Implementation Variations in Distribution Standards – Through a 21.3 Standards Lens

Contents

I - Introduction

Following a recent study[1] involving sellers and system providers, IATA reviewed 90+ specific challenges arising from differences and irregularities across airlines' usage and interpretation of the Enhanced And Simplified Distribution (EASD) standards.

While some of these points were specific to earlier versions of the standards (and have since been addressed), others could persist **even if schema version 21.3 or a later release** was adopted.

This paper aims to outline the key reasons for variations in implementation of distribution standards across airlines, as well as highlight some of the challenges incurred by sellers when consuming multiple airline APIs.

The intended audiences are implementers adopting 21.3, to encourage best practices and remove friction to seamless interoperability across different parties in the supply chain.

It ends by proposing both near-term and long-term approaches to address the variations observed.

II - Three Fundamental Causes of Variations

1. Duplication

Duplication of information or functionality in distribution standards is one of the primary causes of variations in implementations today. While many measures have been taken in past versions of the schemas to remove duplicate elements or functions, there are still features which appear across multiple schemas. Some of these features provide airlines with a necessary level of flexibility to orchestrate shopping and order management flows to closely suit their business models, while others could conceivably be reduced to bring further alignment and standardization.

Examples of features that have been de-duplicated in the past:

- The removal of generic ID references in 17.2
- The removal of flight-shopping capabilities in OfferPriceRQ/RS in 17.2

Examples of de-duplication that could bring further standardization:

- Implementation of ancillary shopping flows
- Presence of fare details or cabin classes

2. Optionality

Another cause of variations is the **optionality of data elements or message flows**. Airlines will typically send messages with a minimal amount of information and most airlines omit information the recipient would consider important or essential. This inconsistency between the type and amount of information returned by different airlines poses integration challenges for API consumers (sellers and aggregators).

Like the challenges around duplication, optionality in data or message flows provides the flexibility to support different airline business models. Implementation guidance and certification could play a strong role to address

---

this challenge. Moreover, there are a relatively small number of mandatory elements in the message schemas – this, too, could be a point to address for strengthening standardization.

3. Interpretation

A third reason for implementation variations is the common **misuse of data elements used for purposes other than their original intent**.

Many elements meant to carry free text are being used very differently across implementations and, in some cases, retrofitted with structured information that only certain API consumers can understand and de-code (e.g., flat-file positional records or character-delimited records, such as CSV).

Note that for data elements meant to hold coded values (with reference to the ATSB Codeset Directory at hand), there is little deviation from a standard implementation, so the issue described is prevalent in free-text structures or coded elements which do not reference a predefined set of codes.

III - Specific Examples of Variations

Offers constructed per O&D vs full return itinerary

Several airlines employ a per-bound shopping flow, splitting the offers between outbound flights from their related inbound flights. This approach at flight shopping presents three outcomes:

- This could potentially reduce the overall number of constructed offers, if each bound is requested in separate consecutive AirShopping requests but would force the seller to reflect the two-step process on the front end for the agent or traveler.
- The seller would need to orchestrate multiple AirShoppingRQ API calls in rapid succession (one for each outbound flight provided) in order to display full itineraries on the front end. This approach would, in fact, have a higher impact or the performance of the airline API than constructing full itineraries for a single shopping response.
- The airline could provide both outbound and inbound solutions separately in a single AirShopping response, but without explicit information on combinability, the Seller would need to employ complex logic on their part to associate specific inbound flights to their corresponding outbound flights.

Details returned at different steps of the flow

While many airlines are capable of including all details pertaining to an offer within the first AirShopping response, others make some of the information obtainable only through subsequent API calls i.e. there are different levels of detail passed across different steps of a shopping flow.

One method of reducing response times in current implementations is, for example, where some airlines will choose to provide tax breakdowns and fare rules only after offers are selected by the seller. This selection process happens in the OfferPriceRQ/RS exchange, whose response would include the additional information for a specific offer which was not provided in the previous AirShopping response.

Again, to tackle this, some seller system providers who require details for all offers constructed, will fire multiple OfferPrice API calls in rapid succession, one for each offer provided in the previous AirShopping response, which could adversely impact overall performance.
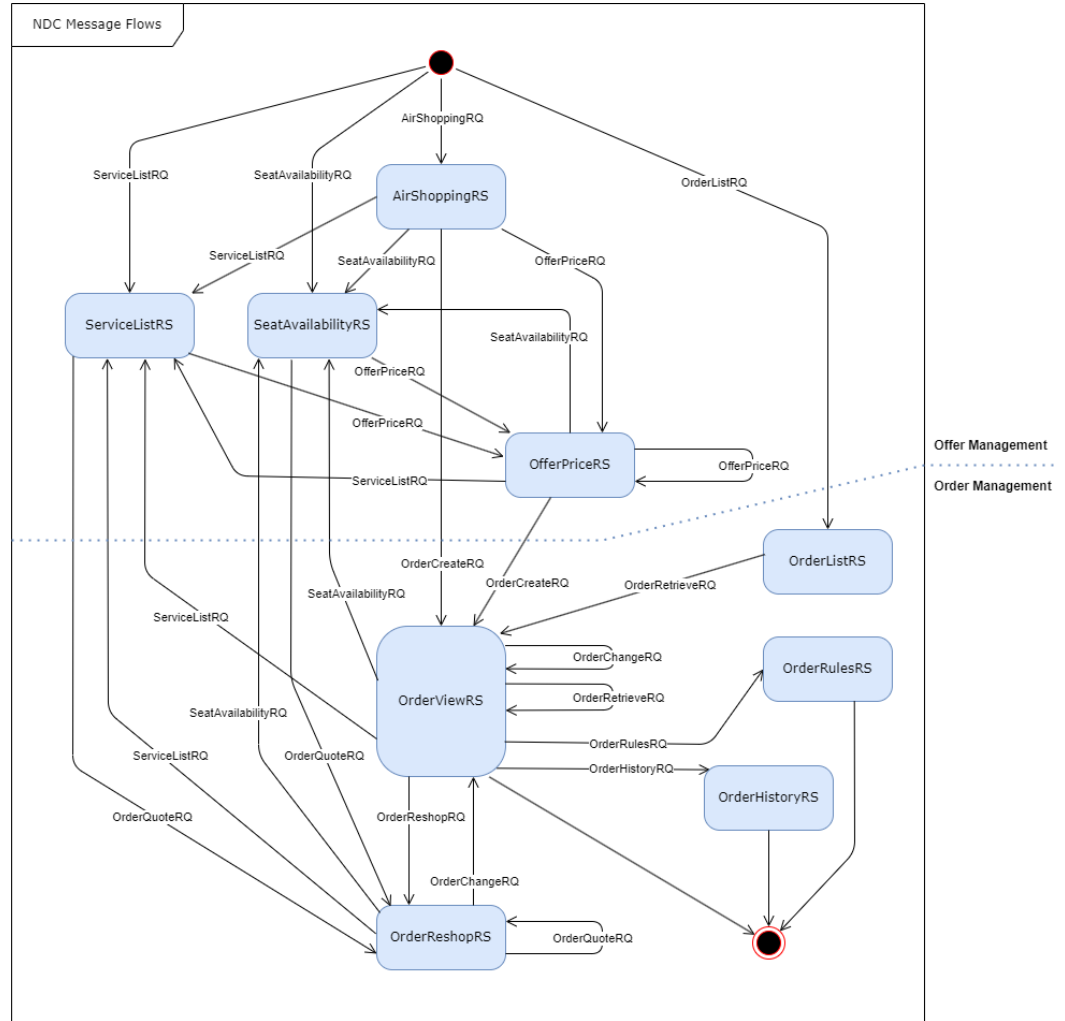

Figure 1 – *Possible sequences of message flows with key 21.3 NDC messages*

Ancillary services

Non-flight services (such as ancillaries) in Distribution Standards are by far the area with the most variations across implementations. To set the stage, there are two main ways by which airlines present ancillaries during shopping:

- It may be instantiated as a service (i.e. concretely linked to a specific offer item or a la cart offer item in the shopping response).
- It might be only disclosed outside of the offer item structure (i.e. typically in an informational part of the message). This option is not optimal.

Non-flight services can be returned in the following messages:

- AirShoppingRS
- OfferPriceRS
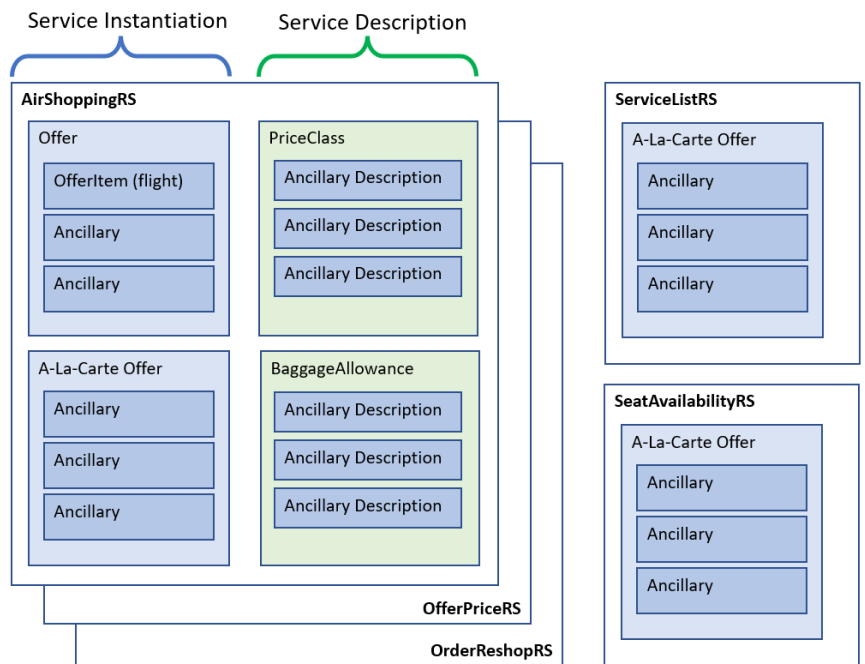- OrderReshopRS
- ServiceListRS
- SeatAvailabilityRS

Figure 2 – *Location of potential service instantiation and description*

Note: ServiceList and SeatAvailability respond to specific requests for the construction of ancillary services (normally in combination to specific offers and/or flights).

Variations in offer item construction

1. The first difference observed is between optional ancillary offer items within constructed offers (normally placed within the same offer that contains flight services), and additional ancillary items that can be requested separately (known as "a-la-carte ancillary services").
2. Within the AirShoppingRS or OfferPriceRS or OrderReshopRS, we find flexibility and variations between those airlines who package optional non-flight services within the flight offers (setting the service offer items "MandatoryIndicator" to false), and those who make use of the separate "a-la-carte" offer structure (and often, a mix of both). In other words, some airlines upsell in the offer structure instead of the a-la-carte structure.
3. Another difference is in the amount and completeness of ancillaries returned within an initial AirShopping response, which then drives whether further ancillaries need to be requested. In some cases, airlines will provide all or sufficient levels of optional ancillary services within the "a-la-carte" offer structure, such that sellers would not require the use of the ancillary-focused message ServiceList. Other implementations only make ancillaries available through subsequent shopping messages.

Disclosure vs concrete offer items

So far, we have looked at ancillaries that airlines materialize into actual offer items. However, there are many implementations disclosing ancillaries outside of the offer/offer item structures – an aspect of offer construction related to bundling.

For example, airlines include baggage allowance details together with their flight offers, with many/most airlines not linking these to actual ancillary offer items (purely disclosures linked to the flight offers), while some will construct respective offer items, complete with names/labels and associated service taxonomy codes. Those who skip the construction of offer items don't generate concrete products for things that are typically included in the bundle (often as part of a "fare family"), and this creates further variation on the seller side.

Another example of disclosing ancillaries without constructing offer items is found in price classes, which are intended to be used to label offers under an airline-specific brand. This price class structure supports multiple

free-text descriptions within each instance of a price class, which is often used to list the ancillaries included under that brand (e.g., fast track, lounge pass…) in a non-machine-readable format.

Duplication of fare details and cabin classes

The presence of certain values in multiple areas of the schemas, such as cabin classes, brings inconsistency across implementations. These can be found within flight details, fare details and other areas of the messages. This information is a suitable candidate for de-duplication across schemas. Likewise, fare details are usually nested within the offer item structures of shopping responses, but also often isolated with the DataLists structure, without being referenced from anywhere else in the messages.

Default response behaviors

Due to the reasons outlined at the start of this paper (specifically the topic of optionality in data elements), many sellers are having challenges with consistency across different airlines and, within the same airlines, even across different messages.

Often, when some information is not returned by an airline (but expected), it is unclear if this due to:

- technical issues,
- general unavailability of information (e.g., a product or service is simply not available), or
- intentional omission (e.g., reducing the size of a response payload for performance reasons)

There are currently no mechanisms in place for a seller to know what information may be missing (but potentially available through subsequent API calls or by using different filter criteria).

The consequences are that each integration requires customization on a per-airline basis, with some sellers integrating with 3rd party API service providers in order to complement missing information.

Adherence to coded values and formats

9989	Data type, coded
1	Carry-on
2	Allowable baggage
3	Carry-on chargeable
4	Carry-on free
5	Checked free
6	Checked chargeable
700	Ticketed
701	Time Limit - No PNR cancellation
702	Domestic itinerary
704	International itinerary
704	Mail ticket
705	Time Limit - Automatic PNR cancellation
706	Ticket revalidation required
707	Airport ticket
708	Self service ticketing - Pre-validation required
709	Prepaid Ticket Advice
710	Satellite/Remote ticketing
711	Staff reservation entitlement
712	Staff status
713	Staff type of travel
714	Staff ticket type indicator
ADT	Adult
ARE	Area time difference allocated
BAG	Baggage
CHD	Child (reduced fare due to age)
CRO	Crossing number
CRW	Crew
CUS	Customs status
DEL	Delayed
DHD	Deadheading Staff
FEM	Female Adult
FRT	Freight
INF	Infant
MAI	Mail
MAL	Male Adult
NOI	Noise allocation
NOT	Not displayable
NRV	Non-revenue earning passengers
PAX	Passengers
REV	Revenue earning passengers
TME	Overall time difference
TOF	Take-off fuel

Most machine-readable data elements in the standards reference pre-determined sets of values found in either the ATSB Codeset Directory or online EASD Implementation Guide. Usage of codes that do not fall within the permitted values exists across airline implementations. As a result, sellers must manage custom mapping-tables on a per-airline basis, converting and normalizing elements to a baseline the sellers can use together with other airlines' data (when aggregating content, for example).

The presence of clear instructions on coding conventions is also no guarantee of adherence. For example, IATA Resolution 777 defines the format of an OrderID. However, only a handful of implementations adhere to this convention, to this day.

Figure 3 - *For example, PTC codes passed between sellers and airlines during shopping often contain values other than the official codeset referenced by these elements.*

Transitional implementations: legacy + NDC

One integration aspect of most implementations today, which involves NDC with tickets/EMDs, is responsible for much of the confusion on the ability to tie in legacy processes together with modern airline retailing. The implementation decisions for these legacy-to-NDC integration areas are largely left up to each airline, as the distribution standards focus mainly on the core NDC data structures and mechanics and how they should function in a retailing/e-commerce and ticketless world. Some examples of these include:

- Mapping coupon statuses to order service statuses.
- Defining the behavior of tickets in servicing scenarios, where exchanges and cancellations are involved.
- Capturing payment or refund details in the ticket structures, and how this relates to NDC structures.
- Decisions around the construction of offer items and services in NDC, given how services (e.g. services included in bundles or branded fare families, SSRs, etc.) are managed with tickets/EMDs.
- Workarounds to address legacy limitations (e.g., non-homogenous PNRs, splitting PNRs, etc.)

IV - Potential Solutions to Variations

There are some possible short-term and long-term solutions to address the extent of variations in implementations.

Near-term actions

The following items are some of the potential solutions which could foreseeably be achieved in under two years:

1. **Stronger implementation guidance** [Work in progress] – industry groups are continuing their effort to enrich and add details to the online implementation guide. Best practices are being documented for the 21.3 release, which should reduce the number of variations. This would also help with avoiding the usage of duplicate values, with guidance focusing on usage of only specific values.
2. **Documenting conditionality** – This is necessary to instruct which optional elements are conditional to the presence of other elements, i.e., if a certain optional element is provided, other specific optional elements should also be included.
3. **Increasingly stronger validation** on ARM index – This point is coupled with stronger implementation guidance - as more details are described as part of best practices, more of these rules can be enforced in the certification process. Potentially spot-checking APIs for compliance to schemas from recognized companies could also help to reduce deviations over time.
4. API consumers providing **real time feedback to API providers** – a quick and iterative process of feedback and improvement is important for API providers to keep up with seller requirements and implementation trends.
5. **Acceptance of some variations** due to, for example, airline – or market-specific requirements, or regulatory requirements. Not all aspects of the standards can be reduced to single processes. Therefore, factoring in this flexibility in the design of a seller platform is important to accommodate any variations which are intrinsic to the Offers & Orders paradigm.
6. **Codeset renewal for retailing** - for usage of coded values that fall outside of the ones listed under the ATSB CodeSet Directory and Implementation Guide, whenever new codes are required by airlines, these should ideally be presented to the industry groups who can then officially add them to the standards. This process does not require changes to the XML schemas and can therefore act as a short-term solution for issues of code adherence.
7. **Quality and transparency of API specifications** - Airlines should attempt to publish as many details as possible on their developer portals to allow sellers to examine up-front what information is passed by

each airline and evaluate if message flows are also compatible with their front-end shopping and servicing processes.

Longer-term considerations

The following points describe transformational areas of improvements in the standards and could be considered as part of large milestone releases (without the constraints of backwards compatibility).

1. **De-duplication of data and functions** in schemas. As described in the sections above, there are several areas of the standards that could be further restricted to less ways of performing the same functions. This is true of the data passed through messages, as well as message flows. Industry standards working groups drive the priorities of such improvements and rely significantly on implementers' feedback to draw a roadmap for improvements. These changes may take time, before being introduced, due to their footprint on the schemas, and would likely need to await a major release of the standards (as opposed to the more-frequent intermittent releases).
2. **Adaptation to common practice**. It is also worthwhile observing what the trends are across multiple implementations, even those that do not directly affect each implementer specifically. Interoperability can also be achieved by deciding to implement things in ways that are highly adopted by a majority of implementers, especially when best practices are missing, in certain cases. This can then open more easily doors to new partnerships.

Migration considerations

The considerations above clearly demonstrate the potential difficulties that may arise with partner integrations when airlines implement the 21.3 standards differently. While there may still be some flexibility left in future versions of the schemas, it would nonetheless be advisable to implement following best practices or, if guidance is not available, by observing the more widespread approaches to implementing the standards.
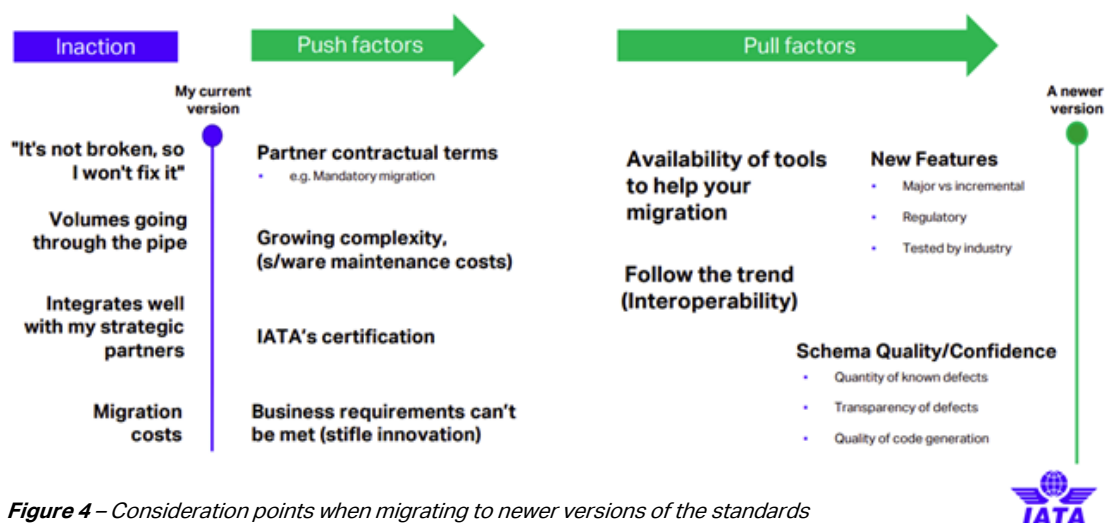

Figure 4 – Consideration points when migrating to newer versions of the standards

Reference Material

Retailing Implementation Forum covering the Variation Topic:
https://airtechzone.iata.org/community/events/#nov22