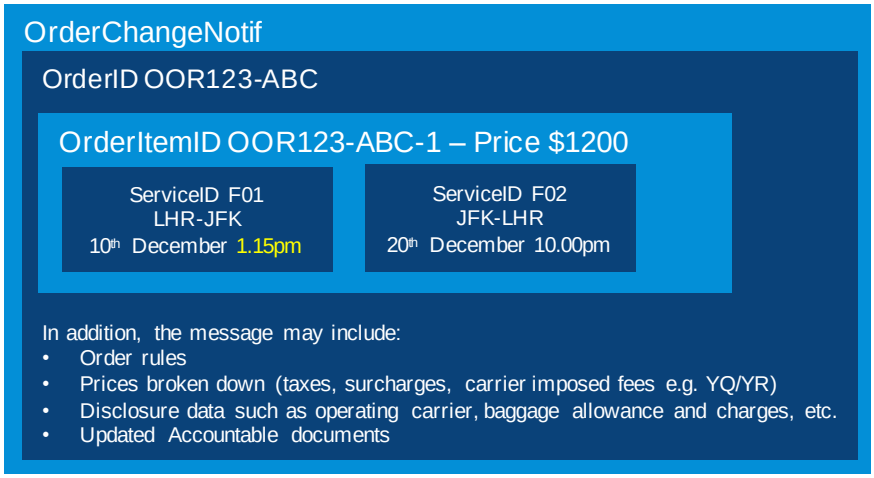


Steps to follow in the process

1. The ORA performs a minor schedule change on a flight.

2. The ORA has to update Customers' Orders impacted by this schedule change.

3. For each impacted Order, the ORA sends an OrderChangeNotif message with the updated image of the Order.



4. The Seller receives the change notification with an updated Order.

Post conditions

The ORA has successfully notified the Seller about the schedule change.

3.5.4.15 Use Case 18b – Involuntary changes – Schedule change - Flight cancellation, passenger is reprotected by the Airline

Description

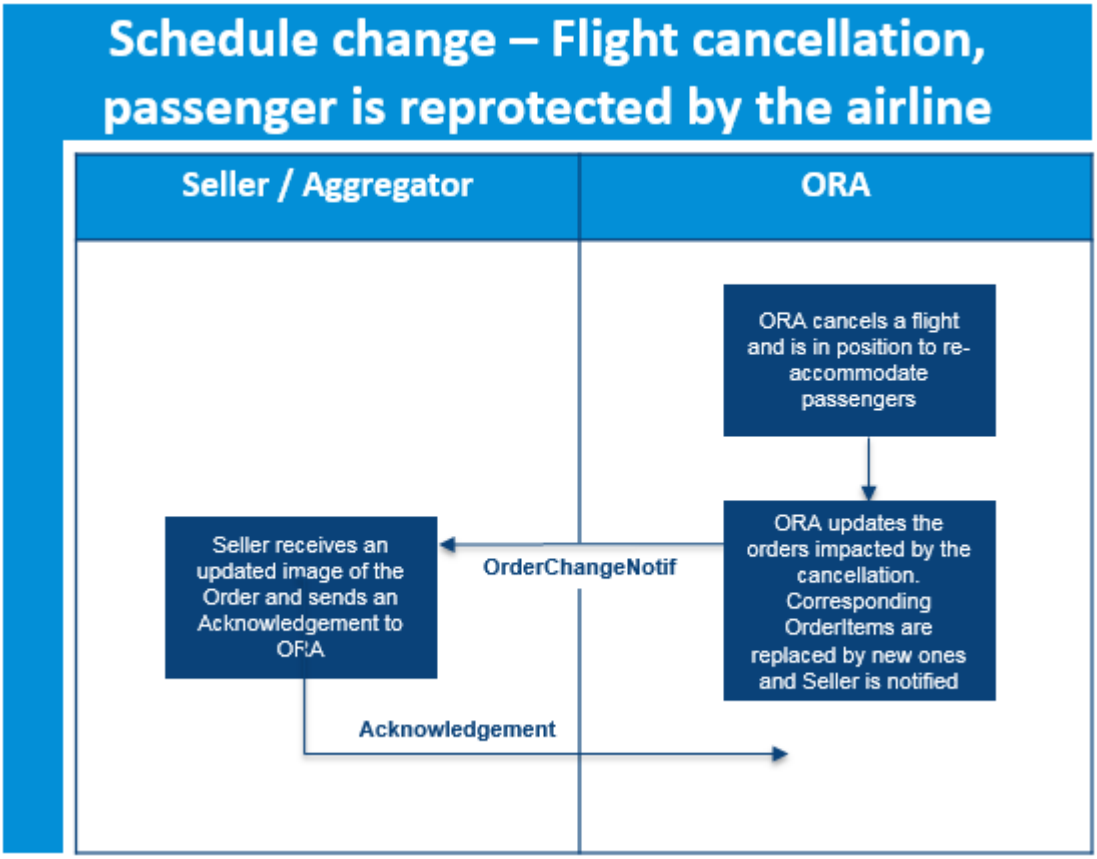
A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. Due to a planned flight cancellation, the ORA, which is able to re-accommodate the traveler onto another of its flights, will notify the Seller and provide an updated Order including a new travel plan.

This Use Case describes the way the ORA will notify the Seller about the Order change.

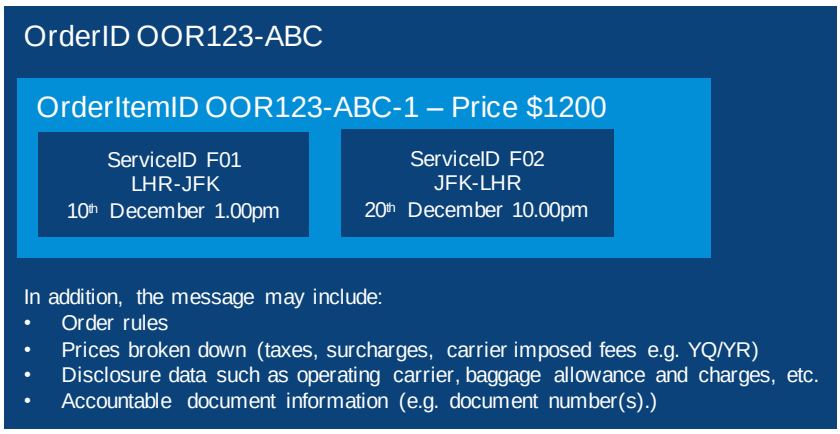
Preconditions/Assumptions

- The Order has already been paid, and accountable documents have been issued.
- Travel has not commenced; schedule change occurs during planning window.
- There are no connecting flights in the original Order and only the ORA participates in the journey.

- Each illustration focuses on the flow from an ORA to one particular Seller, regarding a particular Order, but the ORA should contact all Sellers that have Customers that are impacted by the schedule change.
- In OrderChangeNotif, no alternative Offers are presented to the Customer.
- We assume the Customer accepts the change.



Existing Order

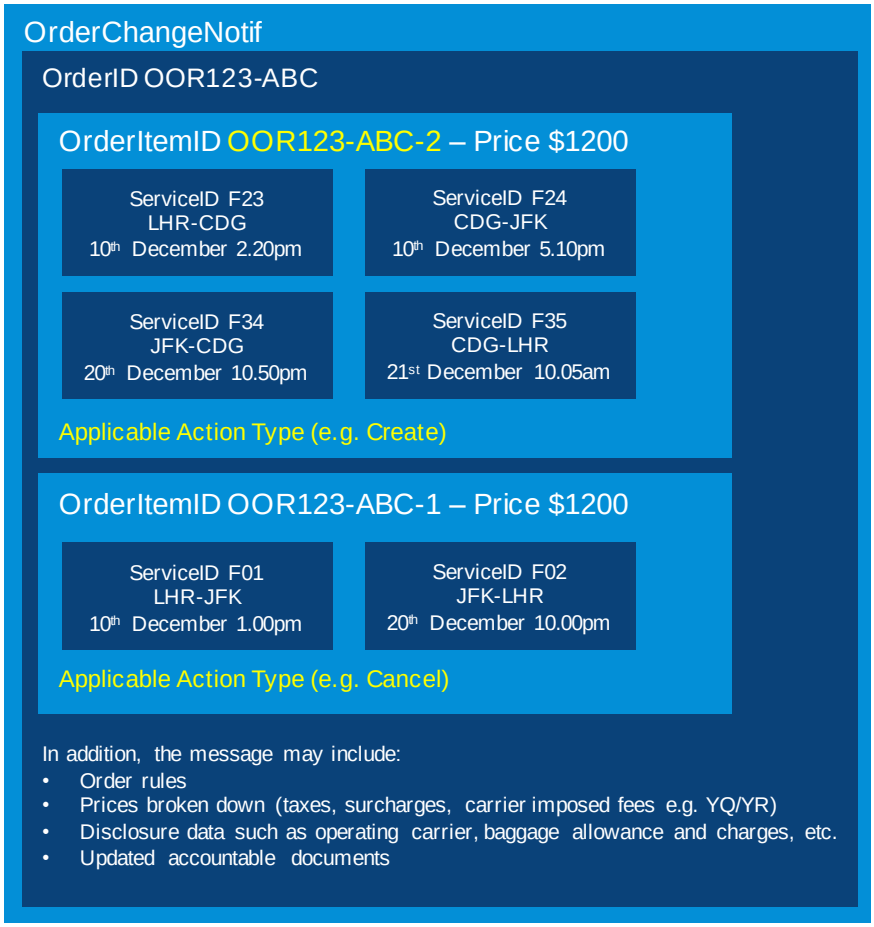


Steps to follow in the process

1. The ORA cancels a flight.

2. In position to re-accommodate the passenger, the ORA updates Customers' Orders impacted by this flight cancellation by proposing other travel solutions.

3. The ORA sends OrderChangeNotif message with the updated image of the Order including a new OrderItem with new Services for the new flights. The Seller sends an Acknowledgement message to the ORA.



4. The Seller receives the change notification with an updated Order. OrderItem and its corresponding OrderItemID were changed with the new itinerary. The Seller sends an Acknowledgement message to the ORA.

Post conditions

The ORA has successfully notified the Seller about the Order change including a new trip proposal, and accountable documents have been automatically re-issued.

3.5.4.16 Use Case 18c – Schedule change - Flight cancellation, passenger NOT reprotected by the Airline, re-shopping on same ORA

Description

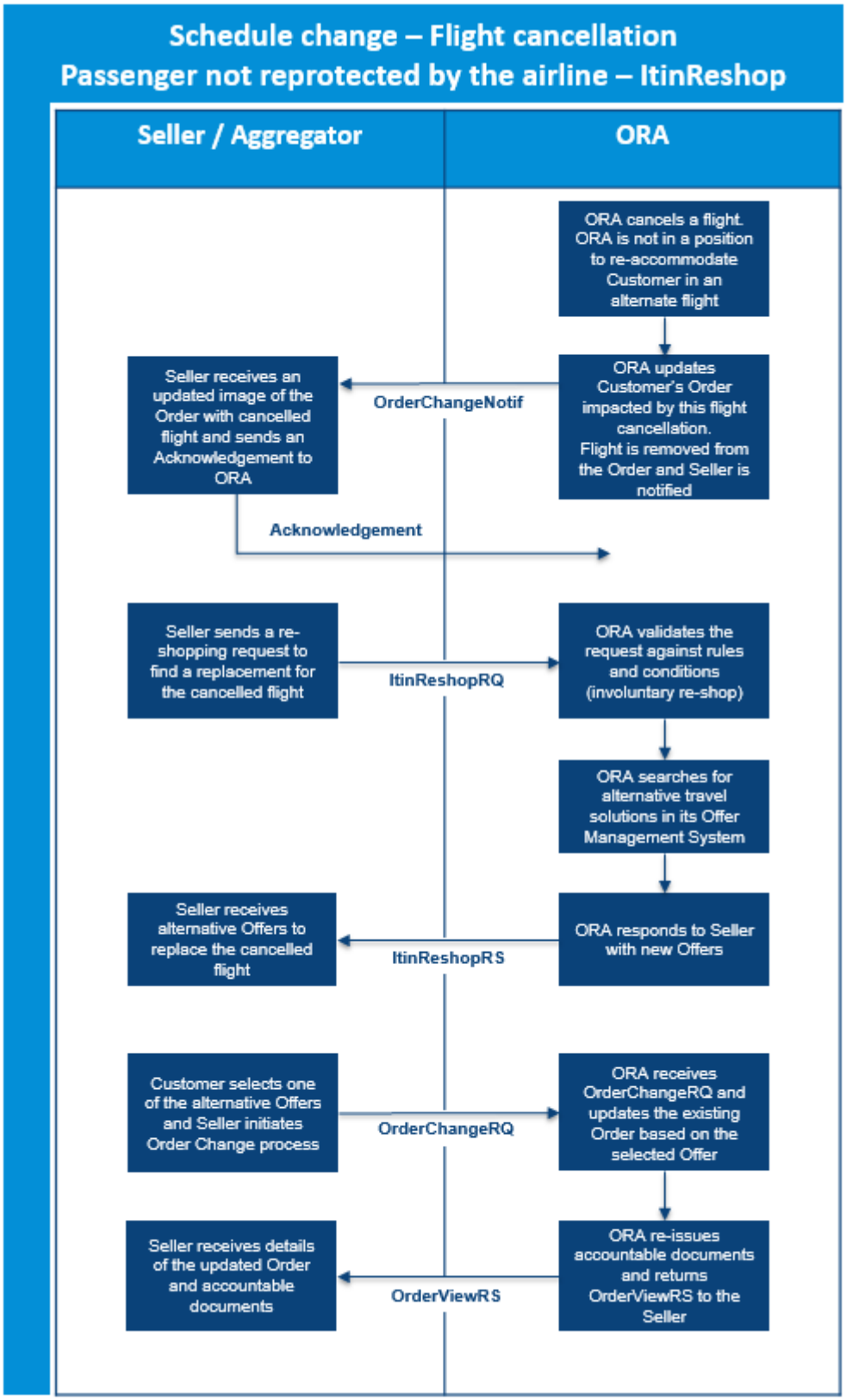
A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. Due to a planned flight cancellation, the ORA, which is NOT in position to re-accommodate the traveler, will notify the Seller and provide an updated Order reflecting the flight cancellation.

This Use Case describes the way the ORA will notify the Seller about the Order change (cancelled flight) and how the Seller will have to find an alternative travel solution with the same ORA.

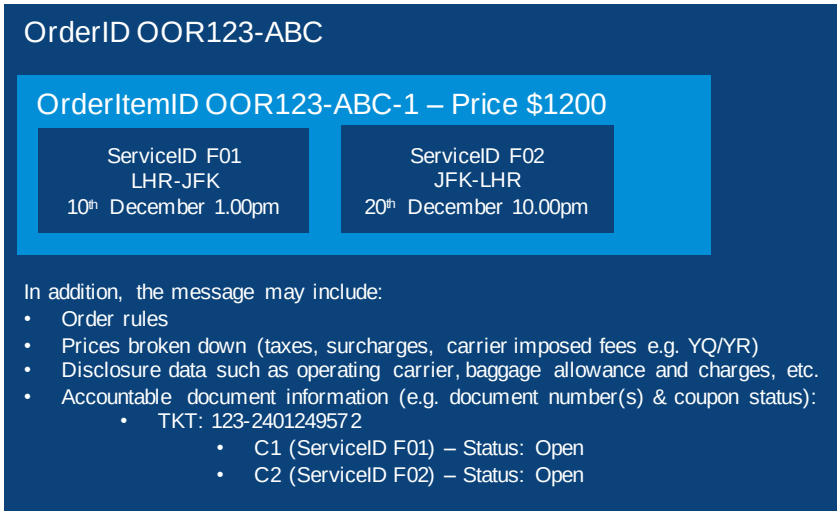
Preconditions/Assumptions

- The Order has already been paid, and accountable documents have been issued.
- Travel has not commenced; schedule change occurs during planning window.
- There are no connecting flights in the original Order and only the ORA participates in the journey.
- Each illustration focuses on the flow from an ORA to one particular Seller, regarding a particular Order, but the ORA should contact all Sellers that have Customers that are impacted by the schedule change.

Flow



Existing Order

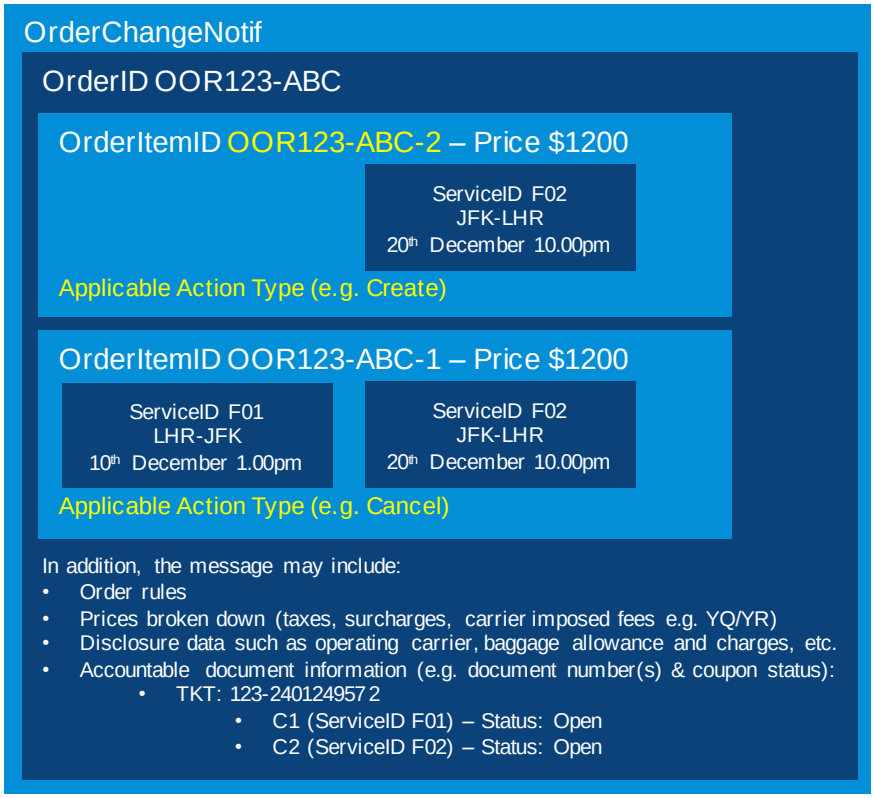


Steps to follow in the process

1. The ORA cancels a flight.

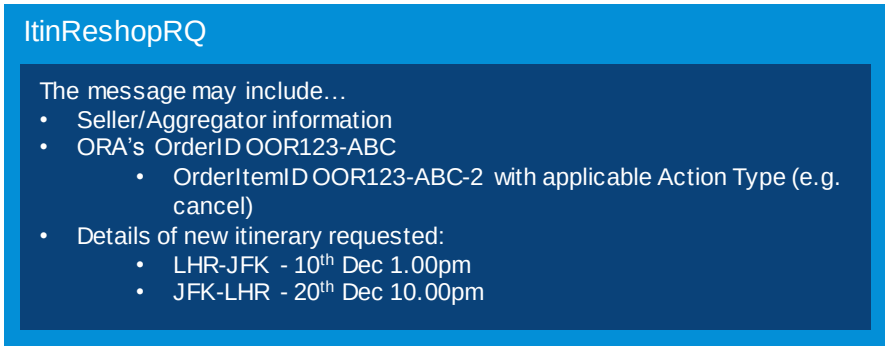
2. The ORA is not in a position to re-accommodate the passenger in an alternate flight, the ORA simply updates Customer's Order impacted by this flight cancellation. Flight is removed from the Order; no other changes are performed (e.g. accountable documents remain untouched).

3. The ORA sends an OrderChangeNotif message with the updated image of the Order, which does not contain the cancelled flight anymore.



4. The Seller receives the OrderChangeNotif with an updated Order and sends an Acknowledgement message to the ORA.

5. The Seller gets in touch with the Customer to advise him about the cancellation, and to find a replacement for the cancelled flight. The Seller/Aggregator sends an ItinReshopRQ message to the ORA, requesting alternative flights for the outbound LHR-JFK flight (the Customer would like to keep the original date and similar departure time).



6. The ORA receives the re-shopping request, validates that a change to the Order is allowed with special conditions due to the flight cancellation that occurred.

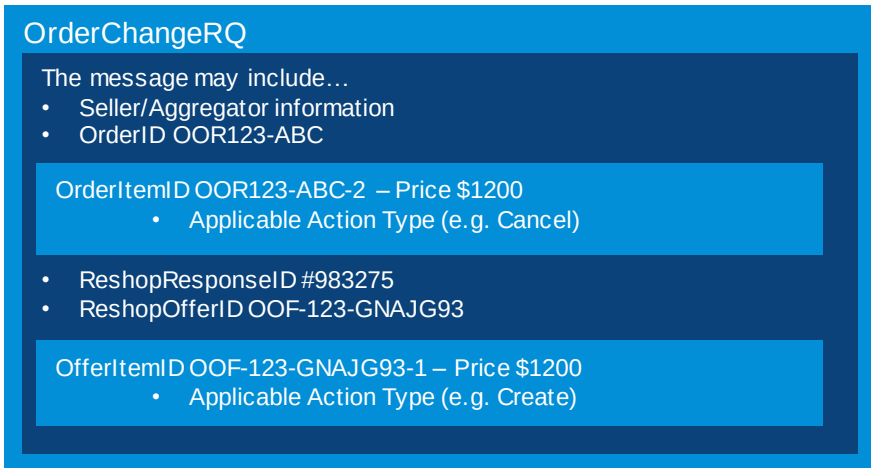
7. The ORA builds alternative Offers in its Offer Management System to replace the OrderItem impacted by the flight cancellation. All the Offers computed by the ORA

will have the same price as the original Order, as we are in a re-shopping flow after an involuntary change occurred; there is no price difference or penalty.

8. The ORA sends an ItinReshopRS message to the Seller/Aggregator with new Offers.

9. The Seller displays the options to the Customer and the Customer decides to accept the Offer proposed by the ORA. The Seller/Aggregator sends an OrderChangeRQ message to the ORA.

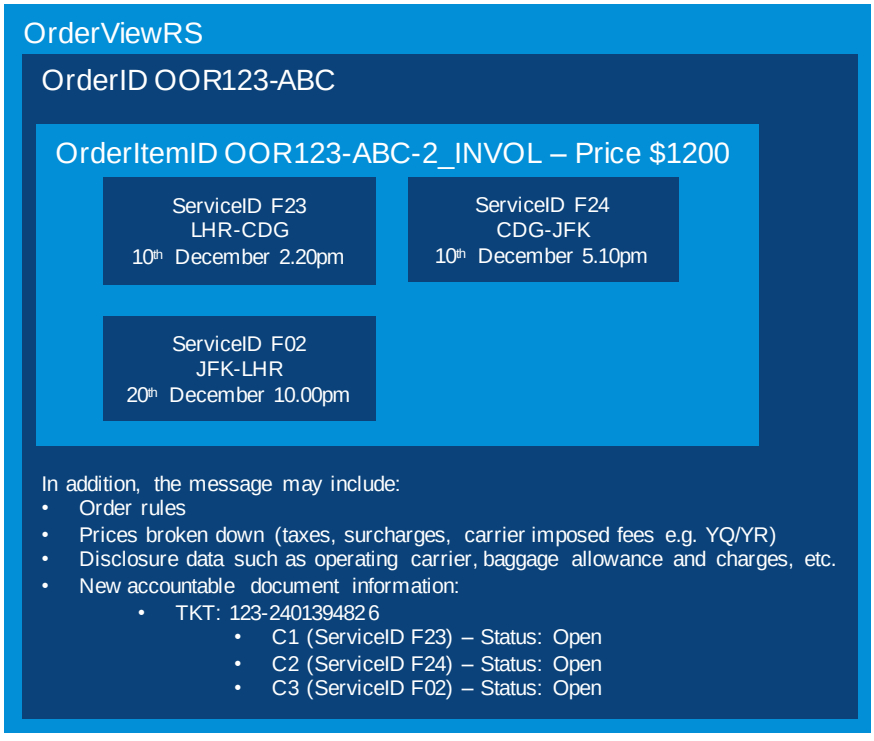
Note – No payment details are needed as there is no change in the price, nor any penalties/change fees.



10. The ORA updates the existing Order by creating a new OrderItem corresponding to the OfferItem OOF-123-GNAJG93-1, which was returned in the ItinReshopRS. Then ORA then proceeds with cancellation of the existing OrderItem OOR123-ABC-2.

11. As there is no additional collection, the ORA re-issues accountable documents.

12. The ORA sends an OrderViewRS to the Seller/Aggregator with details of the updated Order, which contains the new OrderItem, along with updated accountable document information.



Post conditions

After flight cancellation by the ORA, the Customer is now in possession of an updated Order with a new flight to replace the cancelled one, on the same ORA.

3.5.4.17 Use Case 18d – Schedule change - Flight cancellation, passenger NOT reprotected by the Airline, shopping on new ORA and cancellation of original Order

Description

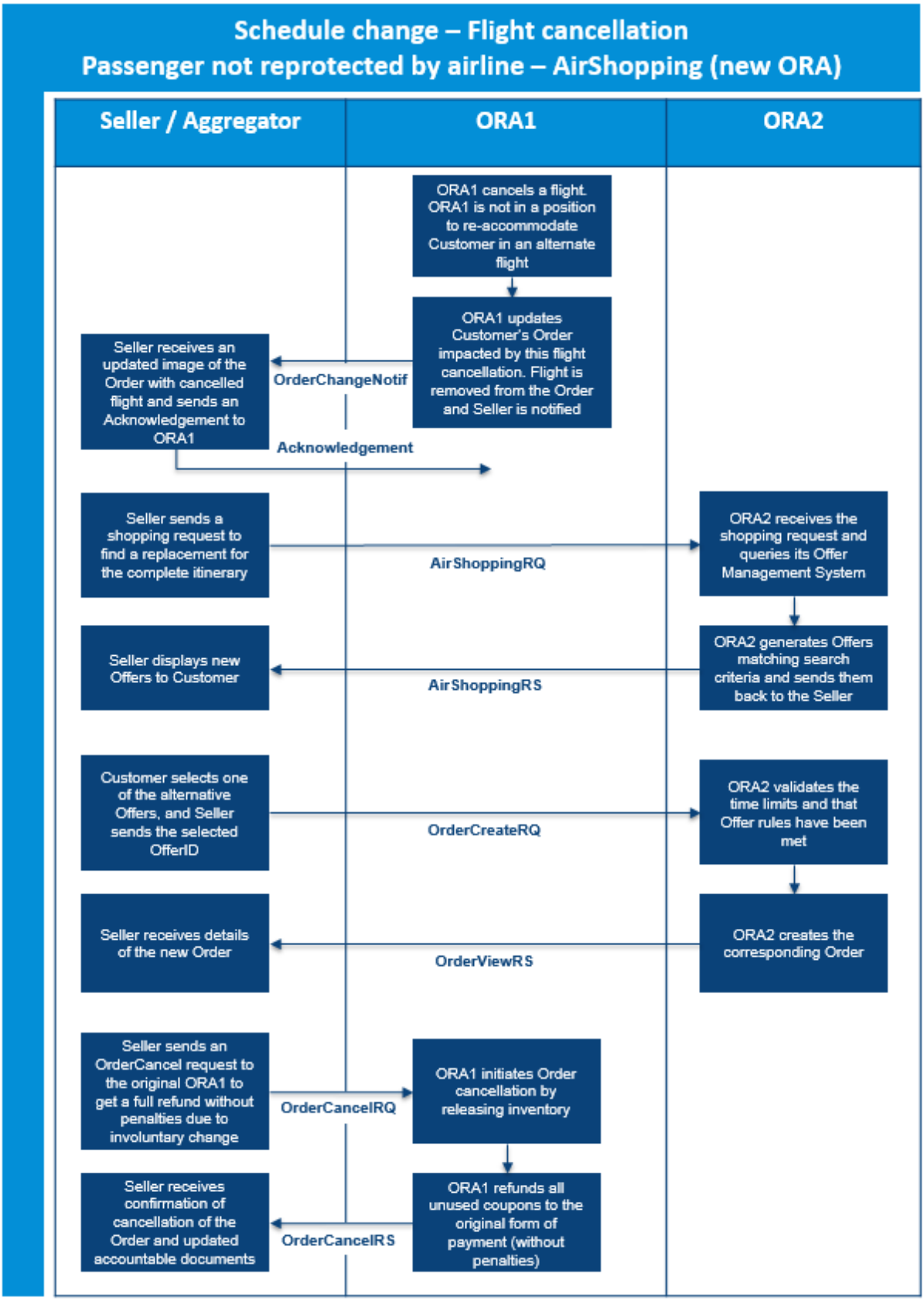
A Customer has an Order for round-trip travel to New York from London, departing on the 10th December and returning on the 20th. Due to a planned flight cancellation, ORA1, which is NOT in position to re-accommodate the traveler, will notify the Seller and provide an updated Order reflecting the flight cancellation.

This Use Case describes the way ORA1 will notify the Seller about the Order change (cancelled flight) and how the Seller will have to find an alternative travel solution by shopping on new ORA2. The Seller will then request a cancellation of the original Order.

Preconditions/Assumptions

- The Order has already been paid, and accountable documents have been issued.
- Travel has not commenced; schedule change occurs during planning window.
- There are no connecting flights in the original Order and only ORA1 participates in the journey.
- Each illustration focuses on the flow from an ORA to one particular Seller, regarding a particular Order, but the ORA should contact all Sellers that have Customers that are impacted by the schedule change.

Flow



Existing Order

OrderID OOR123-ABC

OrderItemID OOR123-ABC-1 – Price $1200

ServiceID F01
LHR-JFK
10th December 1.00pm

ServiceID F02
JFK-LHR
20th December 10.00pm

In addition, the message may include:
- Order rules
- Prices broken down (taxes, surcharges, carrier imposed fees e.g. YQ/YR)
- Disclosure data such as operating carrier, baggage allowance and charges, etc.
- Accountable document information (e.g. document number(s) & coupon status):
  - TKT: 123-2401249572
    - C1 (ServiceID F01) – Status: Open
    - C2 (ServiceID F02) – Status: Open

Steps to follow in the process

1. ORA1 cancels a flight.

2. ORA1 is not in a position to re-accommodate the passenger on an alternate flight, the ORA1 simply updates Customer's Order impacted by this flight cancellation. Flight is removed from the Order; no other changes are performed (e.g. accountable documents remain untouched).

3. ORA1 sends an OrderChangeNotif message with the updated image of the Order, which does not contain the cancelled flight anymore.

OrderChangeNotif

OrderID OOR123-ABC

OrderItemID OOR123-ABC-2 – Price $1200

ServiceID F02
JFK-LHR
20th December 10.00pm

Applicable Action Type (e.g. Create)

OrderItemID OOR123-ABC-1 – Price $1200

ServiceID F01
LHR-JFK
10th December 1.00pm

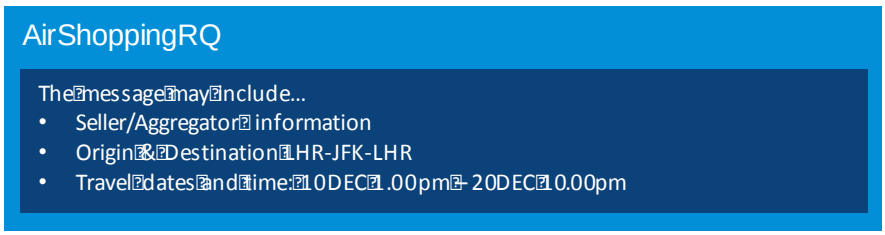
ServiceID F02
JFK-LHR
20th December 10.00pm

Applicable Action Type (e.g. Cancel)

In addition, the message may include:
- Order rules
- Prices broken down (taxes, surcharges, carrier imposed fees e.g. YQ/YR)
- Disclosure data such as operating carrier, baggage allowance and charges, etc.
- Accountable document information (e.g. document number(s) & coupon status):
  - TKT: 123-2401249572
    - C1 (ServiceID F01) – Status: Open
    - C2 (ServiceID F02) – Status: Open

4. The Seller receives the OrderChangeNotif with an updated Order and sends an Acknowledgement message to ORA1.

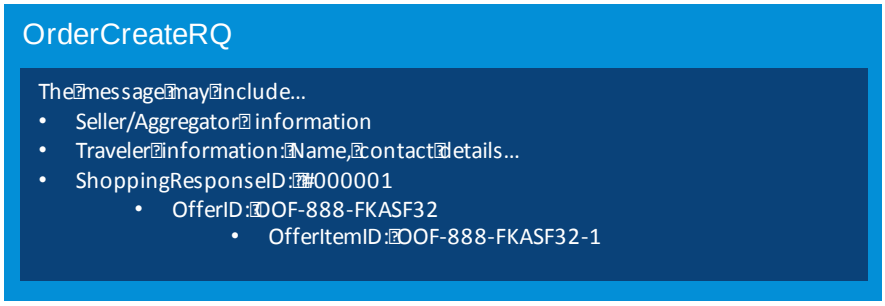
5. The Seller gets in touch with the Customer to advise him about the cancellation, and to find a replacement for the cancelled flight. The Seller/Aggregator decides to shop on a new ORA to find alternative flights for the complete itinerary (the Customer would like to keep the original date and similar departure time).



6. ORA2 receives the shopping request and queries its Offer Management System to build relevant Offers.

7. ORA2 sends an AirShoppingRS message to the Seller/Aggregator with the proposed Offers.

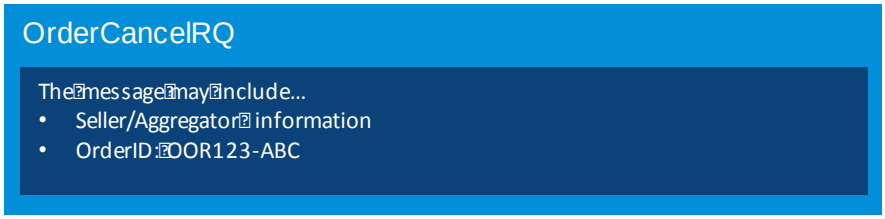
8. The Seller displays the options to the Customer and the Customer decides to accept the Offer proposed by ORA2. The Seller/Aggregator sends an OrderCreateRQ message to ORA2 with the selected OfferID and OfferItemID.



9. ORA2 validates that the time limits have been respected and that Offer rules have been met, and creates the Order in its Order Management System.

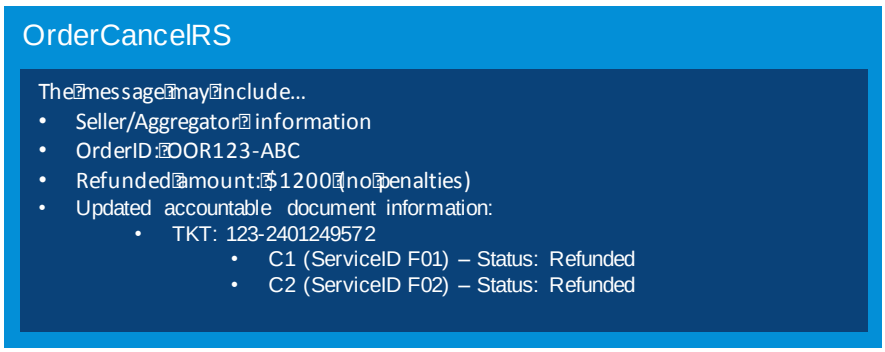
10. ORA2 returns an OrderViewRS to the Seller/Aggregator with details of the new Order.

11. Once the new Order has been created by ORA2, the Seller proceeds with cancellation of the original Order by sending an OrderCancelRQ message to ORA1. The Seller expects the Customer to get a full refund without penalties due to the flight cancellation by ORA1.



12. ORA1 validates that Order cancellation can occur without any penalties due to the involuntary change that impacted the Order. ORA1 releases inventory.
13. ORA1 triggers the refund process by crediting the total amount to the original form of payment and by updating the accountable document (all coupons refunded).

14. ORA1 responds to the Seller/Aggregator with an OrderCancelRS message which contains confirmation about the cancellation of the Order and the updated accountable document.



Post conditions

After flight cancellation by ORA1, the Customer is now in possession of a new Order on new ORA2 (which still has to be paid), and the original Order has been cancelled and refunded by ORA1.

3.6 Additional Airline considerations

With NDC an Airline has much greater control over how their products are offered in the indirect channel, at what price and with which rules and conditions.

With this greater control comes increased responsibility in many areas, particularly when an Airline is acting as an ORA. In today's indirect distribution model, many of these functions are performed at the point of booking or ticketing by a third party on behalf of Airlines, but in NDC, this functionality will have to be provided by the Airline themselves, either at the point of Offer creation, or at the time of creating or changing and Order.

There are also some existing processes within an Airline that NDC may have an impact on.

Some examples of these functions include but are not limited to:

- Seller authentication *(see Section #4.1.2.5)*
- Calculation and application of taxes, surcharges & fees
- Payment validation
- PCI DSS compliance *(see Section #3.3.1)*
- Processes to support revenue integrity *(see Section #3.6.3)*
- BSP reporting *(see Section #3.6.1)*
- Impact on Revenue Accounting *(see Section #3.6.2)*
- Determination of the Baggage Determining Carrier for an Interline Offer *(see Section #3.7.5.1)*
- Frequent Flyer identification management for multiple Airlines *(see Section #3.7.6.3)*
- Capacity & scalability of APIs *(see Section #4)*

(The brackets indicate that this topic is covered in another section of the guide. Where brackets are absent, this topic may be covered in a future version of the guide, or may not be directly in scope of NDC).

3.6.1 Reporting to the BSP

Note - Where reference is made in this section to "industry settlement providers" (and similar), the example used for illustrative purposes is IATA's BSP, however NDC does not prevent implementers from using other local agency settlement providers (e.g. ARC/TCH). Implementers should contact representatives of their chosen providers for information on how NDC transactions are supported by these providers.

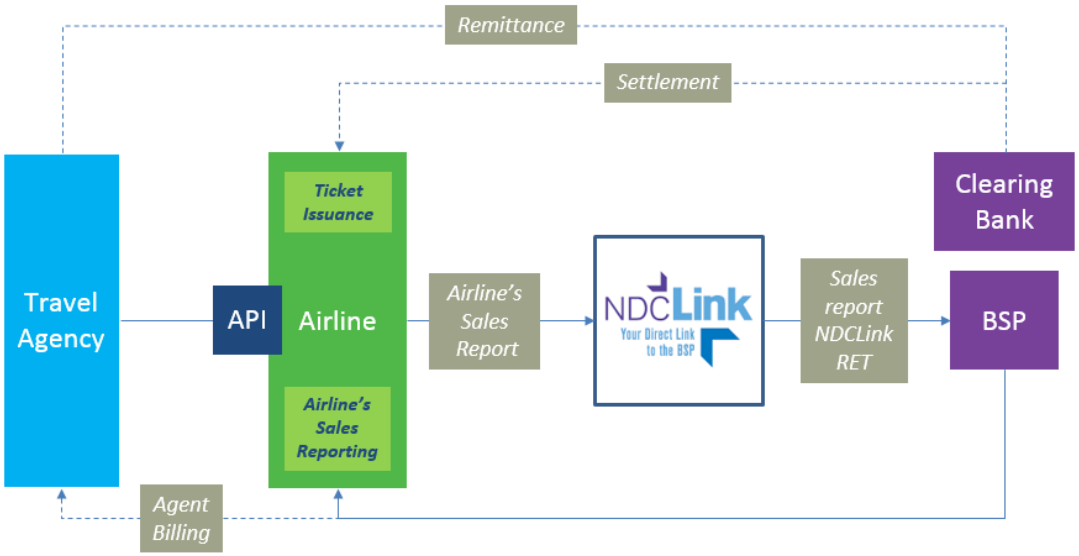
NDC gives the ORA the capability to receive payment data directly from the Customer via the indirect channel, and to process this payment internally. NDC also supports

BSP transactions where an IATA accredited agent is responsible for taking payment from a Customer and will subsequently settle with the ORA via the BSP.

Airlines wishing to use the BSP for NDC Orders must prepare a single global sales daily reporting file, in today's BSP input format, and transmit it to the BSP portal via NDCLink. This reporting follows the DISH RET format. NDCLink performs basic data quality checks and then separates the records into individual BSP files and makes the necessary daily BSP submission. At the end of the process, the Airline will receive a single HOT format file following processing. Airlines must previously check with local authorities and report local specificities in the RET file (e.g. tax specific data).

Once the sales are reported to BSPlink, the BSP conducts remittance from the Agents and settles with the Airline. All sales where settlement is required with the agent should be reported.

The diagram below highlights the main workflow:



BSP Reporting in NDC world

In addition, the Airline may wish to report other sales, even when the Airline has already processed payment. This could be for the purposes of calculating and paying commission, or managing tax on commission.

The Airline must be a participant in the BSP of the countries they wish to implement. Also the Airline can only use NDCLink for processing transactions from IATA Accredited Agencies in a good standing.

To start using NDCLink please contact: NDCLink Customer Care at NDCLinkcs@iata.org. NDCLink team will be able to provide a detailed product

guide containing all technical information (incl. cut off times, file formats, etc…) at Customers' request.

3.6.2 Revenue Accounting

3.6.2.1 Sales Accounting

Note - Where reference is made in this section to "industry settlement providers" (and similar), the example used for illustrative purposes is IATA's BSP, however NDC does not prevent implementers from using other local agency settlement providers (e.g. ARC/TCH). Implementers should contact representatives of their chosen providers for information on how NDC transactions are supported by these providers.

The Airline will report all NDC sales internally to its Revenue Accounting System (RAS), in a similar way to its direct sales today. This reporting is typically triggered by document issuance, and involves an exchange of data from an ET/EMD server to the RAS. For NDC sales, the RAS requires additional information beyond that which may be present in the ET/EMD record. This includes the identity of the Seller, and the internal value of each Service. This internal value is especially important as the ET will not separately show the value per coupon, and while the EMD *may* contain this information it is likely that the ORA may not choose to disclose this information on the EMD record which is visible to other parties.

Note - The "internal value" of a Service is not something communicated in an NDC message, it is simply the value an Airline internally applies to an individual Service for accounting purposes.

The Airlines needs to decide whether its existing data feed for direct sales can report NDC sales with this additional information, or whether a new data feed direct from its Order Management System (OMS) is required.

When reporting to the RAS, there is a risk of duplicating the record of the NDC sale, and this must be managed by the Airline. There is the possibility that the data is received from three different sources; the Airline's ticket server, the feed from the OMS and if a BSP (or similar regional agency-airline settlement mechanism) is involved, the sale could again be reported to the RAS.

3.6.2.2 Revenue recognition

In NDC, revenue recognition continues to be driven by the change of status of a coupon, but the calculation of the amount to be recognized can occur upfront at the time the Order is created, rather than relying on a post-sale calculation within the RAS.

As it is recommended for NDC sales that each Service with an internal value assigned to it by the Airline has its own Coupon, the Airline can immediately recognize the value of each Service when it receives a notification of the change of status of a coupon.

Regardless of whether a coupon is related to an NDC Order or a traditionally sold ticket, ticketing servers will continue to send a single daily report to Revenue Accounting about coupons that have had their status changed to a final status – whether flown/used, refunded or reissued/exchanged. This report is usually referred to as the Uplift File.

3.6.2.3 Interline billing and settlement

For NDC Orders featuring an interline itinerary, as described in the Interline section 3.7), an ORA and any POAs agree Settlement Values for each Service during Shopping. Each POA is advised of any document and coupon numbers by the ORA either following the creation of or change to an Order, either in an OrderViewRS or AirDocNotifRQ NDC message. The POA will then store these numbers in its Order Management System alongside the corresponding Order and Service details.

These Settlement Values per Service, together with the corresponding document/coupon numbers, are then passed into each Airline's RAS.

In all cases, upon uplift, the operating carrier will submit its claim into SIS as today. The current SIS IS-IDEC or IS-XML formats remain suitable for billing against NDC Orders as the trigger remains the change in status of a coupon, and have no reliance on Order, Order Item or Service IDs.

When a validating carrier (normally the ORA) receives inward billing of a coupon, it should already have the settlement values in its RAS to confirm legitimacy of the request and simply has to validate that the billed amount matches the agreed Settlement Value for that Service.

3.6.2.3 ORA validation of Branch Agency

When the ORA receives a display request on an accountable document from a Seller, the ORA is responsible for validating that the requesting agent (or an accredited branch location of the agent, irrespective of the System generating this request, is authorized to display the document before returning the response in accordance with Resolution 722g, paragraph 6.3.1. The requesting system can then identify that the document has been issued following an NDC transaction, and can use NDC messaging for subsequent actions.

3.6.3 The impact of NDC on Revenue Integrity

A significant benefit of NDC is the increased control an Airline has over Revenue Integrity. It gives the Airline greater power to ensure that an Order is not created, and inventory is not held, where the conditions of its Offers have not been met. Furthermore there is no opportunity for a third party to incorrectly apply or combine filed fares either deliberately or in error.

This is in contrast to the existing indirect distribution model, where an Airline is reliant on a third party correctly booking inventory and applying fares. Under this existing model the third party must correctly apply an Airlines' policies together with all applicable fare rules. It is then up to an Airline to perform Revenue Integrity checks after the reservation has been made, where inventory may already have been held for a significant time. This can result in cancelled inventory (which inconveniences both the passenger and the travel agent), or if a ticket has been issued it may result in the generation of an Agent Debit Memo (ADM) which is expensive and adds cumbersome administrative procedures for all parties.

Under NDC, an Airline has access to far more information about a Customer's entire request before an Offer is even made – allowing many revenue integrity processes to occur before an Offer is even presented. By the time an Order has been created, there is therefore much lower chance of revenue leakage, greatly simplifying revenue integrity processes, as the Airline has complete control over pricing, conditions and payment.

This is fundamental to an Airline when considering NDC as way of transforming their distribution capabilities and much of this should be taken into account during Offer construction, whilst some revenue integrity checks may apply when an Order is being created, changed or cancelled. As today, an Airline may wish to carry out further Revenue Integrity checks after an Order has been created, but one of the advantages of NDC is that there is less likelihood an Order will exist in breach of Offer/Order conditions.

In this section of the guide common Revenue Integrity functions are discussed, although this is not an exhaustive catalogue of all possible functions, and can only be seen as a high level reference, pointing to some possible impacts of NDC in this area.

Time Limits

NDC Shopping and Order Management messaging supports various time limits, and these are explained in detail in section 3.1.4.1. In implementing NDC, to support Revenue Integrity, an Airline should ensure it can apply these time limits as required, and subsequently validate whether or not these time limits have expired. What an Airline chooses to do when a time limit has expired is their own decision.

An important Revenue Integrity consideration for Airline's implementing NDC is management of Offer Time Limits. Assuming the Airline has the capability within its Offer Management System to apply this time limit to its Offers, it may be enough for an Airline at the time of Order creation to validate whether an Offer is still valid based on the Offer Time Limit, and accept or reject Order create requests as necessary.

In today's world, ticketing time limits are commonly used by Airlines as a way of protecting their inventory. An agent making a booking will have a time limit within which they must issue a document, and if no document is issued, the Airline will cancel reservations. The equivalent of a ticketing time limit in an NDC context is the "Payment Time Limit". This could have been applied either to the Offer, or as a condition of the Airline creating the Order. If the Airline does not receive payment by the expiry of the time limit, they may choose to release any held inventory within an Order, or indeed cancel an Order in its entirety. It is up to the Airline whether or not to notify the Seller in advance of this action, allowing the Seller the opportunity to arrange for payment to be made, or whether to simply notify the Seller that the Order has been cancelled.

Similar consideration should be made by an Airline to their Inventory and Price Guarantee Time Limits – they should have the necessary automated processes in place to validate and take action during the life-cycle and expiry of these time limits (whether that is simply the release of inventory following the expiry of an Inventory Guarantee Time Limit, reminder messaging to Sellers before a time limit is reached, or other processes).

Similarly, a Seller system may use these time limits to ensure they effectively manage Offers and Orders on behalf of their Customers, the equivalent of today's queue processes. Rather than wait for the notification of a cancelled segment from an Airline, or a reminder of the impending expiration of a time limit, Sellers may wish to have the capability to manage this internally.

Churn

The concept of "Churn" is where a Seller makes a reservation, holds inventory and continuously rebooks if the segment(s) are cancelled by the Airline (where the agent's intention is to circumvent controls such as a ticketing time limit). In conjunction with time limit logic as described above, NDC provides Airlines with the ability to minimize their exposure to this practice – if an Order is created at the request of a Seller, and subsequently an Airline releases held inventory following the expiration of a time limit, it is up to the Airline to determine whether to allow the Seller to hold inventory again, and what time limits to apply. The Airline may control this by requiring the Seller to initiate the shopping process again, providing the Seller with new Offers. These Offers will contain rules, conditions and time limits as determined by the Airline. Ultimately it should be easier for an Airline to control this practice in an NDC environment.

Duplicate Bookings

Today, Airlines have processes to check for passengers that have a duplicate booking. They scan reservations for a particular flight where the same passenger holds multiple segments, the duplicate may then be cancelled allowing the inventory to be re-sold.

Within NDC, the Airline has the opportunity to perform this check before a booking is made – i.e. at the time of Order Creation (or essentially at the point in time they choose to guarantee inventory for an Offer/Order). If a duplicate is detected, the Airline may reject the Order Create request. This means the Airline would be far less likely to hold inventory more than once for the same passenger.

Fictitious Names

An Airline may prevent Sellers from creating a reservation using a fictitious passenger name. To prevent this in today's world, Airlines review booked reservations and cancel segments that are associated to fictitious names.

With NDC, the Airline has the opportunity at the time of Order Creation to perform a check for fictitious names. If the Airline detects a fictitious name, they can reject the Order Create request.

Inactive Segments

In NDC, the difference with regards to inactive segments is that an Airline should see an overall reduction in the number that exist and if NDC is their only method of indirect distribution, they may not impact the Airline at all. For the various reasons described in this section of the guide, an Airline should see a reduction in the number of bookings made and amount of inventory held against their wishes. However, its processes relating to removing inactive segments, and its reasons for doing so, are unlikely to change.

Married Segments

Some Airlines manage their inventory availability for flight legs with O&D (origin and destination) logic. To offer availability, for a multi segment itinerary, they consider the journey as a whole, instead of checking the status of each leg individually.

To ensure the Airline can control this effectively, such an approach uses a "married segment" constraint: the Seller cannot cancel one or more of the segments, whilst keeping the other(s) active.

Under NDC, a travel agent cannot build an itinerary by securing inventory in a number of flight legs. Instead, the structure of the Offers made to Sellers already reflects the constraints the Airline wishes to apply; if for instance 2 flight segments (as

Services) are part of an Offer/Order Item, they cannot be booked/nor cancelled independently. If the Seller wishes to remove one of the segments, they must re-shop the entire Offer/Order Item. No further checks are necessary; the Airline simply needs to ensure the sanctity of the Offer/Order Item is maintained throughout the life of the Offer/Order.

No Shows

The rules regarding no shows in NDC are contained within an Order (and will have been specified at the time of the original Offer), and should a passenger no-show for a flight, today's processes for the handling of this will continue. The difference if the Order was created via NDC is that the data relating to the no-show needs to make its way back to the Order Management System of the Airline, to allow it to take action as required depending on the no-show rules contained within the Order (for example, if a Customer requests a refund relating to an Order on which a passenger has no-showed, the Airline can use this data as required).

Sales Audit

Under NDC, the calculation of a total price for a group of flights is no longer constructed by a travel agent applying or constructing filed fares independently of the Airline. Similarly, ancillaries are no longer priced by a third party with reference to filed or published content. Under NDC it is the ORA that determines the price being offered, and the ORA has complete control of how this is calculated. Under NDC the travel agent cannot incorrectly apply or manipulate a fare.

Similarly, an agent is not required to recalculate pricing in the event of a change to an Order or a refund – once again, this is performed by the ORA.

Accordingly, Sales Audit processes as they exist today (where fare calculations that have been produced by travel agents are checked when a sale is reported to the Airline, which may be some time after the transaction has occurred) are no longer relevant under NDC. The ORA should not require the same level of rigor in checking its own system compliance against its own pricing determination. Following this, under NDC the Airline should expect to issue significantly fewer Agent Debit Memos (ADMs) to agents.

3.6.4 The delivery of an NDC Order (impact on DCS)

When the time comes to deliver the services in an NDC created Order, existing standards for DCS messaging (contained in Recommended Practices 1707-1790e), as well as Ticketing coupon control and coupon status updates should be maintained

by Departure Control Systems. DCS messages are out of scope of Resolution 787*, so NDC does not directly impact these standards.

In the event of an operational disruption where an involuntary rerouting is required, the provisions of Resolution 735d apply.

If the Customer initiates any changes to the NDC Order during the operational window (e.g. an itinerary change, cancellation, addition of ancillary services), NDC messages should be used to complete the transaction(s), and then DCS messaging as described above continues to apply in the delivery phase.

To identify that the accountable documents relate to an NDC Order, an EDIFACT display request may be initiated, and the FCMI value in the EDIFACT document display response should be used. If the FCMI value corresponds to an NDC document, the DCS may use the NDC AirDocDisplayRQ/RS message pair to retrieve the related information, and perform any subsequent Order specific actions using NDC messages.

Resolution 722h describes the requirements when a ground handler provides a duplicate Itinerary Receipt to a passenger. The duplicate receipt should contain the minimum data elements of the original document. For a document issued following an NDC transaction, this would include the Order ID. Accordingly, the ground handler should be capable of populating the Order ID onto the duplicate receipt, and will need to ensure they can access this information from an Airline's Order Management System.

**Messages between Airlines and ground handlers are in scope of the One Order program, more details can be found at http://www.iata.org/whatwedo/airline-distribution/Pages/oneorder.aspx, however this program is currently still in its exploratory phase. The One Order program is not in scope of nor the result of Resolution 787.*

3.7 Interline Shopping, Order Management and Payment & Ticketing

Note - The PDMG WG Interline Task Force continues to work on NDC in interline scenarios and as such the NDC Standard may evolve to reflect any new requirements that arise from their remaining work.

3.7.1 Interline Overview

NDC facilitates communication between interline partners, allowing them to construct and communicate Offers and Orders in which both parties participate. As previously discussed, all NDC shopping requests are received by an ORA from a Seller (perhaps

via an Aggregator), and it is the ORA who is responsible for responding with suitable Offers. Where the ORA cannot fully meet the request and is unable to respond with a complete Offer, or they wish to expand the range of products they combine into the final combined Offer, they may choose to query a POA using NDC messages.

As with online itineraries, a single Airline, the Offer Responsible Airline (ORA), will be the owner of the Offer(s), the Master Order and any related accountable documents. Any other Airline participating in the itinerary is known as a Participating Offer Airline (POA). It is the ORA who will initiate communication with each and every POA and the NDC messages support a full spectrum of functions between these Airlines - from initial Shopping through Order creation and confirmation, to advice of accountable document numbers and any subsequent servicing requirements.

The messages also support a new key concept – “Settlement Values”. These are designed to streamline the interline settlement process, by allowing the POA to explicitly state a “settlement value”, the amount it wishes to receive for any services it provides. This may include relevant taxes, fees and charges. The settlement value is not a Customer facing price, but is only visible between the Airlines involved in the Offer/Order on a bilateral basis. Of course the POA will only know the settlement values of its own services, not of any other POAs in the same Offer/Order. At the time of Offer construction, it is up to the ORA whether or not to include the POA in the Offer - the Settlement Value is one of the factors it will use to make its decision.

The concept of Settlement Values not only simplifies the settlement process, but also provides both the ORA and POA with much greater visibility of the value of the service they are providing. This is in contrast to today where Airlines involved in an itinerary may only discover how much their segment is worth after a passenger has travelled.

3.7.2 General Principles and Assumptions

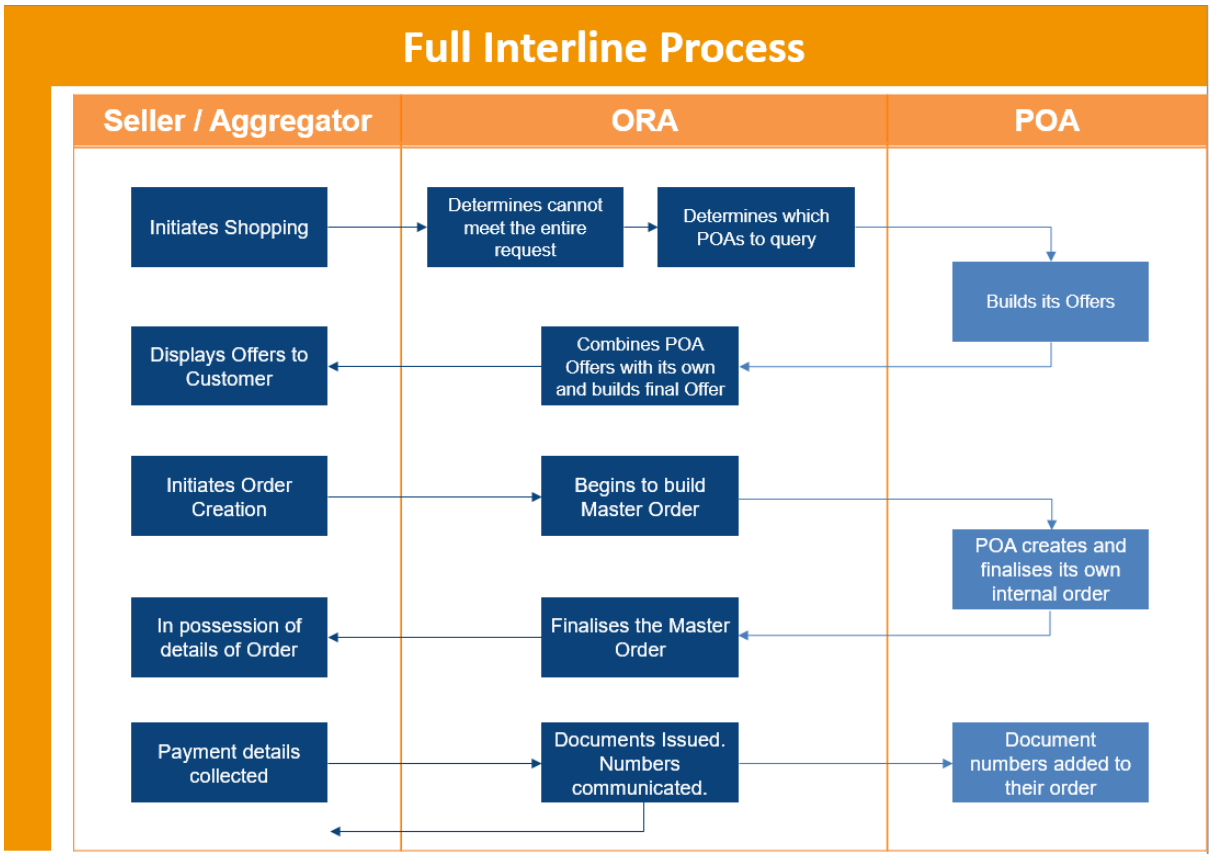
- Whilst not mandatory, it is assumed within our explanations that both the ORA and any POAs have Offer & Order Management Systems in place.
- The ORA builds the Offer (and the itinerary that may form part of the Offer) by contacting each POA individually. A Seller/Aggregator does not construct the Interline Offer themselves. If a Seller/Aggregator contacts two ORAs, receives Offers from both, and allows their Customer to select one from each, the result would be two separate, standalone Orders – they would not form an “Itinerary”, but simply two separate and independent Orders/Journeys.

- These transactions will take place between Airlines that are covered by, at a minimum, an interline traffic agreement.
- The ORA agrees to settle with the POA on the settlement value returned in a shopping response, and agreed upon at the time of Order creation, unless otherwise agreed bilaterally.
- The ORA holds the Master Order and is ultimately responsible for any changes to it.

The ORA, POA, the Seller/Aggregator, and other parties subject to the data exchange will have valid applicable agreements in place between them and have taken steps to ensure that they are compliant with any applicable competition law provisions and regulation, data privacy and protection regulations and any other laws and regulations to which they may be subject. *Please see Legal Considerations in Annex1 for further guidance.*

3.7.3 Full Interline process

The full interline process can be summarized as per the illustration below.



3.7.3.1 Interline Offer Management - Shopping

The Interline shopping process begins as per an online process – the Seller/Aggregator sends a shopping request to the ORA. When the request is received by the ORA, they determine that they wish to combine a POA's services with its own to form a complete, relevant Offer, whether this is because they cannot provide a satisfactory response to the request on their own services, or they wish to enhance their Offer with services provided by a POA.

The ORA, having made this determination, may then use the Airline Profile or other data sources (e.g. a schedule, bilaterally exchanged data, etc.) to decide which POA(s) to query.

The ORA will then send a shopping request (in the form of an AirShoppingRQ) to the relevant POA(s).

When received, the POA will process the request in a similar way to a request from a Seller/Aggregator, querying their Offer Management System to come up with an Offer that meets the criteria in the request as fully as possible (which may include any additional ancillary items it wishes to respond with).

Some of the additional considerations for a POA in an interline scenario may include:

- The need to take into account any applicable regulations that could apply to the itinerary. For example they need to ensure that the correct baggage allowance & charges are applied to the itinerary. Another example is that by participating in the Offer, they will not be in breach of any laws or regulations.
- A decision as to what Settlement Value they will apply to their Offer/Services. In most cases, the POA will specify to the ORA how much they require at settlement for the services they deliver. Settlement Values, pricing and settlement in general is covered earlier in Section #2.4.6 of the Guide.

A key difference between this process and the indirect channel today is that it is often the GDS that would put together an itinerary, and it is they who would police the rules and regulations that apply to the itinerary they have built – for example any traffic restrictions, applying the correct baggage allowance and charges, competition law compliance etc. would be taken into account before an itinerary was finalized and communicated to the Airlines involved.

3.7.3.2 Interline Offer Management - Offer Construction

Both an ORA and any POAs involved in an Interline Offer will continue to apply the principles of Offer Management outlined in Section #3.1.1.2 relating to the structure of Offers.

From the POA's perspective, they will construct their Offer(s), each featuring one or more Offer Items (with each Offer Item containing one or more Services), as if they had received the shopping request from the Seller/Aggregator, and return them to the ORA. The POA will return settlement values at Service level, the will not normally return Customer facing prices (this is the role of the ORA).

Even though they are returning settlement values at Service level, the POA will still combine Services within Offer Items, and whilst these Offer Items do not have a Customer price, they are still unbreakable units.

When the ORA receives the POA's Offer(s), they will combine them with their own Services to form completed, final Offers to be returned to the Seller/Aggregator. However, the ORA must respect the integrity of the POA's Offer(s). Please see the following two examples to help describe this further:

- The ORA cannot choose individual Services from within a POA's Offer Item - they must select an Offer Item as a whole if they wish to use this as part of the final Offer(s).
- The ORA must comply with other requirements of a POA Offer and its structure. For example, they cannot break a POA's Offer Item into separate Services, and if all Offer Items within the POA's Offer are mandatory, the ORA must include each of these within their combined, final Offer(s).

How the Offer is structured and combined by the ORA is a proprietary decision and will be based on the ORA's Offer Management System capabilities and their business decisions – it does not have to match the POA's Offer one for one.

For example, when the ORA creates its Offer, it may include a POA's flight alongside its own within an Offer Item as separate Services (Figure 2 below), or as separate Offer Items (Figure 3 below). Even though this was a POA Offer Item, it is not mandatory that this has to be a separate Offer Item within the ORA's Offer.

The ORA may choose to include the POA's services and its own within one Offer Item so that this becomes an unbreakable unit when it comes to Order Servicing in future.

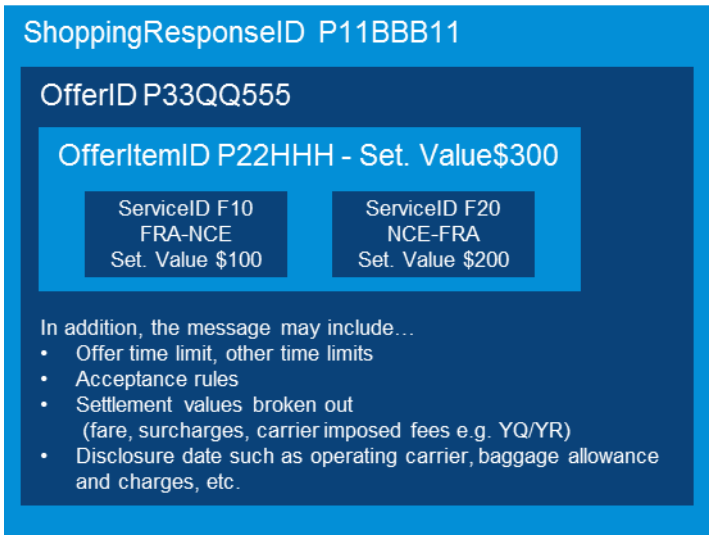


Figure 1 AirShoppingRS POA to ORA

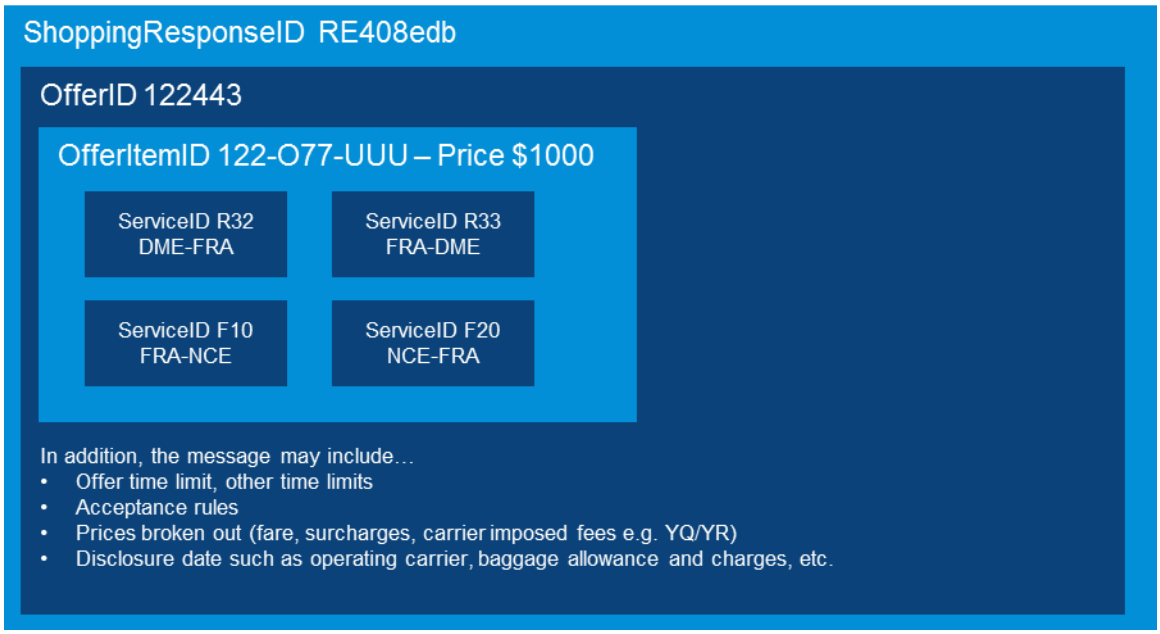


Figure 2 AirShoppingRS ORA to Seller/Aggregator

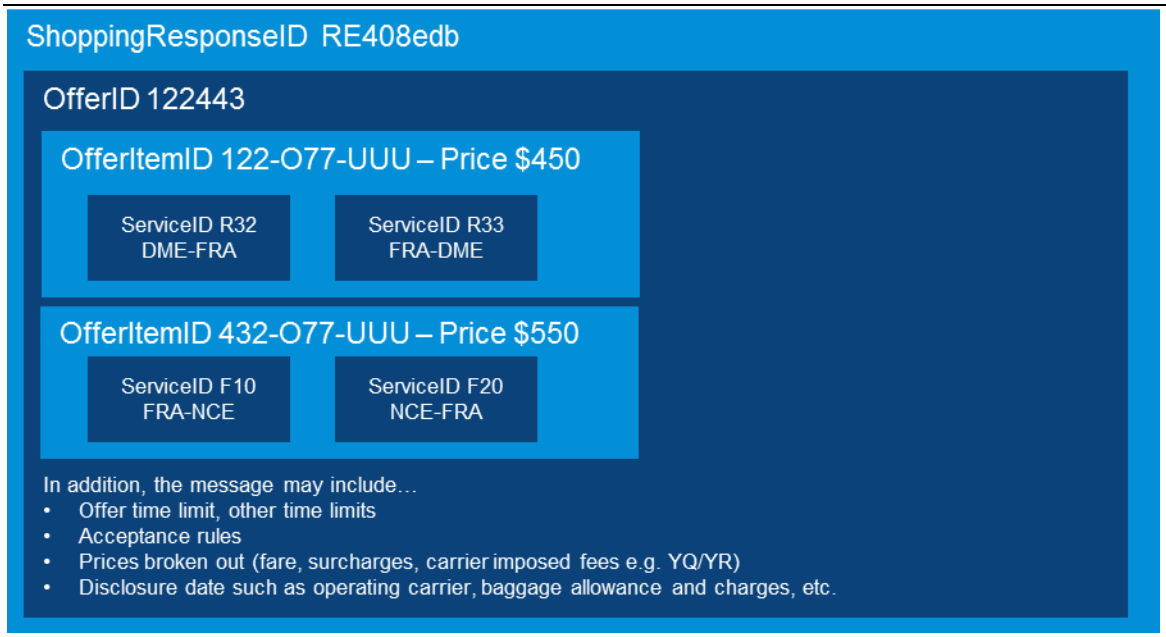


Figure 3 AirShoppingRS – ORA to Seller/Aggregator

3.7.3.3 Interline Offer Management - Shopping Principles and Assumptions:

- Shopping messages are always initiated by the ORA to the POA.
- An ORA may be required to send shopping messages to multiple POAs to complete the journey requested.
- Seller/Aggregators will never query POAs directly to build an itinerary – the ORA does this as part of the creation of their Offers.
- In an interline scenario, an ORA will combine a POA's Offer within its own. In doing so, it must follow the principles and structure of Offer construction as described in Section #2.4.2.3 – the ORA cannot break a POA's Offer Item and use individual Services within the final Offer it will return to the Seller/Aggregator.
- Regardless of the type of message, complete flight details will be sent in the request to the POA if the service is applicable to a specific flight (e.g. flight number, date, cabin)
- If more than one POA participates in an itinerary, they should all be made aware before the Order is fully confirmed of all other Airlines and the full itinerary.

3.7.3.4 Airline Profile in Interline

The Airline Profile has two potential uses in an Interline scenario.

1. If an ORA has chosen to maintain an Airline Profile, a Seller/Aggregator may use this information to determine that this Airline accepts shopping

requests for a particular O&D pair. as per the description of the Airline Profile in Section #3.1.2, the Airline Profile does not replace today's schedule, it does not simply list routes the ORA operates, but rather it outlines for which routes/markets the ORA is willing to receive shopping requests.

2. The ORA may choose to use Airline Profile data to determine which POA(s) can help it complete an itinerary (alongside its own operated flights) and fully meet a shopping request with its Offer.

   The POA must publish its Airline Profile data if the ORA is to use the data to help with this determination.

The principles of using the Airline Profile in terms of how the ORA and POA send, receive and manage this data are as per the Airline Profile Section #3.1.2.

3.7.3.5 Interline Order Management - Booking

As per the Online flow, when a Customer has selected one of the ORA's Offers, the Seller/Aggregator will send an Order Create request (using the OrderCreateRQ message) to the ORA.

At this stage the ORA will begin creating the Master Order, having first validated that the Offer Time limit has not passed (as well as validating that any other conditions or rules have been met). The ORA will itself send an OrderCreateRQ to each POA that formed part of the Offer/Itinerary – and this will contain, amongst other data elements, the ORA's OrderID, and the POA's OfferID(s), OfferItemID(s) and ServiceID(s) as applicable.

When received, each POA will verify that the Offer Time Limit has not passed (again, plus validating against any other conditions) and then create an Order in its own Order Management System, referencing the ORA's OrderID. It will generate and send an OrderViewRS message, sending all relevant information about its Order to the ORA.

When the OrderViewRS is received by the ORA it will apply the POA's information, such as the POA's OrderID, to the Master Order, finalize the Order, and send the necessary information to the Seller/Aggregator.

Whilst the NDC Standard does not specify at which point in the flow an Inventory Guarantee is applied to either the Offer or the Order, in an Interline scenario it is logical that an ORA does not apply an inventory guarantee against an entire Offer/Order at any stage in the process unless it first has an inventory guarantee from the POA as part of their Offer/Order.

The ORA may choose to guarantee inventory on its own services even if the equivalent guarantee has not been applied by the POA, but of course they should not

communicate to the Seller/Aggregator that inventory is guaranteed against the entire Offer/Order until this guarantee is received from the POA.

Interline Order Creation Principles

Generally, the POA should not refuse to create an Order based on an Offer they have previously sent to an ORA unless availability no longer exists against an Offer that was made with a rule "subject to availability", specified time limits have been exceeded, or any of the components of the Order are in contradiction with regulatory restrictions.

Today, the Validating Carrier, i.e. under NDC usage the ORA, is responsible for applying taxes/fees/charges under PSC Resolution 785.

3.7.3.6 Interline Order Management – Payment & Ticketing

As per Section #3.3, the ORA is responsible for issuing accountable document(s) following an Order creation/payment. This does not change in an Interline scenario. Once issued, the ORA will subsequently notify all POA(s) on the document of relevant document numbers. The same principles and process also apply to any modification of accountable documents that may be required following the Servicing of an Order.

The POA may wish to indicate within their shopping response to the ORA their preferences in terms of which accountable documents they would like to see issued (e.g. EMD-A vs EMD-S), but it is ultimately the ORA's prerogative and responsibility as to which documents to issue and when, staying within the framework of applicable resolution(s). Notification of document numbers from ORA to POA is accomplished using an interline-only message - AirDocNotifRQ.

If the ORA chooses to delegate their responsibility for issuing/validating documents, then it is responsible for passing all of the data required for the validator to issue them and to then facilitate the required settlement. It is assumed that any 3rd party validator will have the capability of querying the ORA and the POA for Order transaction history for audit purposes.

3.7.3.7 Interline Order Management - Servicing

Interline Order Servicing will not be covered in detail in this release of the Implementation Guide. To date, PADIS has approved two Interline Order Servicing BRDs (in September 2015 and March 2016) – these BRDs cover voluntary servicing and to a very limited extent involuntary servicing. The PDMG WG Interline Task Force has a mandate to produce a further Interline Voluntary Order Servicing BRD due for submission to PADIS for September 2016, and is beginning its work to address involuntary servicing in a new BRD, due for submission to PADIS at a later date.

Two principles taken from the PDMG WG Interline Task Force Interline Order Servicing BRD are mentioned below, but please note that this is a very limited view of Interline Order Servicing and is not an exhaustive list of principles.

- The ORA and POA may bilaterally agree that the POA assumes responsibility for protecting the passenger when the passenger's travel on the POA involuntarily changes. This may require the POA to shop other POAs (sub-POAs) in order to fulfil this obligation.
- The ORA will send notification to the POA of any changes within an Order on which the POA participates (be they to flights or other services). This notification applies not only when the POA's services are impacted directly, but for all changes. Depending on the Offer/Order conditions, this may have an impact on the Settlement Value agreed between the POA and ORA, and may also impact the POA's ability/wishes to remain as part of the Order (for example a new POA featuring within an Order as part of an itinerary may result in a violation of traffic restrictions). Carriers may bilaterally agree otherwise.

3.7.3.8 Interline Settlement

NDC supports the ability for POAs to specify a "Settlement Value" at Service level. These are designed to streamline the interline settlement process, by allowing the POA to explicitly state a Settlement Value, the amount it wishes to receive for any services it provides. This may include relevant taxes, fees and charges. The settlement value is not a Customer facing price, but is only visible between the Airlines involved in the Offer/Order on a bilateral basis. Of course the POA will only know the settlement values of its own services, not of any other POAs in the same Offer/Order. At the time of Offer construction, it is up to the ORA whether or not to include the POA in the Offer - the Settlement Value is one of the factors it will use to make its decision.

The concept of Settlement Values not only simplifies the settlement process, but also provides both the ORA and POA with much greater visibility of the value of the service they are providing. This is in contrast to today where Airlines involved in an itinerary may only discover how much their segment is worth after a passenger has travelled.

3.7.4 Interline Messages

All communication requirements for shopping and Order Management between the ORA and POA can be facilitated by using the existing NDC messages.

At the moment, the only Interline specific message is:

AirDocNotifRQ: This message is reserved for interline communication from the ORA to a POA. It serves to communicate accountable document numbers (e.g. ET, EMD-A, EMD-S) to the POA(s) identified in the documents.

3.7.5 Other Interline Considerations

3.7.5.1 Baggage Considerations

The ORA is responsible for applying relevant governmental regulations (e.g. US DOT, CTA) or industry resolutions (e.g. IATA Tariff Composite Resolution 302) in determining the carrier whose baggage rules apply and resulting applicable disclosure requirements when constructing an Offer. This Airline is the Baggage Determining Carrier (BDC).

Based on the relevant regulation/resolution that would apply to the itinerary, if the ORA is the BDC they will apply their own baggage allowance and charges to the Offer. Alternatively, if the ORA is not the BDC, they will identify which POA is the BDC, and apply the correct baggage allowances and charges. The correct allowances and charges are determined by either:

- Information already known to the ORA (e.g. an internal database)
- Querying a published baggage information source, which may or may not be a central data repository of baggage data.
- Sending a BaggageAllowanceRQ, BaggageChargesRQ or AirShoppingRQ to the BDC, and receiving the information as part of the response.

Note - If an itinerary has more than one BDC (e.g. if a Resolution 302 based itinerary features a stopover), for each possible POA that may be the BDC the ORA will need to be query its source of baggage information and apply each of the correct baggage allowances and charges for the relevant portion of the Offer (e.g. the first POA's allowance and charges to the first sector, and second POA's to the second sector).

It is assumed that the Baggage Determining Carrier's checked baggage allowance and charges are applied and communicated to the Seller/Aggregator by the ORA as part of any Offer, and that this information is also communicated to any carrier participating in the Offer. It may be useful for each Airline to receive this information in advance of any Offers being created and sent, although this is not mandatory.

The ORA may offer its prepaid baggage service(s) if permitted and specified as such in the response from the Baggage Determining Carrier.

Each Airlines participating in an Offer, including the ORA, must provide carry-on allowance and embargo data for all Operating Carriers involved in the Offer, and this information needs to be returned to the Seller in the shopping response per Airline.

The POA may return baggage service taxes/fees/charges to the ORA, as applicable.

The ORA is responsible for communicating baggage taxes/fees/charges to the Seller/Aggregator.

3.7.5.2 Codeshare Considerations

In most cases, interline NDC processes can be applied to automated codeshare situations - the ORA would act as marketing carrier and the POA would act as operating carrier, and the ORA would send a shopping request to the POA as per the processes described above.

In certain situations, a POA may wish to query another Airline (a “sub-POA”) using NDC shopping messages to create its portion of the Offer (i.e. it will combine another Airline’s Offer with its own in the same way an ORA would involve a POA). This is especially applicable for automated codeshare situations.

In this instance, it is imperative that the “sub-POA” have full knowledge of all parties to the Offer. As such, the true ORA and all POAs in the cascading message path must be disclosed. The term “True ORA” refers to the ORA that received the request from the Seller/Aggregator – because a sub-POA would receive a shopping request from another Airline, without the “True ORA” being designated, they may incorrectly assume the POA that sent them the request is the ORA.

Also, it should be noted that the Settlement Value returned from a Sub-POA to the POA must be equal to the Settlement Value returned from the POA to the ORA. This is a requirement to ensure the correct settlement between the validator and service provider.

It is not mandatory that a Sub-POA returns a Settlement Value - this value could be based on a separate commercial agreement outside of the NDC transaction cycle. This Settlement Value could be applied to the Sub-POA’s Service by the POA as it is combining the Sub-POA’s Services with its own into a combined Offer, resulting in correct Settlement by the validator.

3.7.6 Use Cases – Interline

Principal Actors

The principal actors in each use case are:

- Customer *(please refer to* Section #3.1.4 *for a definition)*
- Seller/Aggregator
- Offer Responsible Airline (ORA)
- Participating Offer Airline (POA)

Common Preconditions & Assumptions

Please note the following common assumptions for interline use cases:

- The ORA and each POA have implemented Offer and Order Management Systems.
- These transactions will take place between Airlines that are covered by, at a minimum, an interline traffic agreement.
- The ORA holds the Master Order.
- These illustrations focus on the flow to one particular ORA, but the Seller may have contacted multiple ORAs simultaneously.
- Codeshare flights do not feature in any of the Offers or Orders within any of these use cases.

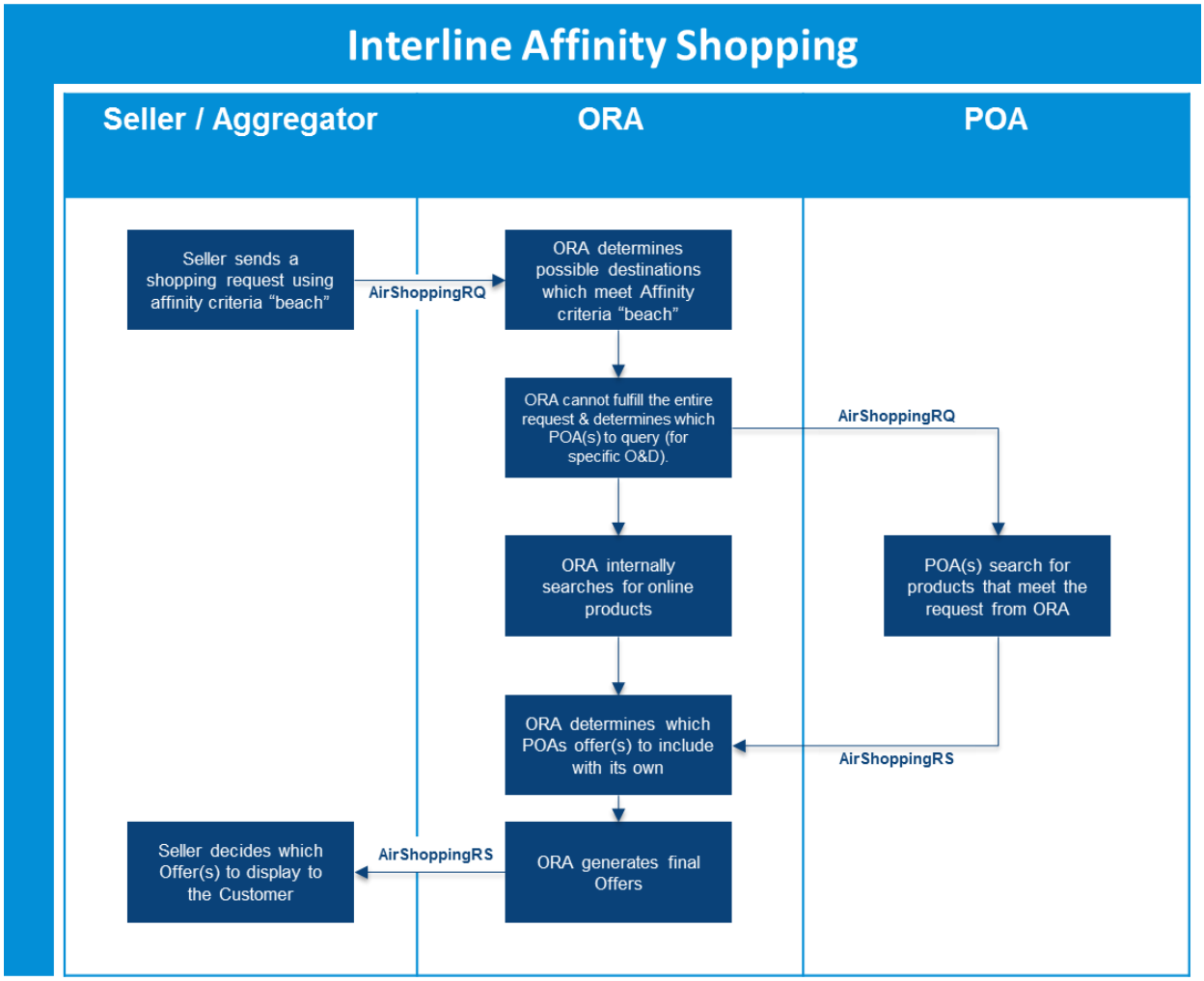
3.7.6.1 Use Case 19 – Interline Affinity Shopping

Description

A Customer based in London decides that he would like a beach holiday, but does not have a particular destination in mind.
This Use Case describes the process of shopping for flights using affinity criteria on multiple marketing carriers.

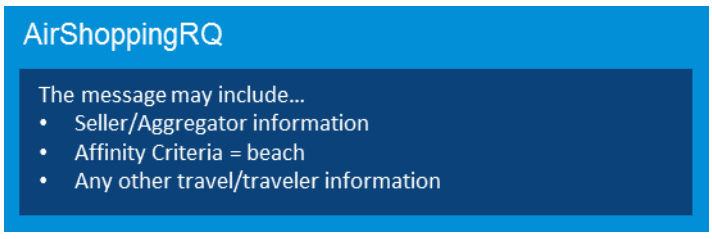
Preconditions/Assumptions

- The Customer communicates to the Seller their intended travel plan which includes travelling to a beach destination from their home city.
- In this use case the ORA and POA(s) do not return any ancillaries, bundled or otherwise, to the Seller/Aggregator as part of the Offer(s), but it should be noted that affinity shopping supports this functionality.



Steps to follow in the process

1. The Seller/Aggregator sends a shopping request to the ORA using the Affinity criteria "beach destination".



2. The ORA receives the shopping request and determines possible destinations which meet the Affinity criteria of "beach destination" using internal logic.

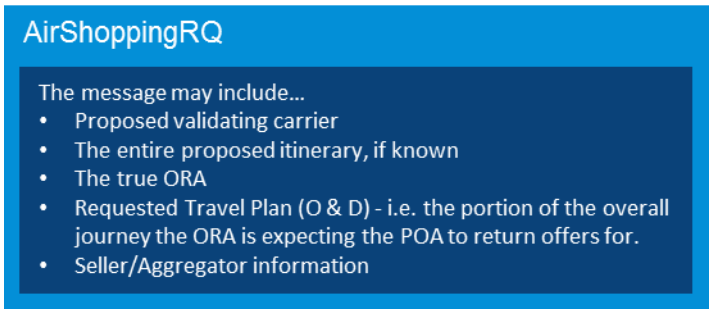
3. The ORA builds connections using known schedules and rules (such as minimum connect times) for the ORA and any interline partners.

4. The ORA determines that it cannot fulfill the entire request and needs to query POAs.

5. The ORA initiates an internal process for their online portion of the Offer (i.e. it determines which of its own services it wishes to include in the Offer/s it will return to the Seller/Aggregator).

6. The ORA generates a list of POAs that may have valid flight offerings that meet the Customer's needs, and are able to respond to an AirShoppingRQ.
   - The list may be generated using the Airline Profile data but this is not mandatory. The ORA may choose to generate its list using internal data.
   - The ORA validates that appropriate commercial agreements exist with the POAs in the generated list.
   - The ORA performs a check that the request does not generate any violations of appropriate competition laws or regulations.

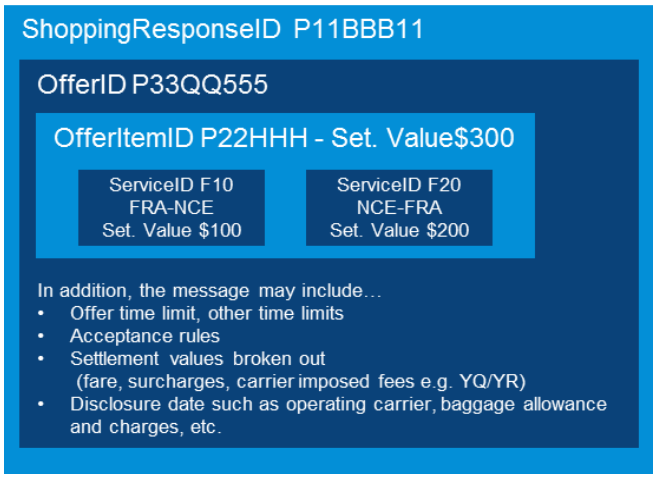
7. The ORA generates and sends an AirShoppingRQ message to the POA(s)



8. Each POA receives the AirShoppingRQ message and performs its own validation that the request conforms with commercial agreements and is not in contravention of competition law or regulation.

9. Each POA determines what, if any, flight offerings it wishes to return to the ORA.
   - Such flight offerings may or may not meet all of the criteria set out in the request.

10. Each POA formats and sends an AirShoppingRS message to the ORA which includes all of the flight Offers it wishes to make in response to the original request.



11. The ORA receives the response messages from all POAs
    - The ORA determines which (if any) of the POA Offers it wishes to combine with its own and include in its response to the Seller/Aggregator
    - The ORA combines responses from all the POAs into unified Offer(s) to the Seller/Aggregator

12. The ORA transmits its consolidated Offer(s) to the Seller/Aggregator.

13. Offer(s) are presented to the Customer by the Seller/Aggregator.

Post Conditions

The Customer is in possession of Offer(s) which meet the ORA's definition of "beach destinations".

3.7.6.2 Use Case 20 – Add an Ancillary to an Existing Order, Interline Journey

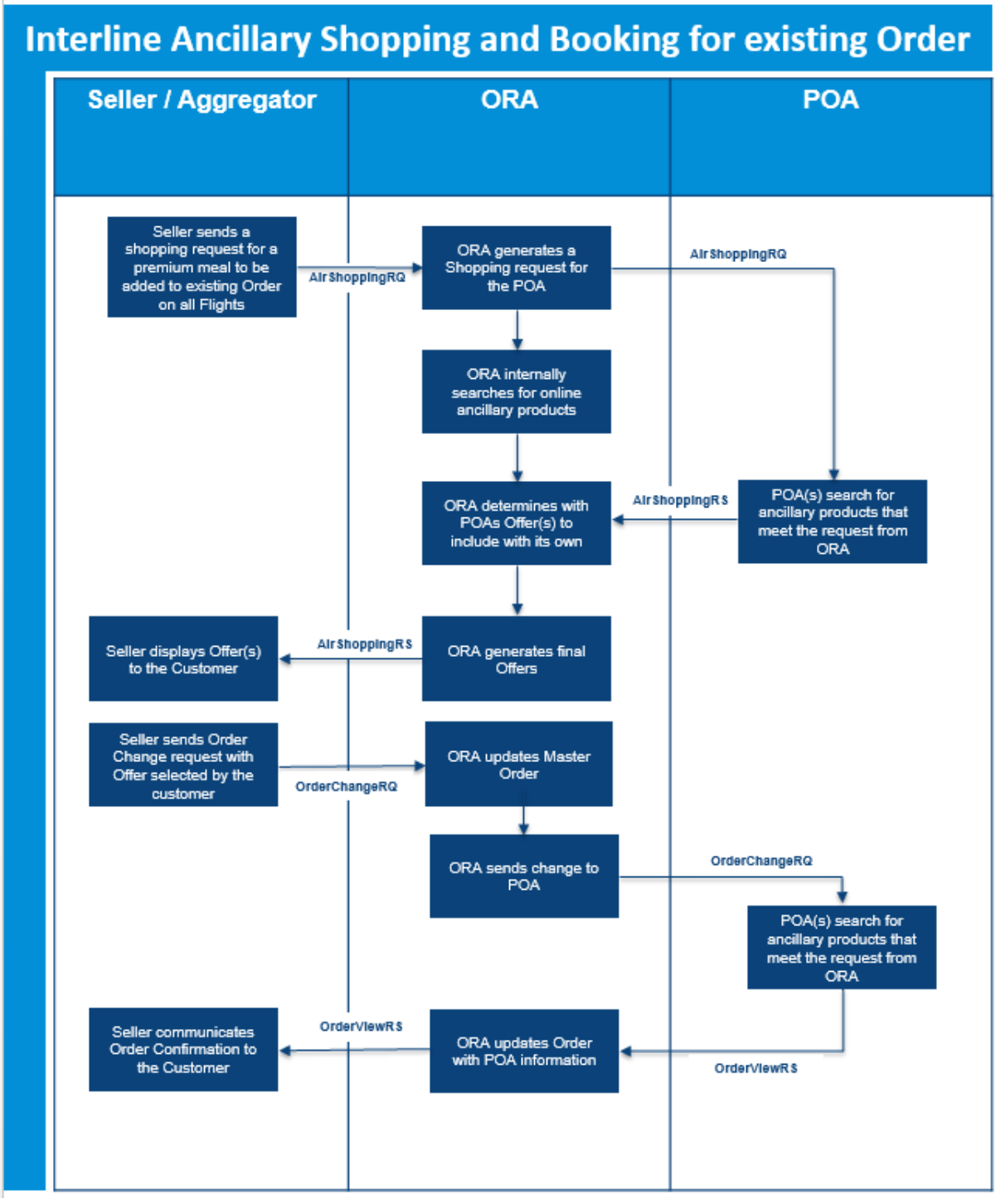
Description

A Customer already has an Order for a one way flight from Denver to Frankfurt and decides to enhance their onboard experience with premium meals on all of their flights.

This Use Case describes the process of Shopping for and Ordering ancillaries for all flights in an interline journey where an Order already exists.

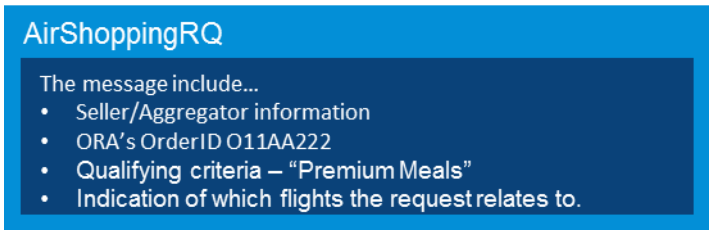
Preconditions/Assumptions

- The ORA already holds a Master Order for travel from Denver to Frankfurt via Chicago. DEN-ORD is on the ORA, ORD-FRA on the POA.
- The Seller and ORA, and ORA and POA, have implemented workflows that involve using AirShoppingRQ/RS for adding standalone ancillaries to Orders. This is one of several Shopping message pairs that could be used to fulfil this purpose.
- The ancillaries are not inventory controlled.



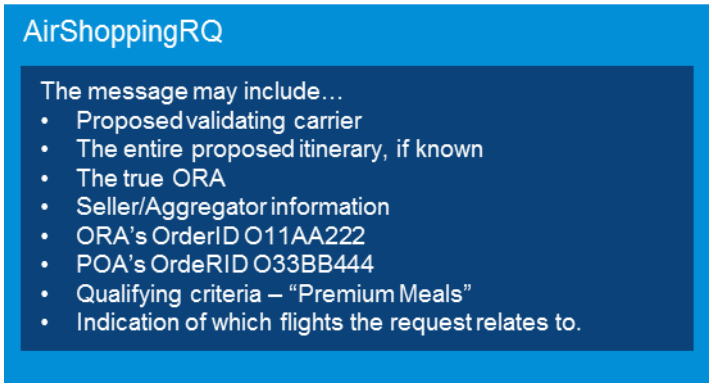
Steps to follow in the process

1. The Seller/Aggregator sends a shopping request to the ORA requesting Offers for premium meal ancillaries for flights on the ORA and POA.



2. The ORA initiates an internal process for premium meals for its online portion of the Offer (i.e. it determines which of its own services it wishes to include in the Offer/s it will return to the Seller/Aggregator).

3. The ORA generates and sends an AirShoppingRQ message to the POA(s)



4. The POA receives the AirShoppingRQ message and performs its own validation that the request conforms with commercial agreements and is not in contravention of competition law or regulation

5. The POA determines what, if any, premium meal offerings it wishes to return to the ORA. Such offerings may or may not meet all of the criteria set out in the request.

6. The POA formats and sends an AirShoppingRS message to the ORA which includes all of the Offers it wishes to make in response to the original request.

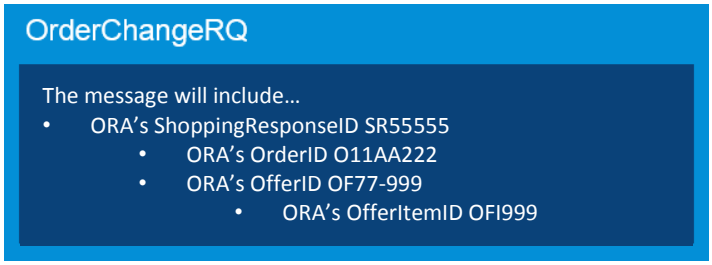
7. The ORA receives the response messages from the POA
   - The ORA determines which (if any) of the POA Offers it wishes to combine with its own and include in its response to the Seller/Aggregator
   - The ORA combines responses from all the POAs into unified Offer(s) to the Seller/Aggregator

8. The ORA transmits its consolidated Offer(s) to the Seller/Aggregator.

9. Offer(s) are presented to the Customer by the Seller/Aggregator.

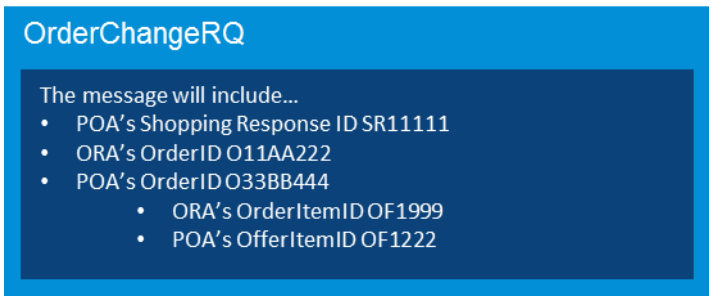
10. Customer selects an Offer for their premium meals.

11. The Seller/Aggregator sends a request to add the selected premium meals to the existing Order referencing one of the Offers returned by the ORA.



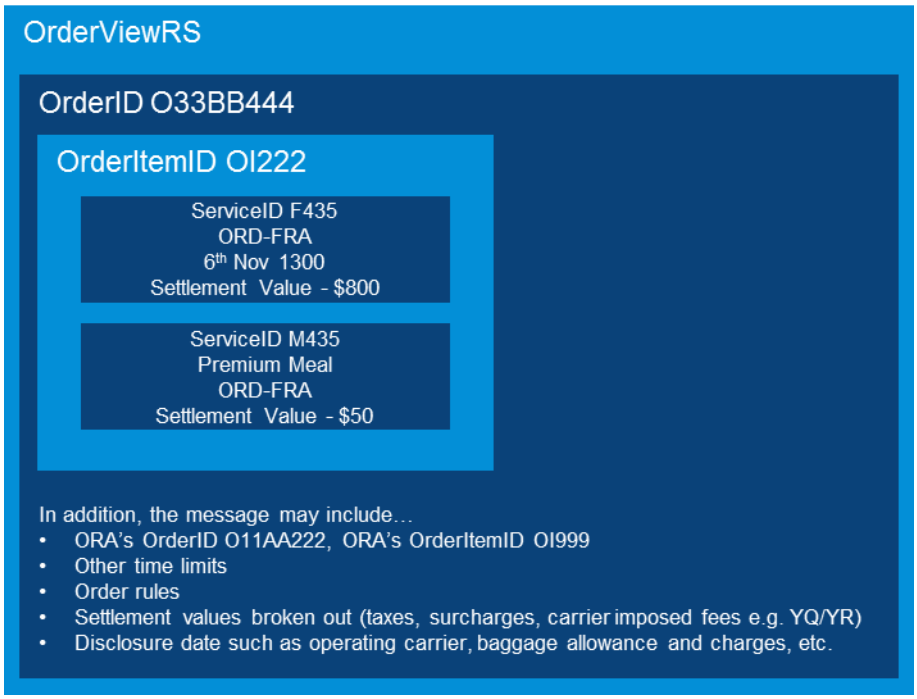
12. The ORA adds the premium meals, based on the Offer, to the master Order in its Order Managemant System.

13. The ORA formats and sends OrderChangeRQ to the POA.



14. The POA adds the premium meal to its existing Order in its Order Management System.

15. The POA responds to the ORA with an OrderViewRS confirming the premium meals.



16. The ORA responds to the Seller/Aggregator with an OrderViewRS message.

Post Conditions

The Customer is in possession of an Order with confirmed flights and premium meals,. The Order has not yet been paid nor accountable documents issued.

3.7.6.3 Use Case 21 – Interline Shopping with Recognized Traveler

Additional Actors (specific to interline)

- Participating Offer Airline (POA1) – recognizes the Traveler
- Participating Offer Airline (POA2)

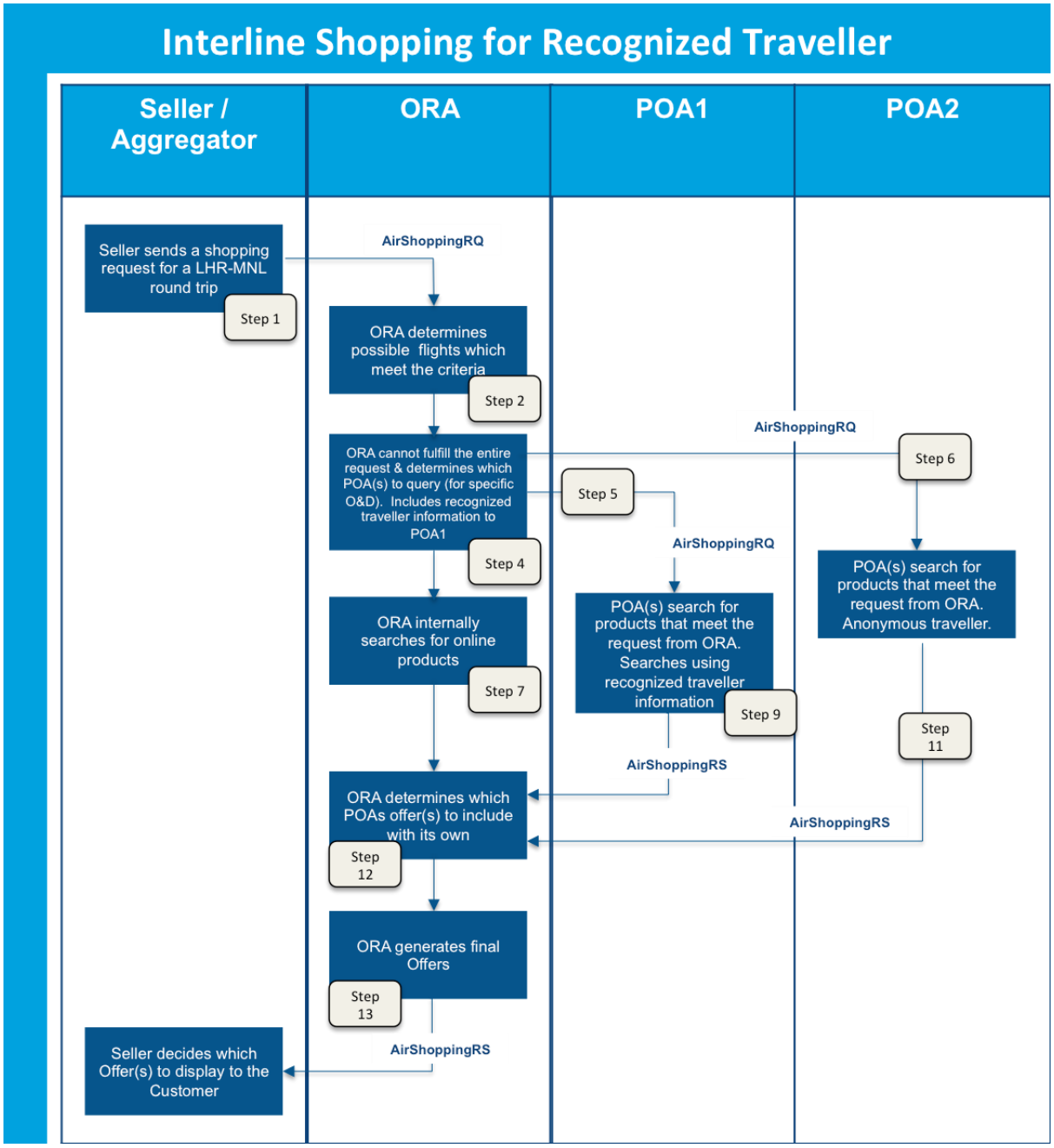
Description

A Customer based in London would like a round-trip flight to Manila

This Use Case describes the process of shopping for flights on multiple marketing carriers (no codeshare) to fulfill the travel plan. The Traveler is recognized by the ORA and POA1.

Preconditions/Assumptions

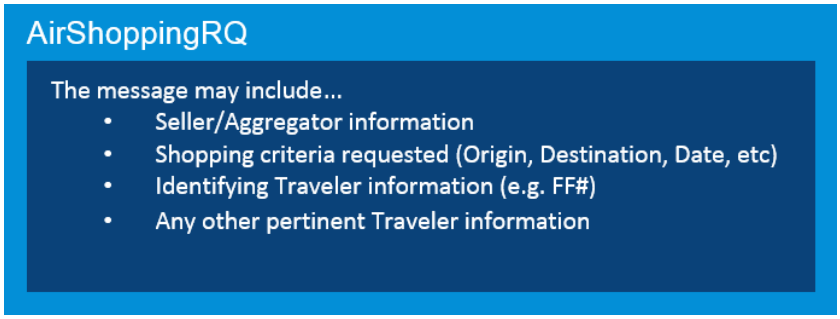
- The Customer communicates to the Seller their intended travel plan which includes travelling to a Manila from their home city.



Interline Shopping for Recognized Traveler – Message Flow

Steps to follow in the process

1. The Seller/Aggregator sends an AirShopping Request to the ORA for round-trip travel between LHR and MNL.

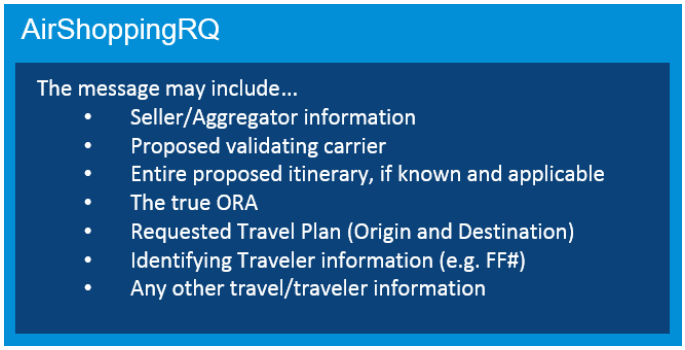


2. The ORA builds connections using schedules and rules (such as minimum connect times) for the ORA and any interline partners.

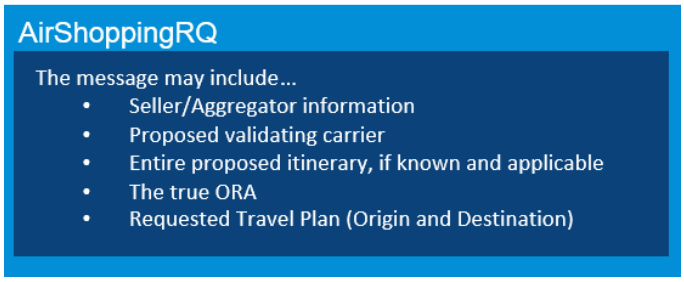
3. The ORA determines that it cannot fulfill the entire request and needs to query POAs.

4. The ORA generates a list of POAs that may have valid flight offerings that meet the Customer's needs, and are able to respond to an AirShoppingRQ.
   - The list may be generated using the Airline Profile data but this is not mandatory. The ORA may choose to generate its list using internal data.
   - The ORA validates that appropriate commercial agreements exist with the POAs in the generated list.
   - The ORA performs a check that the request does not generate any violations of appropriate competition laws or regulations.

5. The ORA generates and sends an AirShoppingRQ message to the POA1. The message includes the recognized Traveler information.



6. Simultaneously, the ORA generates and sends an AirShoppingRQ message to the POA2. The message **does not** include the recognized Traveler information



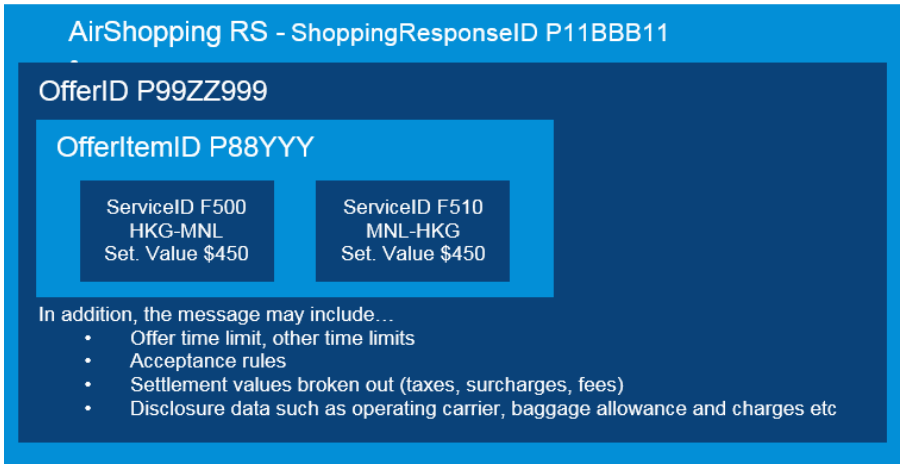
7. The ORA initiates an internal process for its online portion of the Offer (i.e. determines what Offer/s it wishes to return to the Seller/Aggregator).

8. POA1 receives the AirShoppingRQ message and:
   - Performs its own validation that the request conforms with commercial agreements and is not in contravention of competition law or regulation
   - Determines what, if any, flight offerings it wishes to return to the ORA.
   - The POA will also use its internal business rules to include special offerings based upon a recognized Traveler. In this case, the Traveler is an elite member of its travel program and is entitled to a premium seat for free.

9. POA1 formats and sends an AirShoppingRS message to the ORA which includes all of the flight Offers it wishes to make in response to the original request.

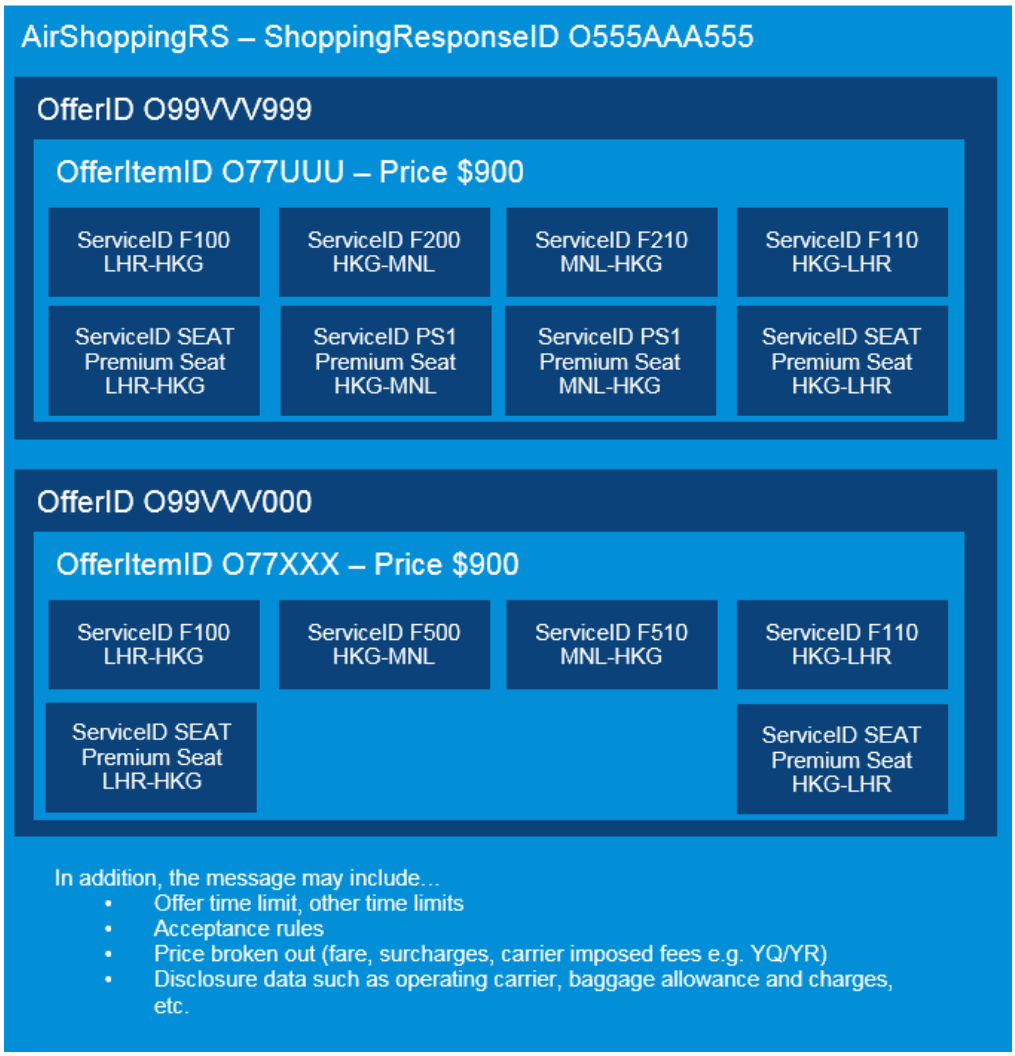
10. POA2 receives the AirShoppingRQ message and:
    - Performs its own validation that the request conforms with commercial agreements and is not in contravention of competition law or regulation
    - Determines what, if any, flight offerings it wishes to return to the ORA.
    - The POA has no indication of the identity of the Traveler, so will create its Offer for an anonymous Traveler.

11. POA2 formats and sends an AirShoppingRS message to the ORA which includes all of the flight Offers it wishes to make in response to the original request.



12. The ORA receives the response messages from both POAs
    - The ORA system determines which (if any) of the POA Offers it wishes to include in its response to the Seller/Aggregator
    - The ORA aggregates responses from all the POAs into unified Offer(s) to the Seller/Aggregator

13. The ORA transmits two Offers to the Seller/Aggregator via an AirShoppingRS message, the first Offer containing services (inc. free premium seat) for POA1, the second containing services for POA2.



Post Conditions

The Customer is in possession of 2 Offers which meet their required travel request. One of which includes free premium seats for both ORA and POA1 travel.

3.7.6.4 Use Case 22 – Schedule Change, Flight Cancellation, POA Reprotects passenger

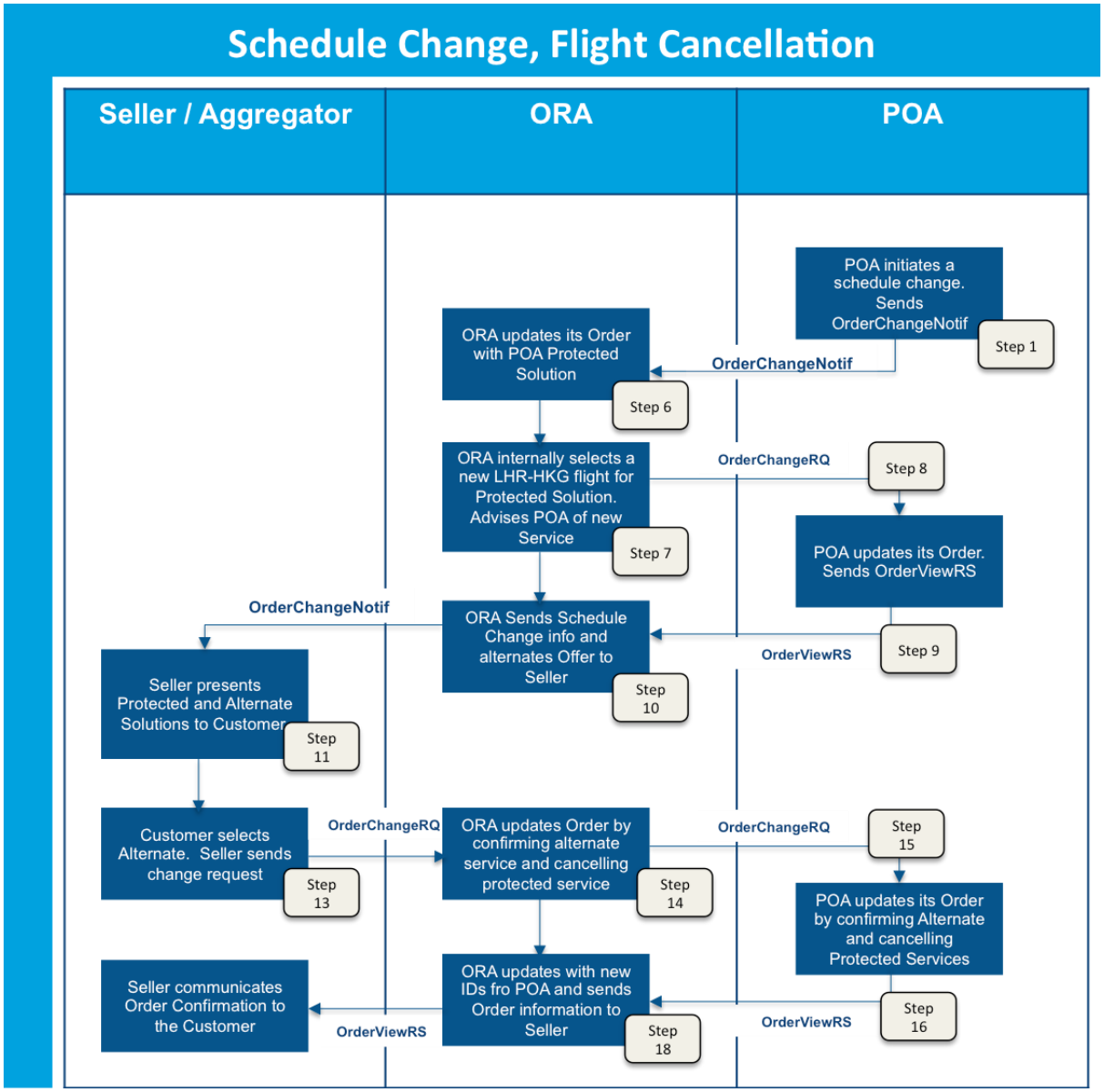
Description

A Customer based in London holds a ticketed Order for round-trip travel between London to Manila. The LHR-HKG flights are on the ORA. The HKG-MNL flights are on the POA. Travel has not commenced. The POA cancels the service on the outbound from HKG-MNL

This Use Case describes the process of the POA advising the ORA of the flight cancellation, and offering of alternative flights, with the ORA then informing the Customer via the Seller.

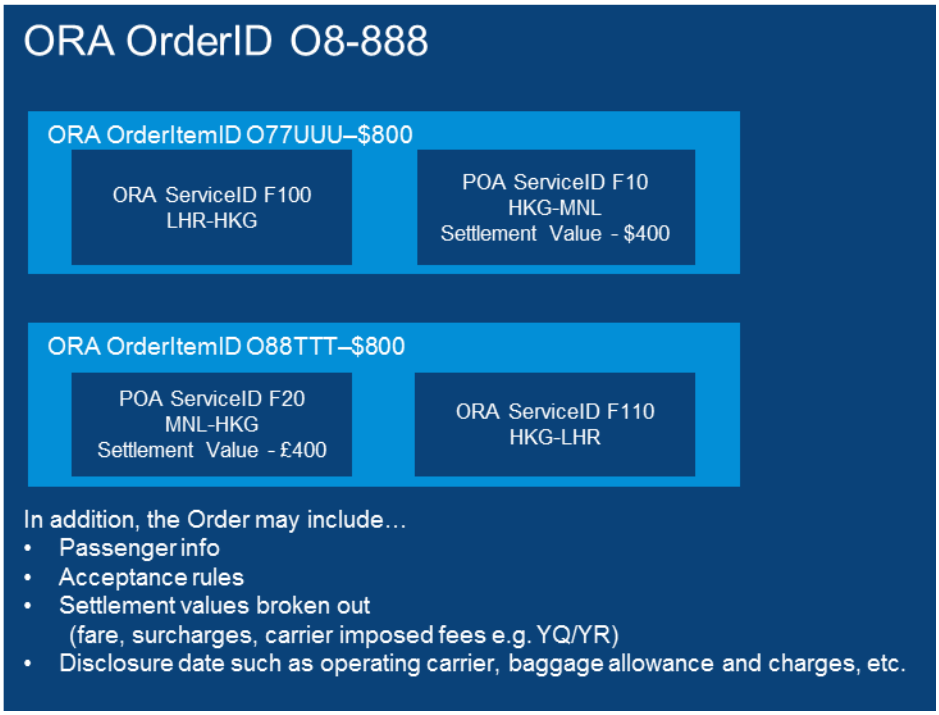
Preconditions/Assumptions

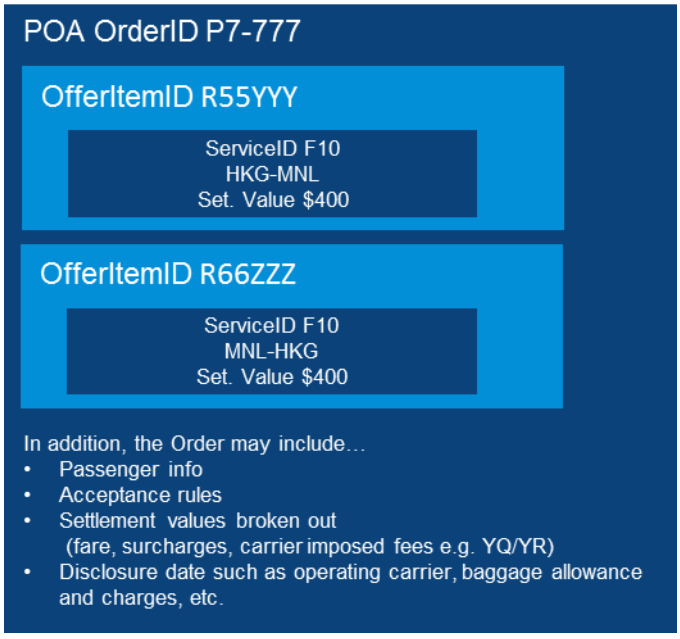
- An accountable document has been issued.
- The POA must send a protected segment flight back to the ORA. This will be in the form of an Order Item containing a Service, each with their corresponding OrderItemID and ServiceID. This will replace the previously confirmed POA Order Item.
- The POA indicates its preference regarding accountable documents (e.g. reissuance)
- In this use case, there is no change to settlement values for the POA's protected solution or alternative solutions.
- In this use case, The ORA does not request additional collection from the passenger for them to be allowed to choose one of the alternative options.



Schedule Change, Withdrawal of Service – Message Flow

Initial Order





Steps to follow in the process

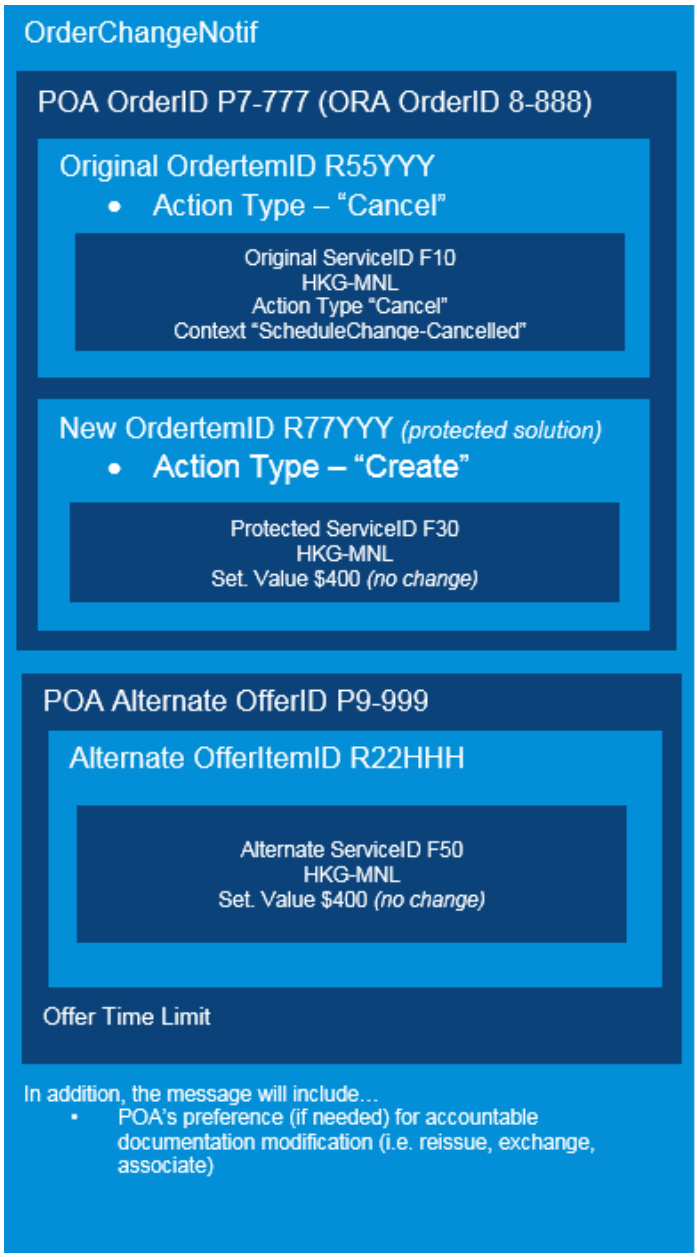
1. The POA initiates a schedule change to cancel HKG-MNL flights and internally determines that this action affects the Order with ORA OrderID O8-888 and POA OrderID P7-777.

2. The POA identifies one protected, suitable solution (per commercial agreements) and further alternative solutions on the POA's flight services

- The POA may or may not shop sub-POAs to provide alternative solutions (in this use case it chooses not to – and no codeshare flights are involved in these alternative)
- The alternative solutions will be sent to the ORA in the form of Offers.

3. The POA updates its version of the Order to reflect that the protected solution is now the confirmed service to fulfill that portion of the itinerary.

4. The POA formats and sends an OrderChangeNotif to advise the ORA of the schedule change for HKG-MNL along with the protected & alternate solution(s).



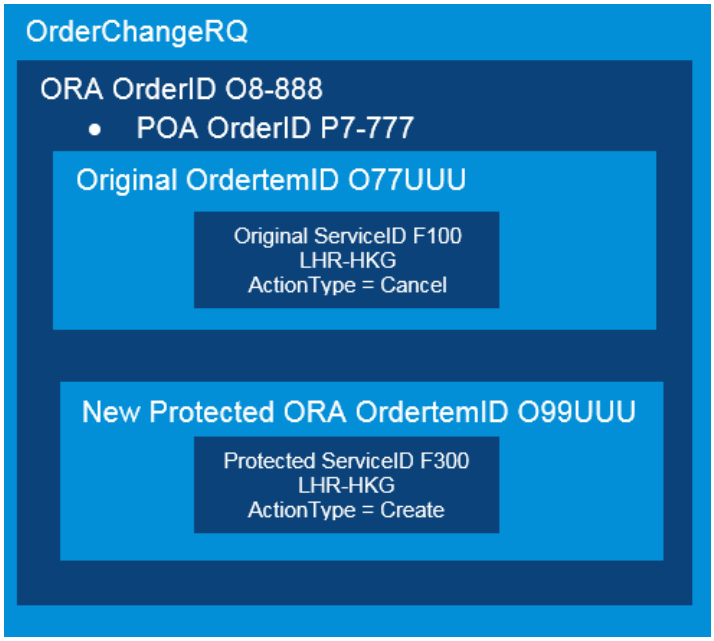
5. The ORA receives the OrderChangeNotif from the POA and generates and sends an Acknowledgement to the POA.

6. The ORA updates its Order with the Protected Solution.

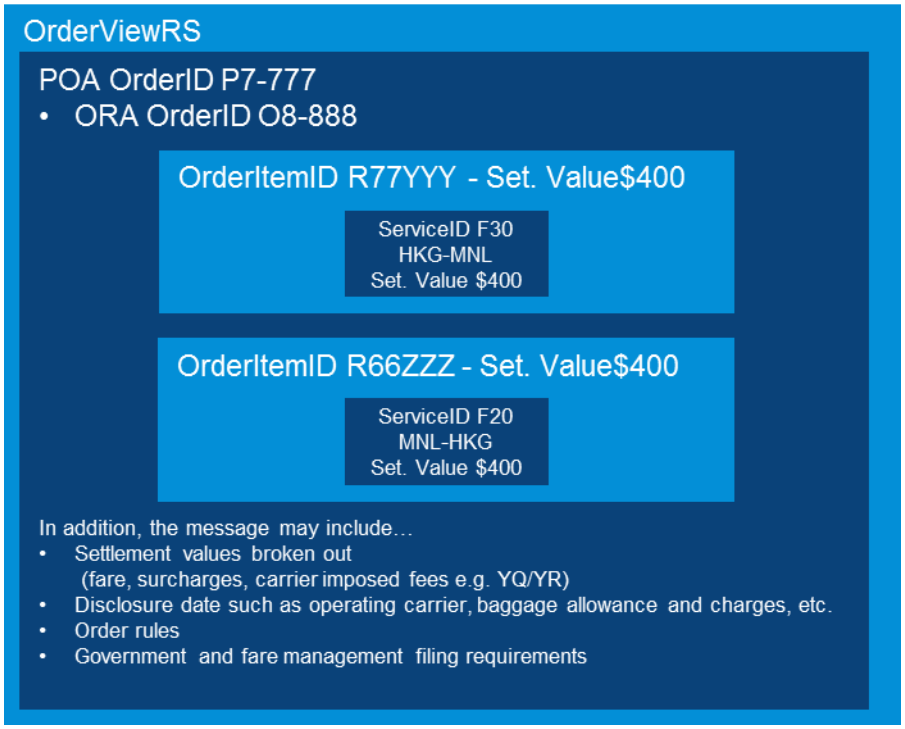
7. The ORA decides to:

   - Protect the Customer on a new LHR-HKG flight that works better with the POA's new protected solution and
   - Include a different LHR-HKG flight with the POA's alternate solution
   - Alternate decision #1(not shown in flow): The ORA could choose to protect the passenger on its original flight. In this case, the ORA would immediately send OrderChangeNotif to the Seller/Aggregator in Step 10. The message will include the protected solution and one or more new alternate Offers.
   - Alternate decision #2 (not shown in flow): The ORA could choose to protect the passenger on its original flight and not provide any alternate Offers to the Customer. In this case, the ORA would immediately send OrderChangeNotif to the Seller/Aggregator in Step 10. The message would not include any new alternate Offers.

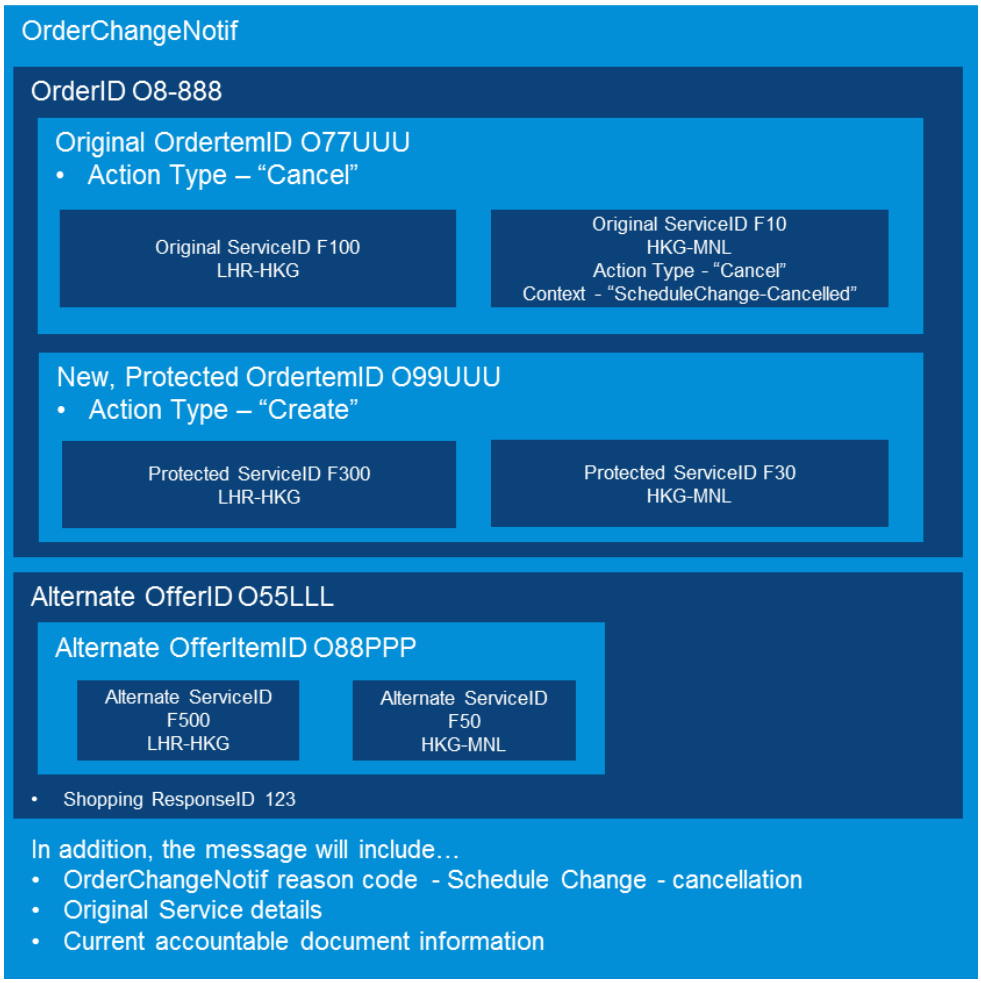
8. The ORA advises the POA of the decision to protect the passenger on a new LHR-HKG flight using OrderChangeRQ. This allows the POA to have a correct copy of the Order in its system.



9. The POA updates its Order and replies using an OrderViewRS to the ORA



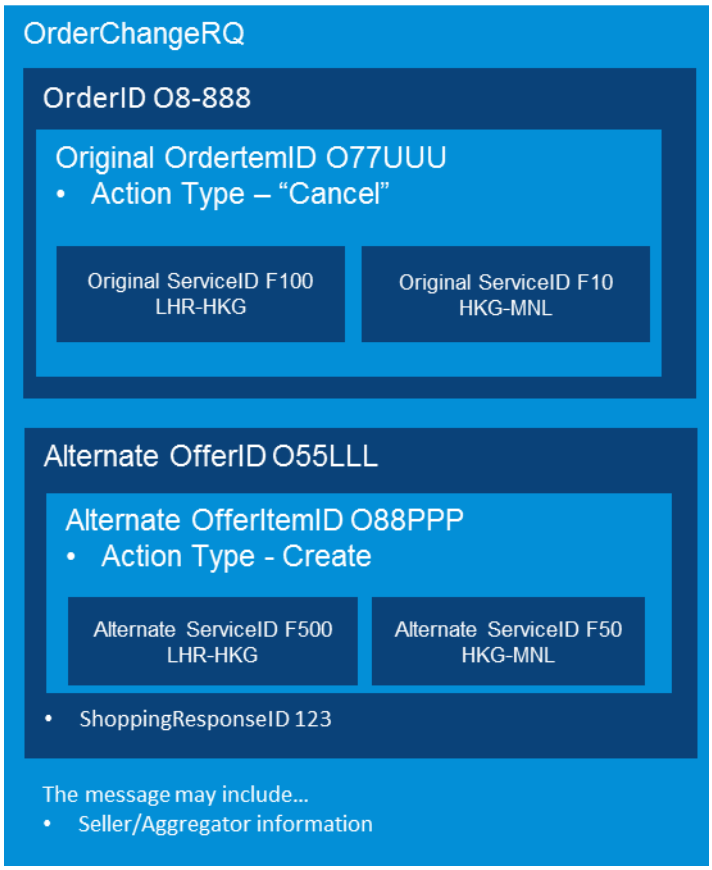
10. The ORA formats and sends an OrderChangeNotif to the Seller/Aggregator with the protected solution and an alternate Offer



11. The Seller/Aggregator presents the protected solution and the alternate Offer to the Customer

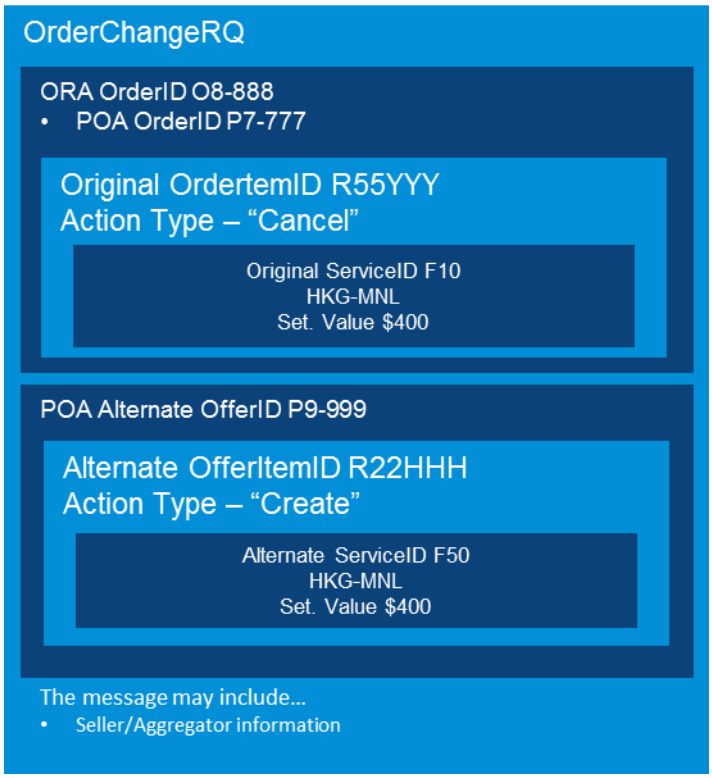
12. The Customer chooses the alternate solution

13. The Seller/Aggregator formats and sends an OrderChangeRQ to the ORA, advising the Customer has rejected the protected solution and chooses the alternate Offer

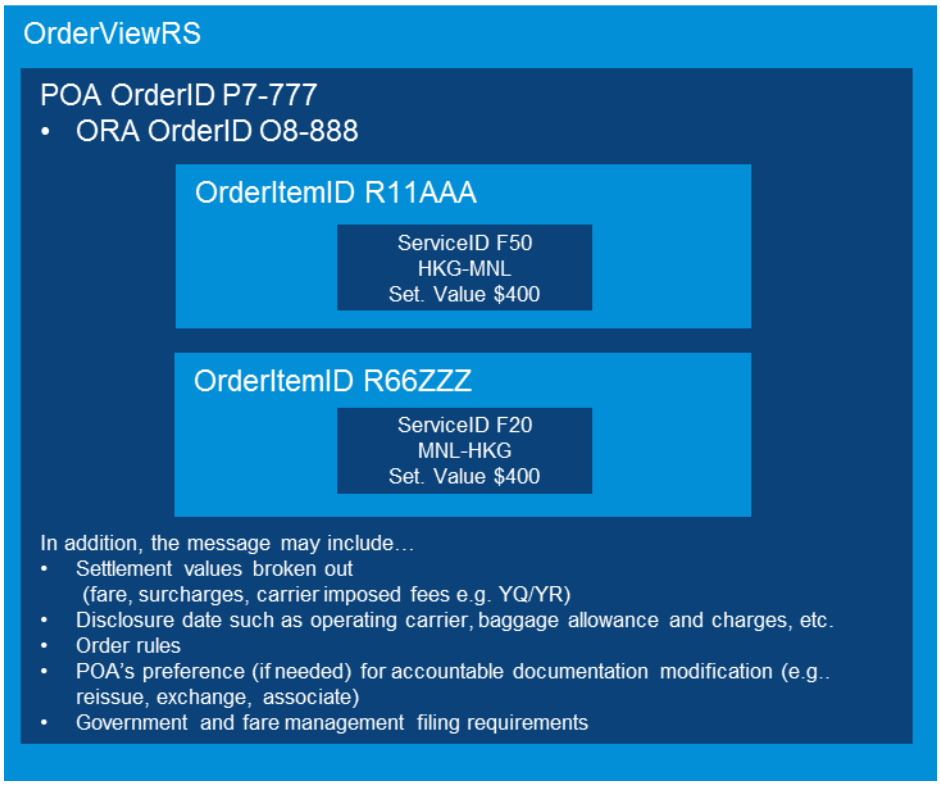


14. The ORA updates the master Order by confirming its Service of the alternate solution and cancelling its Service in the protected solution

15. The ORA generates and sends an OrderChangeRQ to the POA confirming its Service of the alternate solution and cancelling its Service in the protected solution.

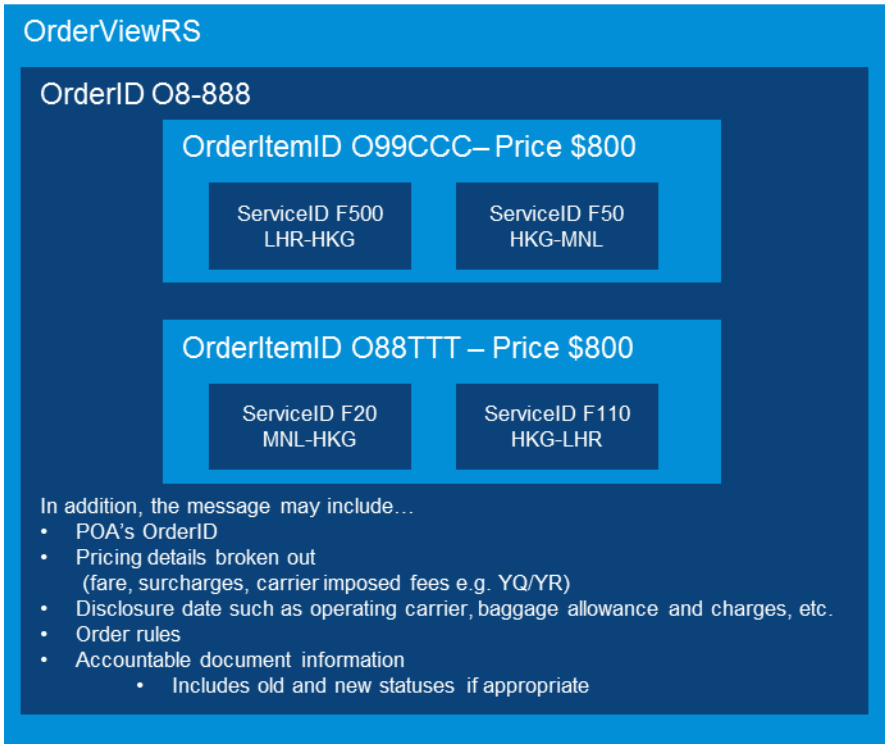


16. The POA receives the OrderChangeRQ and updates its Order with the ORA's new OrderItem and Service data, cancelling and confirming its Services as appropriate. The POA generates and sends an OrderViewRS to the ORA.



17. The ORA receives the OrderViewRS from the POA, internally updates the Order with the POA's New OrderItemID(s) and ServiceID(s) as applicable, and updates/reissues accountable documents as necessary.

18. The ORA formats and sends an OrderViewRS to the Seller/Aggregator.



19. The Seller receives the OrderViewRS from the ORA, informs the Customer that the changes have been made to their Order including accountable document information. No refunds or additional collection is due.

Post Conditions

The Customer is in possession of a newly confirmed Order, which meets their required travel request. Accountable document changes have been actioned.

4 Implementation support

4.1 Implementation Guidance

4.1.1 NDC evolves the Airline services landscape

(NDC) provides a unique opportunity to modernize how air travel is sold, opening up the prospects for Airlines to become more profitable by selling not just seats, but unbundled options such as Wi-Fi, lounge access, seat and menu choices, baggage options, etc.

It is important to understand that though NDC introduces opportunities to improve Customer choice many things will remain the same.

For example when NDC is widely adopted Airlines will use the same sorts of passenger service systems (reservations, departure control, etc.) as was the case before NDC. Those systems may be adapted for NDC, but NDC will not require a fundamental change in the passenger service systems of an Airline, whatever the business model those Airlines operate.

For distribution, though some indirect sales will be made through direct connect to travel agents, other sales will continue to be made using GDSs. The GDSs may themselves adopt features of NDC. NDC is an initiative driven by the business needs of Airlines and their partners. Where existing processes and structures serve those needs adequately they are likely to remain in place.

The expectation is that NDC will facilitate a richer landscape of service providers, but any new service providers are likely to work with and alongside the established service providers. The introduction of NDC based services will represent an evolution, with tomorrow’s situation being a hybrid of today's service provision, service utilizing NDC and other services aimed to support both.

To ensure this evolution of services happens as smoothly as possible, IATA has established the Integration Group. This group, made up of industry experts from across the domains NDC affects and working outside of the NDC team & project, is tasked with the integration of NDC with existing standards (and by implication the systems that use those standards). The integration group will carry out the analysis and where necessary make recommendations to the appropriate standards setting bodies to ensure NDC works with and will continue to be supported by the long established process of Airline industry standard setting and revision.

4.1.2 Architectural Choice

The most fundamental choice this guide will discuss regarding NDC as a project is how the NDC solution will be integrated into the Airlines' Passenger Service Systems (PSS). Broadly speaking there are three situations Airlines can be found in relating to their PSS:

- They host their own systems. Those systems may be developed in house or use licensed software
- Their suite of PSS is managed by a single outside organization. That organization will be responsible for managing hardware and software; a user group may influence the management of the software and hardware
- Their suite of PSS is managed by a number of outside organizations. Those organizations will be responsible for managing hardware and software; user groups may influence the management of the software and hardware

In all cases the fundamental IT architecture choice regarding NDC is the same; should NDC be integrated directly into the PSS itself or should the integration be facilitated using an integration layer inserted logically in front of the PSS with an adapter designed specifically for NDC.

4.1.2.1 Airline Reference Architecture

IATA developed the NDC Reference Architecture in order to highlight the critical components an Airline should consider for the successful deployment of NDC.

The NDC Reference Architecture offers a framework for planning and deploying NDC projects. It will help Airlines drive decisions associated with their implementation of NDC. For instance, Airlines will be able to:

- Manage the expansion of NDC within their organization from pilot to comprehensive deployment and adoption.
- Introduce architecture-centric methodology. NDC Reference architecture offers a few suggestions for getting the NDC initiative off to a fast start.

Overall, the aim is to provide a better understanding of what it will take to move NDC from a vision to delivering business value.

4.1.2.2 Architecture principles

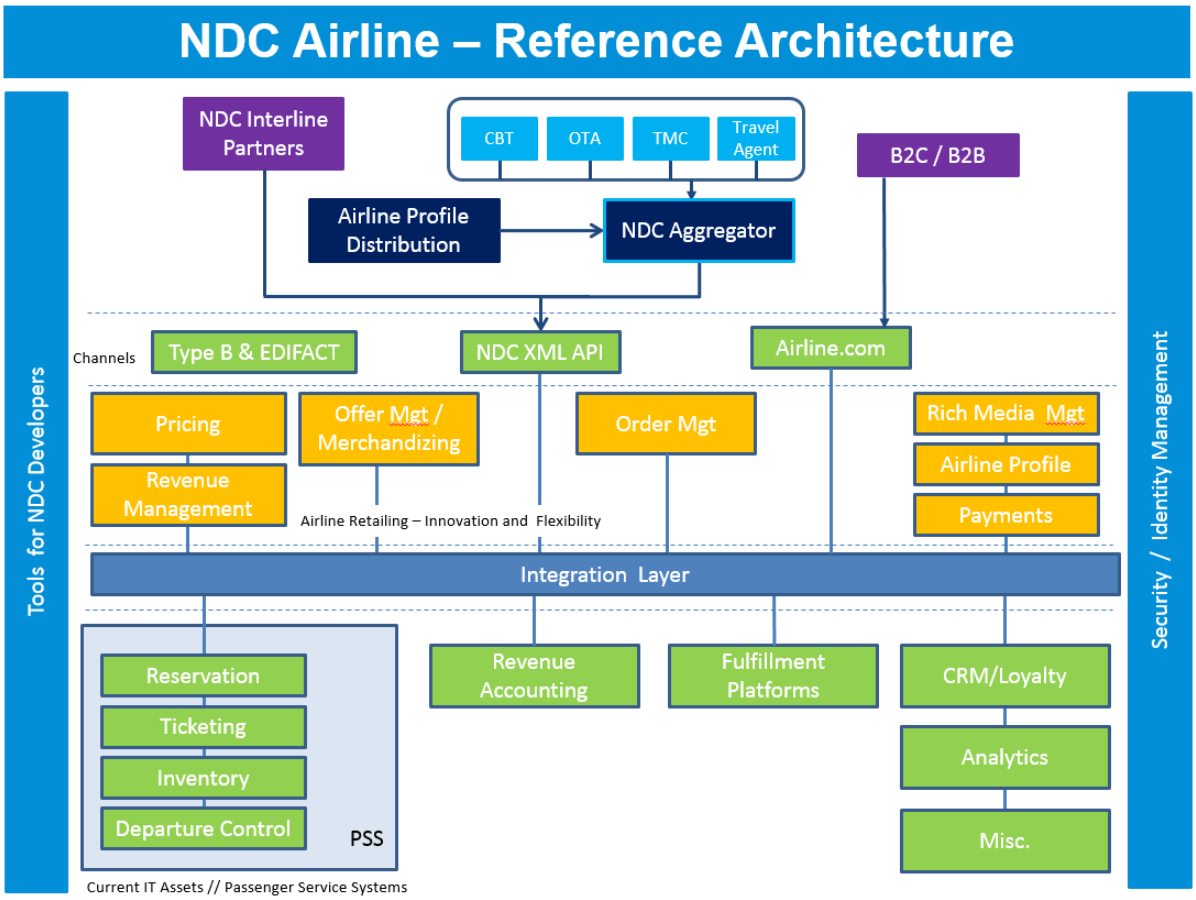
The NDC Reference architecture aims at listing the components required to deploy NDC – it leverages existing building blocks and facilitates the deployment of

new ones. This 'adopt and extend' philosophy recognizes the reality that IT is and will remain a heterogeneous environment. In other words, this guide accepts that Airlines have an existing IT landscape of heterogeneous systems. The goal of NDC is to enhance, rather than replace, this landscape.

With its modular approach, the NDC Reference Architecture offers Airlines a flexible and cost-effective solution. For example, if a technology supplier comes with a better Offer Management solution, the architecture allows that solution to be deployed quickly and economically (e.g. via reduced integration cost) and can easily be integrated with the other building blocks. This approach gives Airlines access to best of breed solutions, can help reduce integration costs and shorten the time needed to deploy new solutions.

Additional points

The reference architecture proposed by IATA is inherently vendor neutral and not specific to a set of technologies. It accommodates the needs of Airlines of all sizes and can adapt to evolving needs and wants.



NDC Airline reference architecture

The chart above illustrates operational systems required by the Airline to support NDC, and how they will interact with each other as well as with each of its distribution channels. The NDC Reference Architecture requires the integration of new functional components:

Offer Management: this module will enable the Airline to respond to the shopping requests sent by agents, construct, store and manage product Offers to agents and support its merchandizing capability with them.

Order Management: this module will enable the Airline to create, store and manage Orders from Sellers originating from product Offers.

Rich Media: this module will enable the Airline to create, manage and distribute rich media content (images, videos etc.) to Sellers.

Airline Profile: this module will enable the Airline to create, manage and distribute the rules to determine which shopping requests should be sent to the Airline.

4.1.2.3 New elements introduced with NDC Architecture

The NDC Reference Architecture introduces two new modules specific to NDC: Offer Management and Order Management.

Offer Management: This module supports rules and processes for price engine, merchandising, personalization and a repository for Offers.

Order Management: This module supports rules and processes for booking, payment, ticketing, and servicing as well as a repository for Orders.

Therefore the NDC Reference Architecture requires IT to integrate the Offer and Order Management with the existing Airline IT solutions. That existing architecture, centered on the PSS, will broadly fall into one of three situations.

- Airlines will host their own systems. Those systems may be developed in house or use licensed software.
- The Airline's suite of PSS is managed by a single outside organization. That organization will be responsible for managing hardware and software; a user group may influence the management of the software and hardware
- Their suite of PSS is managed by a number of outside organizations. Those organizations will be responsible for managing hardware and software; user groups may influence the management of the software and hardware.

The key IT architecture choice regarding NDC is the same for all above cases; should NDC be integrated directly into the PSS itself or should the integration be

facilitated using an integration layer inserted logically in front of the PSS with an adapter designed specifically for NDC.

The considerations that would need to be taken into account if NDC based services are to be integrated directly into a PSS will very much depend on the specifics of that PSS, and therefore will be beyond the scope of this guide. By contrast if an Airline chooses to integrate NDC based services using an integration layer, there is general guidance that can be shared that will support more informed decision making.

4.1.2.4 Future development of the NDC Reference Architecture

The NDC Reference Architecture will continue to be refined. Lessons learned from pilots and early deployments will diffuse into this implementation guide in general and the reference architecture in particular.

4.1.2.5 NDC Secure Tokens

A specific area where the architecture will develop is trust management. It is our intention not only to focus on the recommended mechanism(s), but also to touch on performance/scalability and security/identity management in detail. This will include recommendations on how to address key security requirements such as non-repudiation, message confidentiality and integrity.

4.2 Technical considerations

This guide is also intended as a resource to best practices and usage recommendations to ensure consistency across NDC implementations.

The following section addresses many of the common features pertaining to XML schemas (Name Space, Augmentation points, Metadata...), also illustrates the specific functional use of the schemas and how the elements and data contained, can transition between flows (i.e. between shopping and Order creation).

The NDC Standard and specification will continue to evolve and mature, therefore this document will be modified appropriately to keep pace with the industry.

4.2.1 NDC Schema Design Considerations

The following points outline PADIS recommendations related to the design and architecture of NDC schemas. These are listed for information purposes. Certain points have been reassessed and discarded, following a closer look at how best practices are evolving in the IT industry, while others have no direct impact on the physical implementation of NDC XML messages. Nevertheless, these points

illustrate some of the considerations that were factored into the latest versions of the NDC schemas.

The numbering and wording of each recommendation's description remain unaltered, as sourced from the official PADIS meeting minutes.

12. Rule: 10 – Namespaces

10.1 There will be one namespace per Message Schema (NS + TargetNS) and it shall be the default.
10.2 Object library schemas will follow Chameleon approach and therefore not have a Target Namespace.
10.3 Object library schemas will have one namespace.
10.4 The elementFormDefault shall be qualified
10.5 The attributeFormDefault shall be unqualified
Agreement to adopt chameleon approach. NDC will also keep using a common namespace across all schemas.

7. Rule: 7.2 – "Type" vs "Ref"

Define XML schema elements via the 'type' attribute or an inline type definition ('simpleType' or 'complexType') instead of the 'ref' attribute that references a global element.

Agreed to retain current combination of typed versus referenced instantiations, as changes to schemas focused on higher priority items impacting actual message structure, rather opposed to internal syntax and architecture. Casting elements as types Offers the flexibility of assigning a name to said elements that differ from the inherited complex type, while using references rigidifies the schema by forcing consistent naming of elements, as these cannot be changed. The NDC schemas use a balanced amount of both styles within its common types as well as message structures.

6. Rule: 7.1 – Venetian Blinds

Define all type declarations (complex, simple) globally and all elements locally (Venetian Blinds).

No action required – known and agreed exception, as it is related to recommendation # 7 on types and refs.

PADIS Extra – Metadata

Use of metadata, specifically in case of currency handling.

Usage instructions of metadata will be clarified by the implementation guide. This will include default behaviors with and without metadata, as well as how the metadata is associated with specific elements within the message.

10. Rule 7.11 – Wildcards

Avoid Wildcards in Reference Schemas. Wildcards in IATA schemas work in opposition to standardization. The goal of creating harmonized, standard schemas is to standardize definitions of data. The use of wildcard mechanisms outside of valid augmentation points (such as xsd:any), which allows insertion of an arbitrary number of elements from any namespace) allows nonstandard data to be passed via otherwise standardized exchanges. Avoidance of wildcards in the standard schemas encourages the separation of standardized and non-standardized data.

Agreement to keep xsd:any extensions purely within augmentation points. Best Practices document already reflects usage of this, as compared to similar TPF extensions. Usage instructions of augmentation points will be included in the NDC implementation guide.

4.2.2 NDC Augmentation Points

NDC schema will primarily be used as a payload mechanism for web services and accordingly, it may be anticipated that there will be additional information required for NDC transaction processing that has not yet been defined in the schema.

Additionally, as the NDC specification matures, it is likely that new data exchange requirements will be identified that are necessary for integration with other Airline distribution & merchandising systems.

To accommodate this scenario, the NDC schemas include support for the specification of implementer-proprietary data structures from non NDC namespaces that are wrapped in NDC conformant types so they may be used in an NDC schema. The main construct available since NDC 1.1.3 candidate release for wrapping non-NDC-conforming types is an Augmentation point (global element reference) which is represented as the AugmentationType in the NDC structures schema.

The augmentation point adapter type is an NDC-conformant type that can contains:

- Attributes from external namespaces
- Elements from external namespaces

Augmentations are not considered to be a part of the NDC Standard functionality and therefore may be ignored if not recognized/understood/implemented by consuming

systems. In most cases, the usage and exact specifications of such augmentation points would need to be agreed upon bilaterally amongst integrated parties.

Augmentation points may reference content from more than one external namespace, but all content must be from external namespaces.

Valid business requirements should be covered by amendments to the industry standard. NDC, however, is a new concept and its specifications gradually evolving. Hence it is highly possible that new requirements may be identified during the implementations, and implementers will be constrained by the standards release lifecycle, which will, in turn, slow down the adoption. The augmentation point structure is provided to support these types of scenarios and provide implementers with an interim solution so as to avoid hindering the pace of adoption. At the same time Augmentation points usage is highly discouraged on a longer terms basis - it is not aligned with the overall standardization efforts, and creates grounds for multiple bilateral variations of the implementations. It is expected that implementers will produce corresponding change requests to the industry standard to include required functionality, managed through Augmentations in the interim, for the next available release cycle. The objective is to enhance the standard for the benefit of the industry and to avoid the multiplication of its bilateral variations.

More detailed Augmentation points considerations and usage will be described in the next revisions of the NDC Implementation Guide.

4.2.3 OfferIDs and OrderIDs

The following topic illustrates specific functional use of the schemas, how OfferIDs and OrderIDs transition between the stages of a transaction lifecycle (i.e. between shopping and Order creation).

Example1:
Below is a sample from a shopping response which shows how Offer IDs are used to track individual priced Offers. Once the ORA responds to the Seller / Aggregator with an AirShoppingRS, the message includes but is not limited to: the ORA’s OfferIDs, the ORA’s Shopping ResponseID, the ORA’s OfferItemIDs and ServiceIDs

AirShoppingRS

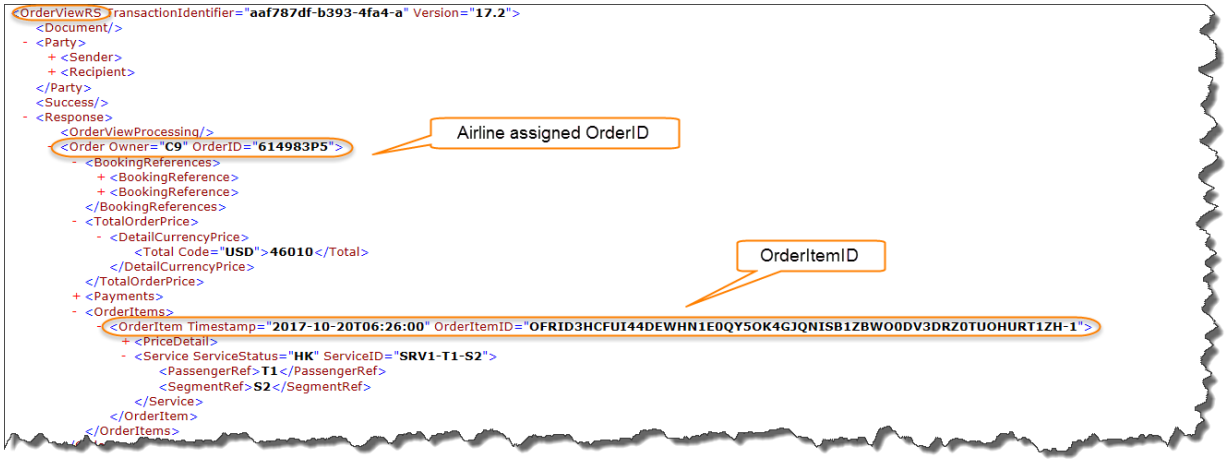
Once the ORA receives a request for Order creation in the form of an OrderCreateRQ message, the message includes the Shopping Response ID, the OfferID and the OfferItemID from the previous shopping transaction(s).

OrderCreateRQ

**The mechanism by which Offers are being tracked and assigned to a particular Offer are not in scope of the NDC Standards.*

Example 2:

This XML sample illustrates how an Order ID is being returned in the OrderViewRS once an Airline has generated a “Master Order” in its own Order Management System. The OrderViewRS message includes but is not limited to: The ORA’s OrderID, OrderItemID and all ServiceIDs.

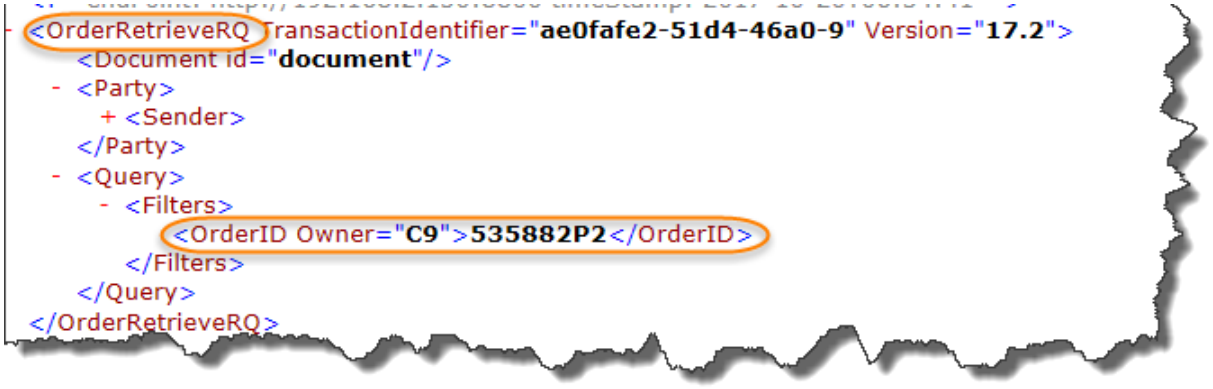


OrderViewRS

**The mechanism by which an Airline generates an Order ID in their own system is not in the scope of the NDC Standard.*

Example 3:

This sample illustrates how an Order can be retrieved by its OrderID using the OrderRetrieve message

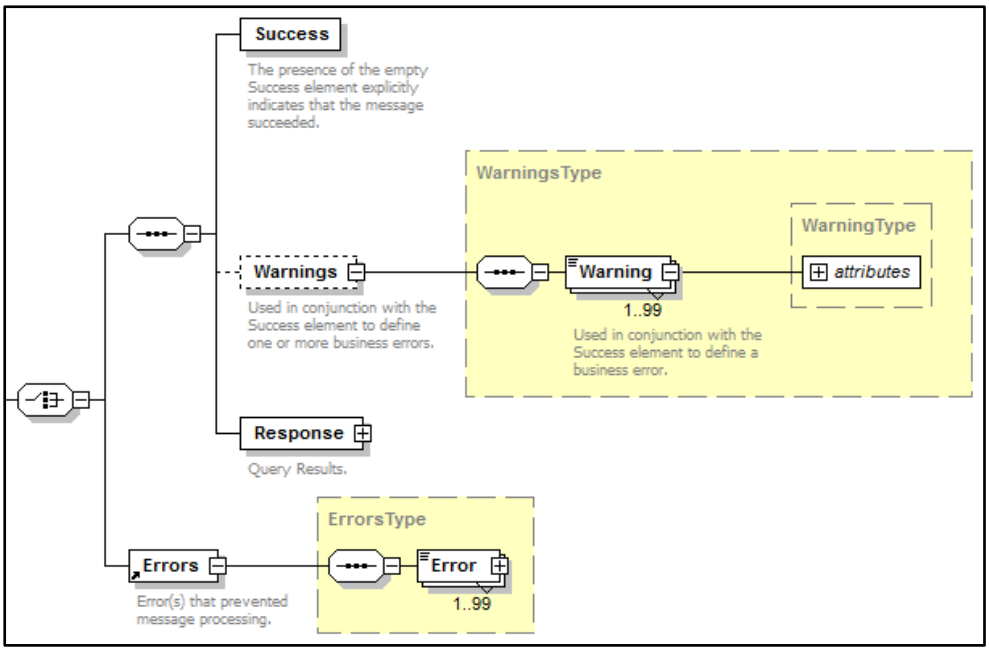


OrderRetrieveRQ

More details on specific use of the schema will be added in the next revisions of the NDC Implementation Guide.

4.2.4 Handling Errors & Warnings

NDC response messages contain standard payload elements to support exception handling. Messages can represent a successful response from the Airline (and thus include the mandatory “Success” indicator in addition to the actual Response. Successful responses could optionally include Warnings. A response message can otherwise present Error messages, in case the request could not be processed.



NDC Response Messages - Standard Payload Elements

The Warning element is used along with the Success element to indicate that the message was received. If only the Success element is returned, then either no errors were found or it may only be an acknowledgement that the request was received. If the Warning element is also returned, then a business error was found.

In the Warning element, a PADIS codeset 9321 error code can be returned as well as the XPath (in the Tag attribute) of where in the request the error occurred. These error codes are sourced from the “PADIS EDIFACT and XML Codeset”, which can be found packaged together with the NDC schemas on iata.org/ndc.

In order to further narrow the location of an error, the RecordID could be used to return, for example, the OrderID or BookingRefID where the error was encountered.

The Error element may be returned when the recipient is unable to process the message, e.g. the message version is not supported or the recipient does not accept the request being sent. The use of the Error element is similar to the use of the EDIFACT CONTRL message and contains similar error code and XPath capabilities as with Warnings. Errors in NDC response messages are designed to provide the details of what caused the error, including the type of error and location.

4.2.5 Change Request and Schema versioning

A form is currently available upon request to raise Change Requests to the schema. Please e-mail PDMG_Secretary@iata.org to request the CR form. We encourage implementers to raise CRs describing in details the issue encountered and proposing a solution if they have found one already. The average time to send a response to a

CR is around a few weeks as it needs to be reviewed by the NDC Change Management Group. The same procedure applies if an implementer finds a bug in the schema.

NDC (EDIST) schemas are published under Passenger and Airport Data Interchange Standards Board (PADIS) governance (PSC Resolution 783) and according to PADIS publication procedures and release calendar.

Two versions of the schemas are published every year in March and in September. The March release will be numbered as release YY.1 and the September release will be numbered as YY.2. For example in 2017, March schema release is named 17.1 and September release as 17.2.

4.2.6 Differences Between NDC v16.2 and NDC v17.2

NDC (EDIST) PADIS 17.1 has been released in March 2017 and 17.2 released in September 2017. These releases of the NDC Standards introduced restructured NDC Offers and Orders in the core messages needed for offer and order management – leveraging the feedback received from early deployments and pilots. These versions will help implementers to converge to one single interpretation of the schemas, which will lead to improved interoperability between systems.

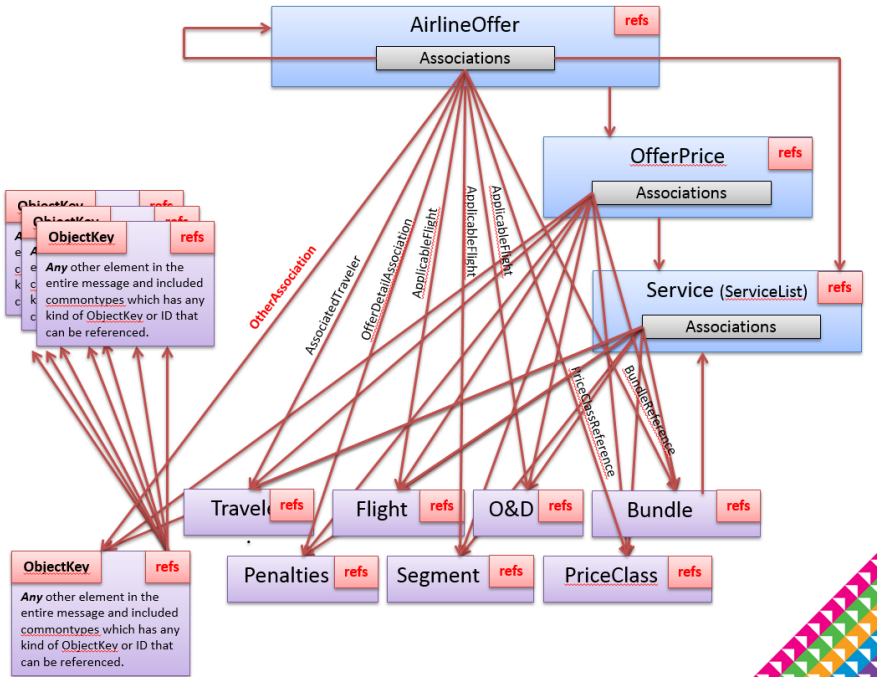
With the 17.2 release, implementers will be able to perform Order servicing functions much more easily and effectively, as well as benefit from a consistent usage of Offer and Order data structures across core messages.

NDC has adopted an iterative approach in delivering new releases of the schemas with added functionalities every six months. The next release will be 18.1 expected for March 2018. The 17.2 release brings propagates the re-structured Offer and Order concepts to the rest of NDC messages, while the 18.1 release will deliver the first set of aligned schemas across the NDC and Airline Industry Data Model (AIDM) initiatives.

The goals restructuring NDC Offers and Orders are:

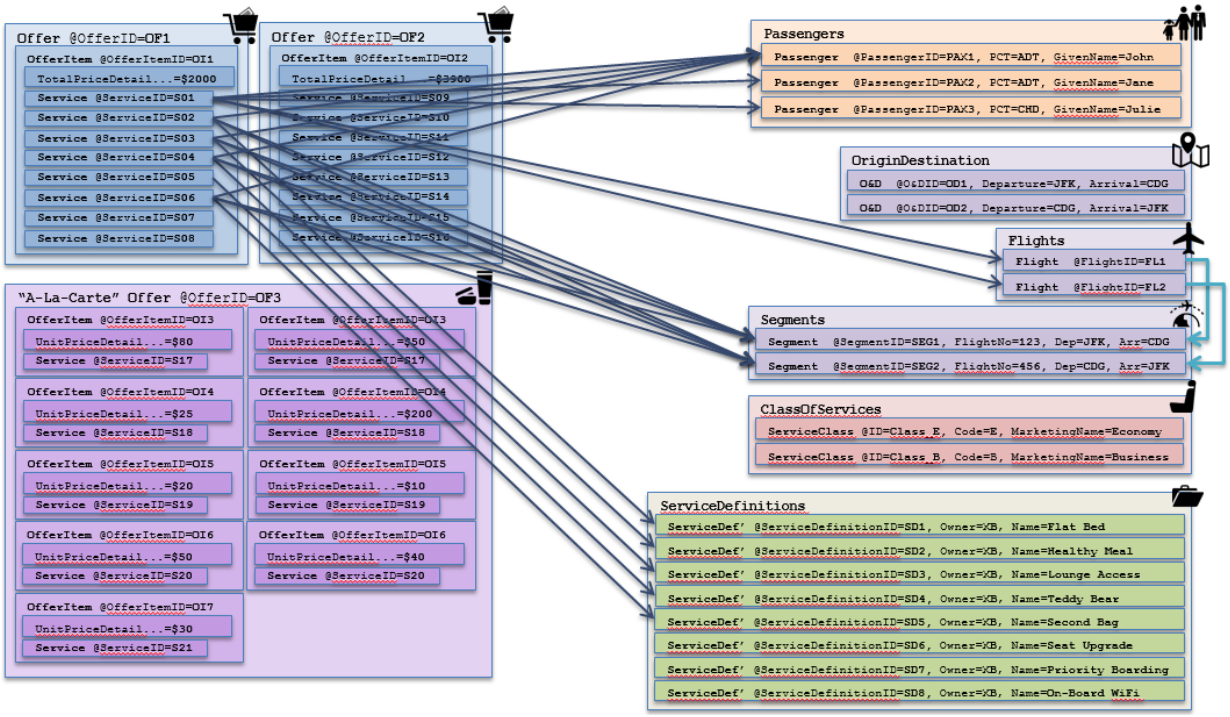
- Ensure a consistent way for Airlines to construct Offers/Orders
- Ensure a consistent way for Airlines and Sellers to interpret Offers/Orders
- Leverage and contribute to Offer/Order modeling (AIDM)
- Take message size & performance into consideration

As illustrated below, previous schema versions allowed anything to be linked to anything by way of generic “ref” attributes. These attributes do not provide any guidance as to what they are intended to reference, leading to confusion and divergent implementations.



Data References Before Message-Restructuring

These generic reference attributes have now been replaced by explicitly-defined relationships. Every group of data that can be re-used in is now moved to the DataList and is replaced by references (so it does not need to be repeated within the message). In general, associations are now made from where the Offer is constructed (Offer/OfferItem) down to the DataList.



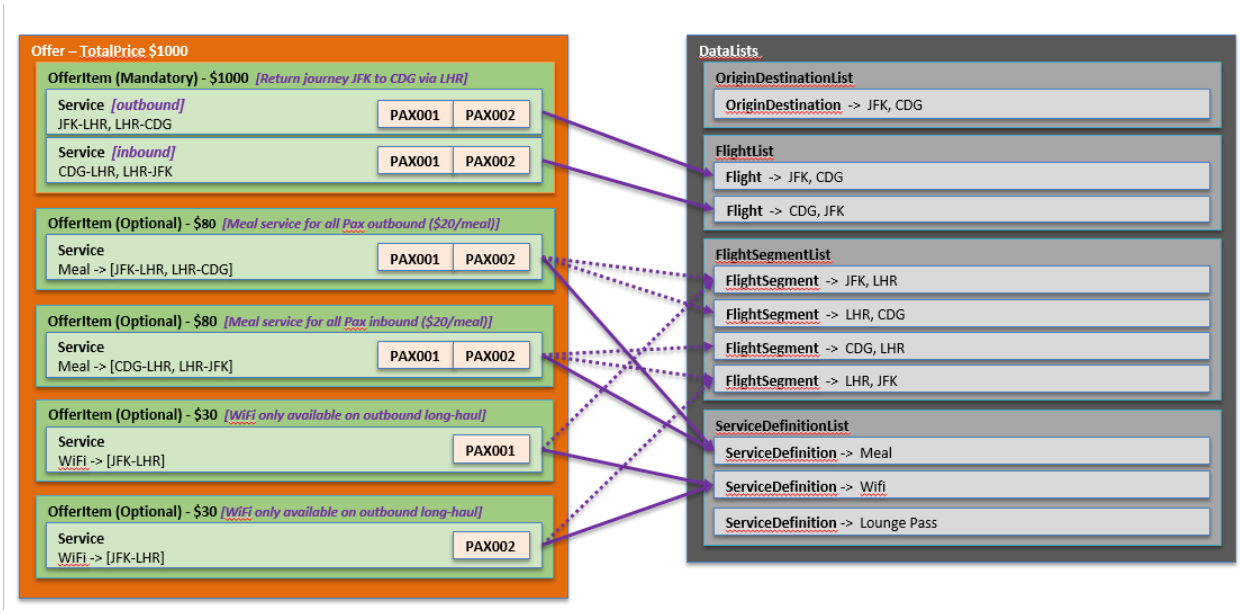
After Restructuring

Summary of changes in 17.1

- Price removed from the Service (in ServiceList):

At the Offer level, a FlightOverview structure contains references to flights that are applicable to all OfferItems included in the Offer.

The OfferItem contains one or more services as a single placeholder for all services. Services within OfferItems now take on two forms: Flight service or other; Flight services directly reference the flight segment details in the DataList, while other services can cater for any ancillary, including bags, seat upgrades, lounge passes, meals, etc. These general services now reference the new ServiceDefinitionList in the DataList (previously called ServiceList) which allows an Airline to further define all its non-flight products. The price at the service level has been removed – pricing is now fixed at an OfferItem level.



Offers-to-DataList Associations

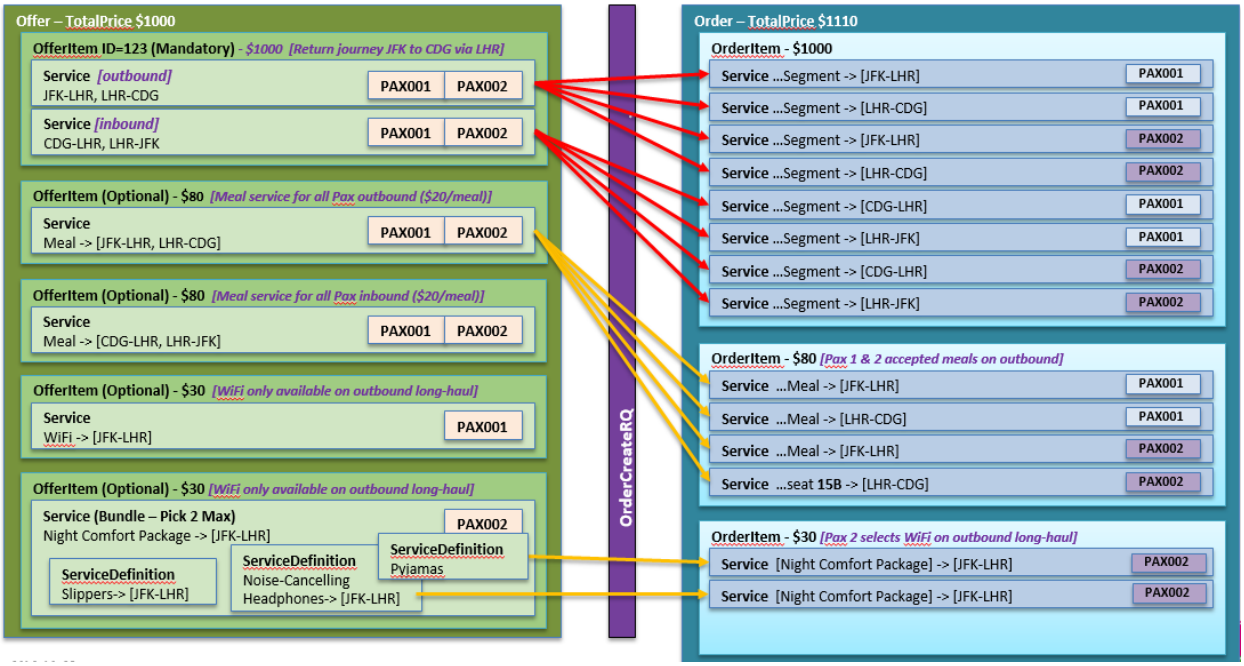
- A-La-Carte functionality introduced:

An A-La-Carte Offer structure was introduced to address message size concerns. It allows the Airline to propose an Offer where services may apply to multiple flight segments, passengers or price classes. These are optional services and only need to appear once within the message, rather than being repeated within every Offer. Note that A-La-Carte OfferItems may be used at the time of Order creation to order quantities defined by the passenger. This is further facilitated by the fact that A-La-Carte OfferItems are unit-priced and only contain a single Service at a time. Multiple instances of A-La-Carte OfferItems may be purchased, which will result in distinct OrderItems in the Order.

OrderCreateRQ

The restructured Order consist of the OrderItems created from the selected OfferItems and A-La-Carte OfferItems. There is a one-to-one mapping between the OfferItem and the OrderItem. Services in the OrderItem are per passenger per segment to allow the independent tracking of the delivery of the services, while Services within OfferItems can be applicable to multiple passengers over multiple flight segments.

OrderCreateRQ now works by referencing Offers/OfferItems rather than by repeating their content. In addition, specific seat locations can now be specified in the request, typically following SeatAvailabilityRQ/RS seat selection.



OrderCreateRQ 17.1 - How an Offer Becomes an Order

Removal of 7 ticketing messages:

Additionally, 7 ticketing messages were removed from the schema package in 17.1: AirDocCancelRQ/RS, AirDocRefundRQ/RS, AirDocExchangeRQ, AirDocVoidRQ/RS. All the functionalities covered by these messages can still be done with Order-servicing messages.

For more details on the exact changes performed on the schema, please refer to the *NDC Schema Release Notes* for both 17.1 and 17.2 versions available in the schema package that can be downloaded at: www.iata.org/ndc >> Standard tab.

Summary of changes in 17.2

This is a summary of the changes implemented in the v17.2 schemas. Overall, the focus of restructuring for 17.2 was on Order Servicing and Seat Availability.

- Scope of restructured Orders extended to:
  - ItinReshopRQ/RS
  - OrderChangeRQ
  - OrderCancelRQ/RS

- The following message pairs were renamed:
  - FlightPrice -> OfferPrice
  - ItinReshop -> OrderReshop

- Decommissioning the following messages:
  - ShopProductRQ/RS
  - ServicePriceRQ/RS
  - OrderHistoryNotif

With this version, the new Offer structure has been propagated to all remaining shopping messages, namely ServiceListRQ/RS, OfferPriceRQ/RS and SeatAvailabilityRQ/RS.

OrderReshop - OrderChange

The OrderReshop and OrderChange messages have been refactored to make their intended functions more intuitive and explicit. The OrderReshop messages are designed to provide a simulation of an action, so that a Seller can assess the consequences of said action and subsequently commit to it via OrderChangeRQ. E.g. “What is the refund amount if I choose to cancel OrderItem #OI13241?”.

OrderReshop also retained the ability to “Reprice” an Order – this now works by returning the Repriced OrderItem in the form of an OfferItem. This OfferItem can be subsequently accept by the payer using OrderChangeRQ.

OrderChange works in tandem with the preceding OrderReshopRS, which provides instructions by the Airline as to how to fulfil the action requested by the Seller in OrderReshopRQ. It is strongly recommended for OrderChange actions to be preceded by an OrderReshop. OrderChange is used to confirm changes to an existing Order, as instructed by the Airline. The actions in OrderChange are structured similarly to OrderReshop to provide consistency and continuity (e.g. how to add OrderItems or how to delete or replace OrderItems from an existing Order).

There is one exception where OrderChangeRQ does not need to be preceded by an OrderReshop: changing passenger details (unless it is a name-

change/correction). Changing passenger details (e.g. adding a contact email/phone number) does not require an OrderReshop, as it is a type of change deemed to incur no additional charges.

OfferPrice

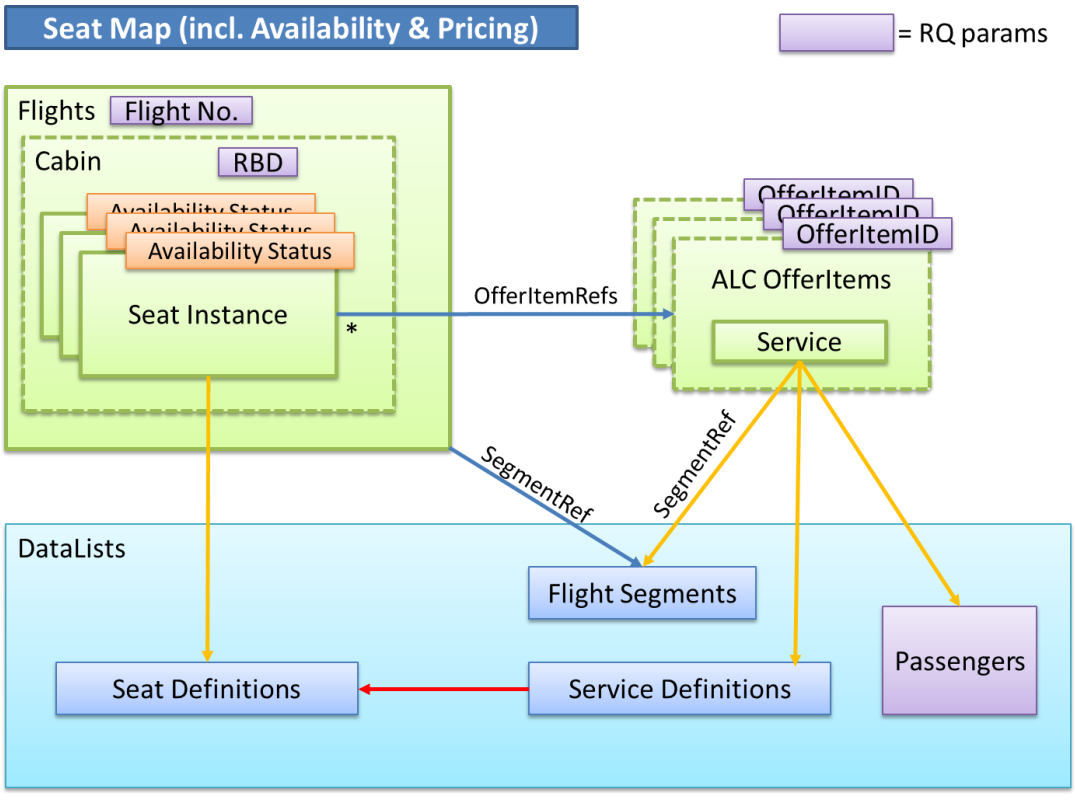
The OfferPrice message was also significantly improved and designed to compound multiple Offers and/or OfferItems into a single refreshed and repriced Offer, with the ability for the Airline to provide additional "up-sell" Offers.

SeatAvailability

The focus of the seat related changes are on the sale and selection of seats on one or more flights though the SeatAvailability schema.

These changes 1) ensure consistency with the shopping process by introducing the notion of an Offer into the SeatAvailabiltyRS and 2) contains improvement in the cabin/seatmap structure to better support the graphical rendering of seatmaps by Seller front-ends.

The SeatAvailabilityRQ/RS allows a query for the aircraft seat configuration, used for display purposes. SeatList was refactored in order to separate the characteristics of seats from the physical location of the seats within the aircraft. Characteristics remain in DataLists in a simplified structure (SeatDefinitionList), available both for seat related (SeatAvailabilityRQ/RS) and non-seat related messages (e.g. Shopping/Order messages).



SeatAvailabilityRS 17.2 – Overview of seatmap structure

4.3 Considering NDC as a project (Airline perspective)

IATA provides various tools to help you for the initial deployment of NDC within your organization.

The NDC Change Readiness Guide is the main document for guidance at the project management level: how to define the scope, the roadmap and the business case. It provides very useful check lists for the NDC program manager.

4.4 NDC Certification Program

In October 2015, IATA launched a certification process for validating the technical capability of actors to deploy, all or parts of the NDC Standard. The goal is to provide transparency on existing NDC deployments; to validate the capability of supporting IT providers in these instances and also to protect the NDC brand and support the NDC early adopters.

As of 1 June, 2016 IATA announced the launch of the New Distribution Capability (NDC) Certification Registry: www.iata.org/ndc-registry. The Registry lists airlines, sellers and aggregators (such as global distribution systems) that have achieved NDC certification as well as those IT providers that have demonstrated they are capable of delivering NDC-certified products.

Any airline that deploys an NDC application programming interface (API) to make its content available, or any seller or aggregator that uses these APIs to get that content, may apply for NDC certification. Any vendor that offers NDC products and services for airlines and sellers can apply to be NDC-capable.

NDC certification and NDC-capable statuses have three levels of attainment:

- **Level 1** covers implementation using past and current NDC schemas with a limited scope – for example, sales of ancillaries post-booking.
- **Level 2** focuses on Offer Management. This level requires a more extensive use of the shopping/Offer management API.
- **Level 3** targets NDC end-to-end deployments. These are deployments which cover both Offer and Order management and where the airline takes full control of shopping as well as booking, payment and ticketing.

More information on the certification program is available under www.iata.org/ndc >> under the tab certification and at ndccertification@iata.org.

5 Appendices

5.1 Glossary

In this section, any of the ***terms in italic*** are new and/or have specific definitions in an NDC context. The remaining terms are either existing industry terms included to provide clarity, technical terms included to aid understanding, or other general terms that may be useful to the reader.

Some of the terms in this glossary are explained in more detail in the relevant sections of the guide.

Accountable Document	Validated official document (such as any type of an Airline ticket, or a Standard Traffic Document - STD - or payment voucher) that has a value and must be accounted for.
Acknowledgment	Acknowledges the receipt of a message but does not imply acceptance of the message content.
Affinity Shopping	A wide search defining a range of criteria such as specific interest, destination attributes, defined budget, date ranges or destination ranges.
Aggregation	The business function of distributing a Seller's shopping request to multiple Airlines and aggregating subsequent responses.
Aggregator	An entity who distributes a Seller's shopping request to multiple Airlines and aggregates subsequent responses.
Airline	Supplies product Offers in response to receiving a request.
Ancillary Services	Ancillary Services are defined in PSC Resolution 787 as anything outside of product attributes (optional or discounted). Ancillary Services may be bundled in the product Offer, or Offered as additional, a la carte services.
Anonymous Shopping	A shopping request sent to Airlines without Traveler personal data. The Airline receiving the shopping request will not be able to identify the candidate traveler, or on whose behalf the request is being made. The request will still carry Seller/Aggregator information.
API	Application Programming Interface

Attribute Shopping	A search specifying one or more attributes to get more focused results (e.g. equipment types, seat types and characteristics, baggage allowance, meals, etc.).
Authentication	The process by which a system identifies an individual or a business entity to make sure that the user or the business entity is who they claim to be, based on attributes that are sent in a message.
Baggage Determining Carrier	The carrier whose baggage allowances and charges apply within an interline itinerary.
Bilateral Interface Agreement	The documented agreement made between the sender and receiver as the basis of the data exchange between systems. This agreement defines a number of features, which are mandatory or optional within the specification (time outs, message Order processing, reject processing).
Bilateral Time Limit	A generic structure for time limits that is subject to bilateral agreements between parties.
Consent	Any freely given, specific, informed and unambiguous indication of his wishes by which the Data Subject, by a statement or by a clear affirmative action, signifies his agreement to Personal Data relating to him is being processed. It should be fully understandable to the Data Subject what will happen if he consents to the Processing of his Personal Data. Consent must be granular, it must be given for each specific purpose.
Confirmed Order	When an Offer has been accepted by a Customer, the Airline creates an Order. Upon completion of the creation of the Order, this is a Confirmed Order and the details of this Confirmed Order are ready to be returned to the Seller/Aggregator in an OrderViewRS message.
Data Controller	The natural or legal person, or any other body, which alone or jointly with others, determines the purposes and means of the processing of Personal Data.
Data Processor	The natural or legal person, or any other body, which processes Personal Data on behalf of the Data Controller.
Data Protection Authority	The local independent public authority made responsible for monitoring the application, within its territory, of the applicable data protection legislation.
Data Transfer	Disclosure of data by transmission, dissemination or otherwise making the Personal Data available. Transfers

	can take the form of systematic data sharing where the same data sets are shared between the same organizations for an established purpose.
Deposit Time Limit	Time by which a deposit must be paid based on the conditions of an Order.
Frequent Traveler	A member of an Airline's loyalty program, where the traveler has a uniquely identifiable reference and this reference can be verified by an Airline. Following verification, the traveler becomes a Recognized Traveler.
Group Order	An Order applicable to one or more travelers, where all traveler names have not yet been specified.
Internal Value	The "internal value" of a Service is the value an Airline internally applies to an individual Service for accounting purposes. It is not communicated in NDC messages, and remains in the Airline's Order Management System. It may also be required by an Airline's Revenue Accounting System.
Inventory Guarantee Time Limit	The time that inventory for a specified product Offer is guaranteed. The inventory held must be converted into a completed Order before the time limit expires otherwise the guaranteed inventory may be lost.
Joint Data Controllers	Data Controllers which jointly determine (in some cases, to a different extent) the purposes and means of one or several Processing operation(s).
Marketing Carrier	The carrier that sells with its own code (as part of a code share agreement) on a flight that is actually operated by another carrier (the Operating Carrier).
Master Order	The ORA owns the Order within NDC, and the term Master Order is used to distinguish this from a record that may be held by a POA, or a Seller, which may be stored within their own Order Management System.
Naming Time Limit	Time by which traveler names must be provided against a Group Order.
Offer	An Offer is a proposal by an Airline to a Customer for a defined set of Services (flights and/or flight related or non-flight related ancillary products) in response to a Shopping Request received from a Seller, possibly via an Aggregator.

	Offers contain one or more Offer Items, and Offer Items from one Offer cannot be combined with Offer Items from another. Once proposed by an Airline, Offers cannot be modified.
A-La-Carte Offer	Container for standalone optional OfferItems, which supports the shopping basket concept. The main purpose of the a-la-carte structure is to reduce the size of the message by inserting Offer Items which are applicable to multiple flight-related Offers defined above.
Offer ID	Offer ID facilitates the tracking and verification of individual Offer(s) selected from the shopping response. The set of Offer IDs returned in a response is referenced by a Shopping Response ID. An Offer ID is unique to each Offer either in itself, or by virtue of it being under a unique ShoppingResponseID.
Offer Item	An unbreakable group of one or more Services within an Offer, and has a total price.
Offer Responsible Airline (ORA)	The Airline responsible for returning a combined Offer, which may include services from other Airlines (Participating Offer Airlines), to the requesting entity. The ORA subsequently performs Order Management functions against this Offer.
Offer Time Limit	The time within which Offers must be converted into completed Orders. On expiry a new shopping transaction may be required.
Operational Window	The period during which a flight is under the control of the operation. The time at which the flight enters the operational window varies between carriers and there is not one sole definition within industry standards today.
Operating Carrier	The carrier that holds the Air Operator's Certificate for the aircraft used for that flight.
Order	An Order is a uniquely identified record of the agreement of one party with another to receive products and services under specified terms and conditions. 'Order' supports the sale of a flexible range of Airline products and services that are not necessarily journey. An Order will contain one or more Order Items each with an identifier that is unique within an Airline's Order Management System. An Order may support non- homogeneity, i.e. each passenger in an

	Order may hold different sets of Order Items at different prices.
Order Item	A selected Offer Item now confirmed within an Order.
Order Management	The key features of Order Management include the creation/booking and servicing of Orders.
OTA	Online Travel Agency
Payment Time Limit	The deadline by which a commitment to pay must be made for the items in the Order.
PCI DSS	"Payment Card Industry Data Security Standard." A third party standard commonly used by actors involved in handling payment information to ensure the state of the art security of data being transmitted. Not part of the NDC Standard.
Personal Data	Any information relating to an identified or identifiable natural person ("Data Subject"); an identifiable person is one who can be identified, directly or indirectly, in particular by reference to an identifyer such as a name, an identification number, an online identifyer or to one or more factors specific to his physical, physiological, mental, economic, cultural or social identity.
Personalized Shopping	Traveler consents to include Personal Data in the shopping request and this information is included as data within the response itself.
Participating Offer Airline (POA)	An Airline (that may be the marketing or operating if applicable) other than the Offer Responsible Airline involved in an Offer or subsequent Order.
Planning Window	The period during which a flight is under the control of the business. The length of the planning window varies between carriers and there is not one sole definition within industry standards today.
Price Guarantee Time Limit	Period for which an Offer price is guaranteed. On expiry an Offer may be re-priced up to the point an accountable document is issued. A price guarantee cannot extend beyond the Offer Time Limit unless the Order has been created.
Processing of Personal Data	Any operation or set of operations which is performed upon Personal Data, such as collection, recording, organization, storage, adaptation, or alteration, retrieval,

	consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, blocking, erasure or destruction.
Product Bundle	Where several services are offered for sale as one product.
Recognized Traveler	Signifies an authenticated traveler in a personalized shopping context (where a traveler consents to share Personal Data in the shopping request) vs. an anonymous traveler, in an anonymous shopping request context (where no traveler data was obtained and/or provided).
Seller	Creates shopping requests to Airlines on behalf of a Customer and displays the subsequent responses for review.
Sensitive Data	Personal Data labeled as Sensitive Data or as "a Special Category" under applicable national laws.
Service	A Service is a product or a service that can be separately delivered and uniquely described by an Airline. It is referenced by an ID that is unique within an Airline. A Service may be sold separately in a single Offer/Order Item or sold bundled with other services in a single Offer Item/Order Item.
Shopping	A process whereby a Seller is able to request Offers from an Airline (for flights and ancillaries) based on its desired search criteria and receive Offers corresponding to its request. There are various types of shopping including, Personalized/Anonymous and Attribute/Affinity Shopping.
Shopping Basket	A shopping basket is e-commerce software that allows visitors to an internet site to select and store items for eventual purchase.
Shopping Response ID	Shopping Response ID facilitates the tracking of what was offered and is an identifier unique to the source Airline for a set of product Offers returned in response to a shopping request.
SIS	Simplified Invoicing and Settlement - the industry platform that facilitates the electronic invoicing and settlement process for Airlines and aviation business partners.

Ticket System Provider (TSP)	A system provider that is approved to issue neutral documents on behalf of Airlines within the IATA BSP environment.
TMC	Travel Management Company
XML	eXtensible Markup Language. A standard document format conceived to store and transport data of potentially complex structures, typically over modern web-based integration methods. XML supports international character sets and is both human-readable and machine-readable.

5.2 IATA resources

What	Where	Notes
NDC Microsite for Airlines	startndc.iata.org	'GoTo' location for all NDC related supporting material produced and provided by IATA. Includes videos, standards, architecture, financial support, program management support, regional NDC contacts
NDC within IATA	www.iata.org/ndc	Various content and links to training, NDC videos, standards, governance, etc
Video Tutorials: • Introducing NDC • Understanding NDC • Adopting NDC	startndc.iata.org	A series of very short videos which provide detailed descriptions of the workflows in an NDC landscape.
NDC Pilots Year End Reports	www.iata.org/ndc then select 'Pilots' from the tabs	Pilot reports are available for 2013, 2014, 2015 and 2016 at the bottom of the page as PDFs
NDC for Business Travel	NDCbiztravel.iata.org	Best place to go to understand how Travel Agents and Corporate Buyers see potential benefits from NDC
ONE Order	www.iata.org/oneorder	All contents and references on the ONE Order program
Certification Registry	www.iata.org/ndc-registry	Updated details on NDC certified / capable players
NDC Developers Portal	ndc.developer.iata.org	

5.3 List of NDC Messages in PADIS version 17.1

NDC Shopping:

AirShoppingRQ/RS

The AirShopping transaction set supports both demanding and flexible shopping experiences for anonymous or personalized shopping. The combination of functionally-rich attribute and affinity shopping support date range or specific month (calendar) shopping as an example. The response returns Offers, which may include branded Offers or itinerary-priced Offers with or without ancillary services. It also returns applicable rules for the integrated fares as well as for each service. The message also returns multi-media content at message level as well as media references at the individual Offer level.

BaggageAllowanceRQ/RS

The BaggageAllowance transaction set provides checked and carry-on baggage allowance details. Request qualifiers may include traveler, origin/ destination, point of sale, flight-specific and ticketed fare information. The response returns the baggage allowance, whether or not IATA Reso 302 or DOT rules are applicable, baggage weight, dimensions and size information by origin/ destination pair. Implementers may also obtain an additional catalog of applicable embargoes and charges within the same origin and destination pair.

BaggageChargeRQ/RS

The BaggageCharges transaction set determines and returns the pricing for a set of checked bags. Request qualifiers include traveler, origin/ destination, point of sale, flight-specific and ticketed fare information. The response returns the baggage charges, whether or not IATA Reso 302 or DOT rules are applicable, and detailed trip-level pricing for all requested passengers, or origin/ destination level pricing that includes checked and carry-on baggage charges.

BaggageListRQ/RS

The BaggageList transaction set determines and returns a list of applicable bags for a specified itinerary or carrier. Request qualifiers may include traveler, origin/ destination, flight-specific and ticketed fare information.

OfferPriceRQ/RS

The OfferPrice transaction set may return two different sets of content. Based on request attributes, the response may initially provide additional a la carte ancillary services that are applicable and available for the selected Offer. If no ancillary services are available, the message returns a final pricing. If ancillary services are available, the modified pricing request includes selected services and returns a final pricing that includes service(s) selection. The response message also returns multi-media content at the message level with media references at the service level.

SeatAvailabilityRQ/ RS	The SeatAvailability transaction set returns data used to construct respective seat maps with fully integrated fees for any identified premium seats. The message also returns multi-media content at the message level with media content references at the individual service level.
ServiceListRQ/RS	The ServiceList transaction set returns a list of all applicable ancillary services that meet request qualifiers and flights. The message supports shopping for additional a la carte services to compliment any selected Offer, as well as shopping for specialty service items not generally included in an initial Offer but rather based on service search filters, e.g. sports equipment specialty baggage and unaccompanied minor fees. The message also returns multi-media content at the message level and media references at the individual service level.

NDC Order Management (Booking and Servicing):

OrderChangeNotif/ Acknowledgement	The OrderChangeNotif transaction sends an unsolicited Order change notification message. The Acknowledgement message may be returned to acknowledge receipt of the notification request.
OrderChangeRQ/ OrderViewRS	The OrderChange/OrderView transaction set requests modifications to an Order by specifying which Order items to change and what to change them to. The updated view of the Order is returned.
OrderCreateRQ/ OrderViewRS	The OrderCreate/OrderView transaction set is a multi-function message that may: 1) Request specified inventory to be held (and returns a reference to the held inventory) 2) Request that an Order to be created (returning the complete view of the Order) 3) Request additions to Order data elements (e.g. add frequent flyer data)
OrderHistoryRQ/RS	The OrderHistory transaction set requests the transaction history and audit trail for a specified Order. Note that this transaction is only available to the Order creation requestor.
OrderListRQ/RS	The OrderList transaction set retrieves a list of Orders that match one or more search criteria.
OrderRetrieveRQ/ OrderViewRS	The OrderRetrieve/OrderView transaction set retrieves a specified Order that matches one or more search criteria. Search criteria may include any supported Order Reference information, which may be the Order ID, a PNR reference, a ticket or coupon/ document number, or other Airline supported Order reference and a Traveler Surname and Given Name. Note that if the Order retrieval request is initiated from the party that originally requested the Order creation, then an Order Reference is sufficient with the identity of the requesting party.

If the Order retrieval request is initiated from a party that did not originally request the Order creation, then an extended security mechanism may be used to extend Order view access to the party, e.g. using a CustomerInputRQ/RS for an additional (bilaterally agreed upon) security challenge such as a security question and answer. The requestor may additionally specify filters to constrain the response information sets, including: Trip itinerary, Flight segment, Passenger, Payment and Accountable document information. If no filters are specified, all Order information is returned. If a matching Order is found, the OrderView response will contain all Order information or filtered information (if filters were requested in the Order retrieval request.) If no matching Order is located, the OrderView response will include processing condition information and no Order information.

OrderCancelRQ/RS The OrderCancel transaction set requests the cancellation of a specified Order, and returns confirmation of cancellation.

OrderRulesRQ/RS The OrderRules transaction set requests the rules, change and penalty fees applicable to a specified Order.

NDC Order Management (Payment and Ticketing):

AirDocIssueRQ/ OrderViewRS The AirDocIssue transaction set requests an Airline to issue flight (ET) and/or ancillary (EMD) document(s), and allows an Airline to respond with OrderViewRS message (which includes the ticket doc information) and provide flight (ET) and/or ancillary (EMD) document details.

AirDocHistoryRQ/RS The AirDocHistory transaction set allows to request an Airline to return history of flight (ET) and/or ancillary (EMD) document details.

AirDocDisplayRQ/RS The AirDocDisplay transaction set requests an Airline to return flight (ET) and/or ancillary (EMD) document details.

Other message pairs:

AirlineProfileRQ/RS The Airline Profile (AP) aims to streamline the volume of NDC shopping requests sent to airline systems by Aggregators or Seller systems. The transaction includes a request from an Airline Profile Receiver to an Airline Profile Sender to send one or more Airlines' Profiles. The response is from an Airline Profile Sender to an Airline Profile Receiver to get one or more Airlines' Profiles. The message also returns multi-media content at the message level with media content references at the individual service level.

AirlineProfileNotif Airline Profile Sender pushes Airline Profile or link to Airline Profile Receivers that have been activated/authorized, including

	Profile version number. The message also returns multi-media content at the message level with media content references at the individual service level.
AirDocNotifRQ	The AirDocNotifRQ transaction sends an unsolicited document change notification message. The Acknowledgement message may be returned to acknowledge receipt of the notification request.
CustomerInputRQ/RS	The CustomerInput transactions allows an intermediate message pair to be inserted allowing additional information to be collected from the Customer, eg authentication of scheme membership, 3D-Secure, Customer product fulfillment data such as limo pickup point.
FareRulesRQ/RS	The FareRules transaction set returns the filed details of a specific fare basis code (FBC).
FileRetrieveRQ/RS	The FileRetrieve transaction set supplements other NDC shopping messages with payloads designed to efficiently exchange Offer-associated media using reference IDs and URLs. Using the FileRetrieveRQ message, implementers can subsequently retrieve binary encoded files and attachments—such as images or PDFs—from the IDs or URLs in a response message that are returned in the FileRetrieveRS message. This message pair also supports scenarios where trading partners maintain a physical cache of Offers-associated media from other trading partners based on File IDs and/or URLs.
InvGuaranteeRQ/RS	The InventoryGuarantee transaction set requests that inventory is guaranteed for specified Offers, pending their conversion into a completed Order. The response returns an indication if the inventory has been guaranteed, and if so, the associated inventory guarantee time limit and a unique inventory guarantee reference ID.
InventoryReleaseNotif/Acknowledgement	The InventoryRelease transaction sends an unsolicited notification to release guaranteed inventory. The Acknowledgement message may be returned to acknowledge receipt of the notification request.
OrderReshopRQ/ OrderReshopRS	The OrderReshop transaction set passes new shopping requests to an Airline to replace existing specified Order items in an Order or for new shopping requests to add to an existing Order. Airline responds with product Offers within the context of the existing Order. Also used to re-price an Order (e.g. prior to payment).

5.4 List of use cases

Section	Chapter	Number	Use Case
Shopping	3.1.4.1	1	Time Limit / Personalized Shopping
Shopping	3.1.4.2	2	Attribute Shopping featuring a la carte Ancillary
Shopping	3.1.4.3	3	Updating an Offer with ancillary items
Shopping	3.1.4.4	4	Requesting an Offer for seats
Order	3.2.6.1	5	Basic Order Creation - flights plus ancillaries
Order	3.2.6.2	6	Creating an Order from two Offers
Order	3.3.5.1	7	Payment & Ticketing using a PCI DSS Provider
Order	3.3.5.2	8	Payment & Ticketing with Payment Time Limit applied
End-to-End	3.4		End-to-End NDC Use case - Initial Shopping, Order Creation, Payment and Issuance
Servicing	3.5.4.1	9	Re-shopping to change flights in an unpaid Order
Servicing	3.5.4.2	10	Full Order Cancellation
Servicing	3.5.4.3	11	Shopping for and Ordering an Ancillary after an Order has been created
Servicing	3.5.4.4	12	Change of name in a paid Order
Servicing	3.5.4.5	13a	Changing flights in a paid Order with additional collation and change fee
Servicing	3.5.4.6	13b	Changing flights in a paid Order with refund
Servicing	3.5.4.7	14a	Changing flights in a paid Order – Refund unbundled premium seats
Servicing	3.5.4.8	14b	Changing flights in a paid Order – Reshop flights and bundled premium seats
Servicing	3.5.4.9	15a	Cancelling one flight from an itinerary (partial Order cancellation), no ancillaries
Servicing	3.5.4.10	15b	Cancelling an individual ancillary (partial Order cancellation)
Servicing	3.5.4.11	16	Partially flown itinerary featuring POA, remainder of itinerary being cancelled
Servicing	3.5.4.12		Order Repricing when Price Guarantee Time Limit has been exceeded, after Order has been created
Servicing	3.5.4.13	17	Involuntary changes – Airline cannot provide an individual ancillary
Servicing	3.5.4.14	18a	Involuntary changes – Schedule change - Flight still operates with new time
Servicing	3.5.4.15	18b	Involuntary changes – Schedule change - Flight cancellation, passenger is reprotected by the Airline

Servicing	3.5.4.16	18c	Schedule change - Flight cancellation, passenger NOT reprotected by the Airline, re-shopping on same ORA
Servicing	3.5.4.17	18d	Schedule change - Flight cancellation, passenger NOT reprotected by the Airline, shopping on new ORA and cancellation of original Order
Interline	3.7.6.1	19	Interline Affinity Shopping
Interline	3.7.6.2	20	Add an Ancillary to an Existing Order, Interline journey
Interline	3.7.6.3	21	Interline Shopping with recognised Traveler
Interline	3.7.6.4	22	Schedule Change, Flight Cancellation, POA Reprotects passenger

Annex 1 (Supplementary)

Guidelines for the protection of Personal Data

Scope of these guidelines

Just as is the case with existing distribution processes, distribution based on NDC, or any other means of personalization or shopping with enhanced content, must be compliant with privacy and data protection regulation. The present Guidelines are aimed at all parties in the distribution chain that decide to implement NDC for receiving or transmitting shopping requests and for responding to shopping requests. It is critical to note that these recommendations are not unique to NDC. The following guidelines would apply to any parties providing personalization in travel retailing, or facilitating shopping for enhanced content based on personal information provided by the shopper. These guidelines are provided to assist all parties engaging in the processing, including transmission, of passenger data using the NDC standards to comply with basic privacy and data protection law requirements. However, these guidelines are principally based on the EU General Data Protection Regulation (Regulation (EU) 2016/679 of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data: "*GDPR*"), which applies from 25 May 2018. Applicable local laws vary in different jurisdictions around the globe, and may even still vary within the European Union. These guidelines are to provide a general understanding of the potential regulatory requirements and should not be understood as legal advice. Any party processing passenger data is advised to consult their own legal counsel for more precise guidance.

The general concepts of privacy protection are:

Personal Data can only be collected and processed lawfully, under strict conditions and for a legitimate purpose.

Personal Data must be processed in a way that is fair and transparent, in line with good data quality and proportionality standards, in line with appropriate security standards and taking into account the rights and expectations of Data Subjects.

Special care must be dedicated to:

- *Requirements of notifications or authorizations;*
- *Restrictions on data transfers;*
- *Restrictions on the Processing of Personal Data for profiling or direct marketing;*
- *Restrictions on the Processing of Sensitive Data;*

- *The need to have adequate contractual arrangements and policies in place.*

The definitions of the data protection concepts as they are being used in the present Guidelines are included in the glossary.

The Guidelines will help Airlines to identify the issues to be considered when implementing NDC, at the time of the design of related software applications and at the time of the Processing itself. Each Airline in all circumstances must comply with applicable local laws and regulations. EU data protection legislation is evolving. Changing requirements will need to be taken into consideration. Nothing in these Guidelines shall be construed as limiting Airlines from applying more stringent or additional measures or derogations as under applicable local laws. The Guidelines are IATA's interpretation on good practices when implementing NDC; they aim at reflecting general EU rules applying to the Processing of Personal Data, and add some good practice advice for the information of Airlines intending to implement NDC. It is the Data Controller's duty, and where applicable the Data Processor's duty, however, to ensure compliance with any applicable laws which would place additional or other obligations on them.

Before implementing NDC, it may be necessary for Data Controllers and/or Data Processors to effectuate privacy and/or data protection impact assessments, particularly when, taking into account the nature, scope, context and purposes, the processing is likely to result in a high risk to the rights and freedoms of the passengers. This may depend on the exact intended service offering or service orientation. Data protection requirements should be considered at the occasion of the preparation or implementation of business cases and when establishing contractual arrangements with service or product providers and other parties involved in the distribution chain.

The scope of these Guidelines is limited to the shopping process based on NDC: Processing of Personal Data at the occasion of shopping requests and the product Offer responses returned from the Airlines. Any additional or other use of NDC involving a Processing of Personal Data will equally have to be compliant with any applicable data protection rules and regulations.

Introduction to Privacy Protection Guidelines

The Guidelines will help parties to identify the issues to be considered when implementing NDC, at the time of the design of related software applications (taking into account the need for implementation of data protection by design and by default), and at the time of the Processing itself. Each party in all circumstances must comply with applicable local laws and regulations. Global data protection legislation is evolving. Changing requirements will need to be taken into consideration. Nothing in these Guidelines shall be construed as limiting parties from applying more stringent or additional measures or derogations as under applicable local laws. The

Guidelines are provided to ensure parties are sensitive to privacy and data protection concerns. They aim at reflecting general EU rules applying to the Processing of Personal Data, and add some good practice advice for the information of Airlines intending to implement NDC. It is the Data Controller's duty, and where applicable the Data Processor's duty, however, to ensure compliance with any applicable laws which would place additional or other obligations on them.

Because NDC enables material changes in the scope of data exchanged during the shopping process, and the roles of parties during that process, these Guidelines focus on the shopping process based on NDC: Processing of Personal Data related to shopping requests and the product Offer responses returned from the Airlines. Any additional or other use of NDC involving a Processing of Personal Data during fulfilment or other processes will equally have to be compliant with any applicable data protection rules and regulations.

The NDC User's Responsibility in the Processing of Personal Data

Before Processing Personal Data on the basis of NDC, parties should assess which level of responsibility they have in the Processing: Data Controller or Data Processor, and which obligations and requirements are attached to such responsibility as under applicable local laws. Under the European system, a Data Controller is responsible for, and must be able to demonstrate compliance with data protection laws, including compliance by others performing data processing on its behalf (Accountability principle).

Accordingly, parties should verify whether all contractual safeguards and arrangements with involved third parties are in place where such contractual safeguards are obligatory under applicable laws. Implementation of NDC may require amendments to existing agreements between Data Controllers and Data Processors, between Data Controllers, or to other contractual arrangements or policies such as privacy policies. Any such amendments may require notification to or authorization by Data Protection Authorities under applicable local laws. Depending on the intended use of Personal Data, the intended services or intended purposes of processing, Data Controllers may need to notify local Data Protection Authorities or, where applicable, request authorization from such Data Protection Authorities.

Possibility of Anonymous Shopping

When implementing NDC, parties should ensure that candidate travelers at all times maintain the possibility for anonymous shopping. Where necessary, adequate contractual arrangements should be put in place with the parties involved in the distributions chain, and with service or product providers.

Where the Airlines receive the shopping request anonymously and thus cannot identify the traveler or the candidate traveler when making and returning the Offers, taking into account the means likely reasonably to be used for identification, the Airlines may not have to take into account data protection requirements as referred to in the present Guidelines during this shopping process. Data protection requirements however will in any case apply as from the moment that the traveler Orders its travel and hence becomes an identified traveler: reference is made to IATA Recommended Practice 1174.

Where it is possible for a website, such as a travel agent's website, to identify the traveler or the candidate traveler making a shopping request, before the shopping request is sent anonymously to the Airlines, and where the travel agent processes such traveler's or candidate traveler's Personal Data, data protection and e-Privacy legislation will apply to such processing by the travel agent as under presently applicable shopping processes.

Privacy by Design and Privacy by Default

Software developers and system providers are encouraged to use privacy by design techniques when developing data processing solutions based on the NDC standards. The standards were designed to facilitate this by ensuring that each data element defined in the standards could be individually managed by applicable software. This would allow for encryption, tokenization or segregation of only sensitive data elements rather than entire records. Fields have also been defined to allow indication of consumer consent to be attached to data.

Data Controllers, and where applicable also Data Processors, should use software applications which include the necessary tools for protecting the privacy of Data Subjects, including as the case may be privacy-friendly default settings.

Implementation of NDC should take place with privacy built in at the start, not just in terms of security measures, but also in terms of minimizing the amount of Personal Data processed (Data Minimization principle).

Lawfulness of the Processing of Personal Data

Before starting any Personal Data Processing on the basis of NDC, parties should check whether there is an appropriate legal basis to do so. Where possible it is always preferable to obtain the Data Subject's Consent. Processing without the Data Subject's Consent may be lawful, such as in cases where the Data Controller can show that the processing is necessary for the purposes of his legitimate interests or the legitimate interests of a third party, according to the interpretation given thereto under applicable local laws, or where applicable laws consider that the processing is necessary to take steps at the Data Subject's request prior to entering into the transportation

contract. It shall be the Data Controller's responsibility to ensure that the Processing of the Personal Data is lawful as under applicable local rules.

For Processing of Sensitive Data, the Data Subject should be asked for prior explicit Consent where this is required under applicable laws, and in the form provided for under such laws.

IATA acknowledges the GDPR requirements to apply from 25 May 2018. Future releases of the Implementation Guide will highlight further guidance to NDC implementers, if deemed necessary. Further details on GDPR may be found on the official website: https://www.eugdpr.org/

Information Requirements

Travelers and candidate travelers, prior to making the shopping request, should receive all required information on the Processing of their Personal Data, as required under the applicable local laws. It should remain possible when implementing NDC, to provide notice, with adequate and clear information, to travelers and candidate travelers for any shopping request, such as with links to clear data protection policies. Where a shopping request is introduced by or via a travel agent or other intermediary, means should be in place to guarantee that no Personal Data of the traveler or candidate traveler are introduced by the travel agent or other intermediary and passed to others in the distribution channel without the traveler or candidate traveler having been informed according to applicable laws, and without having obtained appropriate Consent where required. Before the shopping request is entered, the traveler or candidate traveler should know that he has the possibility to make a shopping request anonymously (anonymous shopping); how he can make such anonymous Shopping Request; what exactly the different advantages and consequences are of anonymous shopping in comparison to a shopping request for personalized Offers, what exactly the purpose is of the Processing of Personal Data, and of data elements, in relation to the shopping request; if the Personal Data are processed for other purposes, the exact nature of any such other specific purposes; who the Data Controllers are for each stage of any processing and by whom they are represented; to which parties the Personal Data are sent in case of request for personalized Offers and for which purposes exactly; in some countries it may suffice to explain that the request is sent to "all relevant Airlines" for the purpose of receiving the requested personalized Offers, other national legislations may require to be more specific. Under some local laws, it may be necessary that- the Airline(s) to whom the shopping request is passed are identified prior to passing the Shopping Request to them. Parties will need to verify and take into account any such local specific requirements; if questions are asked on behalf of the Airlines, before the Shopping Request is introduced, whether replies to the questions are obligatory to receive the specific Offers requested or not, as well as the possible consequences of failure to provide detailed information in the reply; where applicable, the existence of a right of access for the Data Subject to his Personal

Data and a right to rectify Personal Data, as under applicable local laws; Other information, according to the circumstances, is necessary for the Processing to be fair and transparent: the period of retention of the Personal Data, the right of the Data Subject to have Personal Data erased, the right of the Data Subject to withdraw Consent, the right to lodge a complaint with a supervisory authority, the existence of automated decision-making, including profiling.

Parties should have the necessary contractual arrangements in place with the others in the distribution chain through whom the shopping data may be processed.

Obtaining Consent

When implementing NDC, the adequate tools should be put in place for obtaining the Data Subject's Consent where required - including explicit Consent where required - before the Personal Data are passed to others that will process the data. Local rules may allow or encourage the use of opt-in boxes as a tool for obtaining Consent: boxes where a traveler or candidate traveler when making the shopping request indicates by a tick his agreement to his Personal Data being passed to Airline(s) for receiving personalized Offers. Note that under the GDPR the use of pre-ticked boxes is no longer allowed. Other means for obtaining Consent may be implemented, taking into account local rules and practices.

Where applicable, parties implementing NDC shall have all necessary contractual arrangements in place with others in the distribution chain that process data to have such adequate tools applied.

It should be possible to keep records of what each Data Subject exactly consented to: in particular the date of Consent, how Consent was obtained, the scope of Consent, and exactly which information was provided to the Data Subject for obtaining his Consent.

Restrictions on Profiling and Direct Marketing

Users of NDC may intend to use the information received at the occasion of the shopping requests (specific choices and habits) to create Customer profiles in order to provide travelers on a systematic basis with product Offers tailored to match their inferred interests.

Specific information duties and requirements for Consent will then have to be complied with as under applicable national rules.

Many countries have anti-spam laws (e-privacy and electronic communications regulations) in addition to general data protection and privacy rules, preventing

organizations from sending unsolicited e-advertising if the conditions thereto are not fulfilled.

For any such use of the Personal Data involved with the shopping requests, the conditions of such legislation will have to be complied with. Additional tools such as specific opt-in boxes and opt-out facilities may need to be implemented.

Data Subjects should have the possibility to object, on request and, according to applicable local laws, free of charge, to the Processing of their Personal Data for the purposes of direct marketing, which includes profiling to the extent that it is related to such direct marketing. Opt-in and opt-out facilities should be provided for as under applicable local laws.

Any traveler has the right not to be subject to a decision which produces legal effects concerning him or significantly affects him and which is based solely on automated Processing of Personal Data, including profiling or Processing intended to evaluate certain personal aspects relating to him, such as creditworthiness, conduct, etc. Local laws provide for conditions under which any such decisions are allowed. Parties using tools with automated decision-making for Offers should ensure compliance with applicable local laws.

Restrictions on the Processing of Sensitive Data

Parties should ensure that when they return Offers based on shopping requests that contain Sensitive Data, the Data Subject's Consent for this Processing was obtained, as required under applicable laws, including explicit Consent where this is required, and in situations or countries where the prohibition to process Sensitive Data may not be lifted with Consent, they should ensure that any applicable other requirements are complied with. The circumstances and legality of Processing of Sensitive Data must be assessed carefully and can be subject to specific local restrictions.

In some countries specific restrictions may apply to Personal Data that are not labelled as Sensitive Data by virtue of law but are considered as semi – sensitive or privacy intrusive. Where the Personal Data e.g. concern children, a proof of parental Consent may be necessary for the Processing. For shopping requests related to minors, specific tools or measures may need to be implemented, in conformity with applicable laws, to ensure parental Consent and for age verification. The age from which a child can provide valid Consent may vary: local applicable laws need to be followed.

Parties implementing NDC should put all necessary contractual arrangements in place in relation to any such requirements.

Transborder Nature of the Transfers of Shopping Requests

Parties implementing NDC with the view of sharing Personal Data from shopping requests with other group entities abroad, with Airlines, or with other third parties, should take into account the EU data protection requirements regarding transfers of Personal Data to countries outside of the EEA.

Account should be taken of two main situations:

(1) If the recipient country is considered to be providing an adequate level of protection, the Personal Data can be transferred to such country without specific measures related to such Data Transfer: this applies to the list of third countries which were recognized as such by the European Commission, and to US entities which are Privacy Shield certified.

(2) If the recipient country is not considered to be providing an adequate level of protection, the Data Transfer is only allowed under specific conditions providing appropriate safeguards, and on condition that enforceable Data Subjects rights and effective legal remedies for Data Subjects are available. Appropriate safeguards may be applied with the use of contracts following the model issued by the European Commission (Standard Contractual Clauses), or on the basis of certain exceptions to this requirement. Some exceptions that might apply are; with the Data Subjects' explicit Consent, where the Data Transfer is necessary for the performance of a contract between the Data Subject and the Data Controller, or for steps necessary, in the interest of the traveler, before a purchase can be made, such as processing a shopping request. Before relying on such conditions, Airlines should verify how these are applied and interpreted under applicable local laws.

Data Subjects must be informed of the transfer of their Personal Data from the EEA to countries outside the EEA and of the existence or absence of an adequacy decision by the European Commission, or of the appropriate or suitable safeguards and how or where they can be obtained. Local laws impose that the traveler or candidate traveler, before such transfer, has been informed of the names of the recipients of the Personal Data or categories of recipients, if any, and of the third countries where the Personal Data are received by such recipients as well as of the exact purpose of the transfer to such recipients.

Quality of the Personal Data

Parties implementing NDC, where they are Data Controllers, should see to it that all Personal Data obtained through Subject Requests are:

- Processed fairly and lawfully, in accordance with the purpose that was specified to the Data Subject and are not further processed in a manner that is incompatible with such purpose (Purpose Limitation principle);
- Adequate, relevant and limited to what is necessary in relation to the purposes for which the Airline is processing them (Data Minimization principle);
- Accurate and, when necessary, kept up to date (Accuracy principle);
- Kept in a form which permits identification of the Data Subject for no longer than is necessary for the purposes for which the Personal Data were collected or are further processed (Storage Limitation principle);
- Processed in a manner that ensures appropriate security of the Personal Data, including protection against unauthorized or unlawful processing and against accidental loss, destruction or damage (Integrity and Confidentiality principle).

Purpose Limitation

Where a traveler or candidate traveler has been informed of, or has given Consent to, the processing of his Personal Data for the specific purpose of receiving tailored Offers, such Personal Data should not be used for other purposes.

Where the specified purpose of the Processing of the Personal Data is for replying to one specific shopping request only, same Personal Data should not be kept for replying to other shopping requests and should not be retained for direct marketing or any other purposes without additional Consent for these uses, or without other valid legal basis such as the necessity for the Data Controller to comply with certain applicable legal obligations. Parties should ensure that use of the Personal Data for any such other purposes is in compliance with all local laws relating to purpose specification and information to the Data Subject and any requirements relating to Consent.

Data Proportionality and Data Minimization

The Personal Data obtained from shopping requests should not be shared with third parties that are not relevant for the purpose of the shopping request without the Data Subject's Consent or other legitimate reason. Personal Data that are not relevant for the purpose of the shopping request or for other specified purposes, or that are excessive for such purposes, should not be collected, and if they have been collected they should not be shared. Personal Data must only be used and disclosed in ways that are consistent with the Data Subject's expectations and choices. It should be possible to segregate data elements to process specific elements that provide personal information or identification in a manner that complies with applicable laws.

No deceptive practices should be used, nor should the Personal Data be used in a way that may cause harm to the Data Subjects. The fundamental rights and freedoms of the Data Subjects should be safeguarded.

Data Accuracy

The Personal Data processed should be accurate and up to date. Adequate measures should be put in place in this respect. Every reasonable step must be taken to ensure that personal data that are inaccurate, having regard to the purposes for which they are processed, are erased or rectified without delay.

Data Retention

The Personal Data should only be processed and retained for as long as reasonably necessary for the purposes of the Processing, in accordance with local laws.

A distinction should be made between the situation where a candidate traveler refuses all Offers and no transportation contract is concluded, and the situation where an Offer is accepted and the Personal Data are needed for the transportation contract between the traveler and the Airline, in which case the traveler's Personal Data will be further processed for the purpose of the transportation contract: reference is made to IATA Recommended Practice 1174.

The Personal Data of a candidate traveler deciding not to accept any Offers should not be kept longer than necessary for establishing the refusal of the Offers. If the Personal Data are retained for sending new Offers of for replying to new shopping request, or for any other purpose, such as direct marketing, parties should see to it that all requirements for such further use are complied with, including obtaining Consent where necessary as under applicable local laws.

There may be specific data retention obligations under applicable local laws. Airlines implementing NDC should take into account such applicable data retention obligations, if any.

Data Integrity and Security

Appropriate security must be installed, using appropriate technical and organizational measures, such as measures of encryption or pseudonymization. The security measures should be regularly tested and assessed. The level of security should be appropriate to the risk for the rights and freedoms of the Data Subjects.

Data Subjects' Rights

The following rights of Data Subjects need to be taken into consideration, depending on applicable local laws and circumstances of use:

- The right to access to their Personal Data;
- The right to have inaccurate or out of date Personal Data rectified, completed, blocked, erased or destroyed;
- The right to have Personal Data erased that are no longer necessary in relation to the specified purpose (right to be forgotten);
- The right to object to Processing of Personal Data that is likely to cause or is causing damage or distress where there are no overriding legitimate grounds for the processing;
- The right to have Personal Data erased that have been unlawfully processed;
- The right to withdraw Consent (see above);
- The right not to be subject to decisions based solely on automated processing (see above);
- The right to object to being subject to direct marketing (see above).

Depending on applicable local laws and circumstances, a Data Subject may have a right to Data Portability: the right to receive his Personal Data which he has provided to the Data Controller, in a structured, commonly used and machine-readable format and the right to have those data transmitted to another Data Controller.

It is the Data Controller's duty to put adequate measures in place in order to enable Data Subjects to exercise their rights under applicable laws. Data Controllers may be entitled to request Joint Data Controllers, other Data Controllers, or Data processors to act on their behalf for allowing Data Subjects to exercise these rights. Adequate contractual arrangements should then be in place. Airlines should verify under applicable local laws what measures should be taken and what contractual arrangements are allowed.

Notifications and Authorizations

Data Controllers should see to it that any notification/authorization requirement with competent authorities is complied with.

For the Processing of Personal Data

As under the GDPR, it may be necessary for the Data Controller to maintain a record of processing activities. In some countries the Processing of Personal Data may

still be subject to filing obligations with the Data Protection Authority. For certain categories of Processing a prior authorization may be necessary (e.g. for Processing Sensitive Data in the shopping request, such as health data, local laws may maintain or introduce further conditions).

Parties implementing NDC should verify whether such implementation requires amendments to any such notifications filed, or requires new notifications or, where applicable, requires specific authorizations.

For Data Transfers

Data Transfers to countries that are not members of the EEA may need to be notified to the Data Protection Authority or an authorization from the Data Protection Authority may need to be obtained.

Parties implementing NDC should verify whether such implementation requires amendments to any such notifications filed, or requires new notifications or, where applicable, requires specific or additional authorizations.

Interline Legal and Compliance Considerations

Following the approval of NDC, as embodied in Resolution 787 of the Passenger Services Conference, Airlines will be free to develop indirect distribution channels implementing the NDC Standard. This approval in no way obviates compliance with existing obligations under applicable competition laws and regulations. In the context of NDC, such obligations apply only in the context of Offers or Orders that include an interline element. The following legal guidance summarizes how the NDC Standard can be used by Airlines seeking or making dynamically priced Offers for interline travel segments. These guidelines are to provide a general understanding of the potential competition law requirements and should not be understood as legal advice.

- Dynamic communication may be used by any two participating Airlines to seek or make pricing Offers for interline travel segments on which the soliciting and Offering Airline do not compete in response to a bona fide passenger ticketing enquiry for the subject route (no hypothetical requests are permitted).
- For purposes of this evaluation, two Airlines shall be deemed to compete when they each Offer air travel service to one or more airports in each of the locations within the origin and destination // city pair that is the subject of the interline travel segment NDC request.
- On routes for which the two Airlines do Offer competing air travel services, they may not seek or make dynamically priced Offers unless the two Airlines have received antitrust immunity (ATI) from relevant competition authorities. In cases where formal ATI for the two Airlines has been granted, dynamically priced

Offers may be used for interline travel segments on the same terms and conditions as non-competing routes.

- Subject to the above conditions, dynamic communication may also be used to seek or make a pricing request for those ancillary services related to the bona fide ticketing enquiry for the subject interline segment. These ancillary services may include all customary services related to the class of service involved in the ticketing enquiry. Dynamic communication for solely ancillary services (i.e., the pricing request is limited to ancillary services and unrelated to an individual passenger journey) is not allowed. [Certain restrictions on responses to pricing requests for ancillary services may be imposed.]
- Information received through the dynamic communication may be used solely for the purpose of fulfilling the bona fide passenger ticketing enquiry only and may not be used for any other purpose.

Note - A "hypothetical request" occurs where a Seller/Aggregator sends a shopping request to an ORA, or an ORA sends a request to a POA, without this request having first being initiated by a Customer.

This also helps to minimize the number of unnecessary requests to Airline Offer Management Systems.