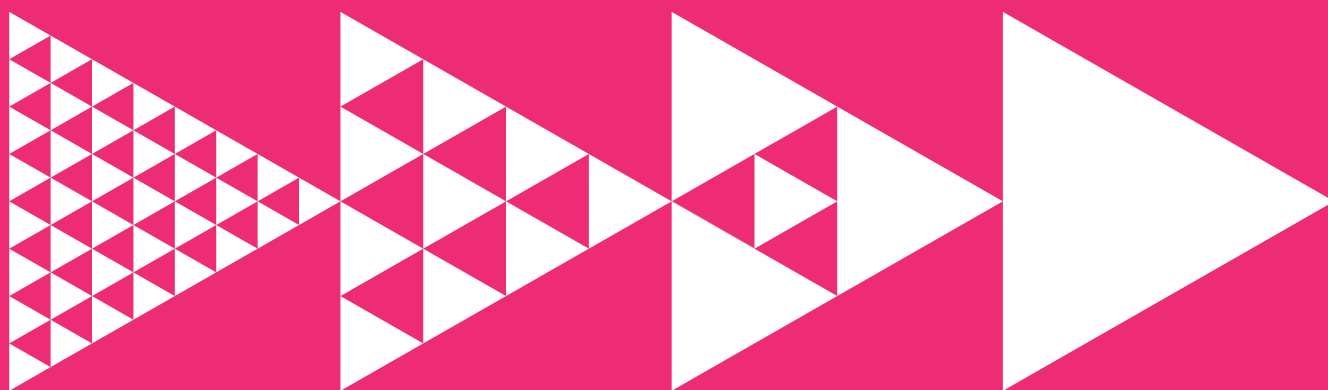




AIR

**AIRLINE INDUSTRY
RETAILING**

THINK TANK



WHITE PAPER 2018

Foreword



Eric Léopold
Director Transformation, FDS
IATA

For almost 15 years, the IATA Simplifying the Business (StB) program focused on improving passenger experience and reducing airline costs. Over this long journey, StB initiated a disruptive distribution program, the New Distribution Capability (NDC), a first step towards airline retailing. At the same time, the environment changed rapidly with digital retailers, such as Amazon and Alibaba, leading the relationship with digital customers globally. The fast pace of digital change, combined with a growing airline retailing vision and a customer centric approach, led to focus on new priorities and the launch of the Airline Industry Retailing (AIR) portfolio.

Digital transformation is happening — and it is just the beginning. For years, airlines have been enhancing their existing processes supporting the same capabilities. Today, the industry is building new capabilities but keeps on operating within the same kind of business models. How long will it take for the legacy airline business model to be disrupted like Airbnb disrupted the hotel business? It's easy to think of a dozen major industries that have already been disrupted in a similar way. Why should airlines escape that revolution? It seems clear that the question is not “if” the airline industry will be disrupted, but “when”, and “how”. Airlines need to be prepared for this major change.

Most mature carriers are already moving to digital strategies, this is a no brainer. Some are going further by investing in innovation hubs to accelerate their digital readiness and therefore fulfilling their digital customers' needs. A few carriers are even taking another bet. Their vision is to become digital companies flying airplanes —

Following its mission –
to represent, lead and serve
– IATA will lead the airlines
through this digital revolution.

their focus being to offer a 100% frictionless experience to their customers. These “digital airlines” will be ready to compete with digital retailers and other digital players.

What can IATA do to help the air travel value chain move to digital retailing? Following its mission — to represent, lead and serve — IATA will lead the airlines through this digital revolution. Going forward, the AIR Think Tank will support the priorities identified in the area of airline retailing, generate ideas and turn them into prototypes. The AIR Think Tank will contribute to the acceleration of the implementation of industry standards.

For its first year, the AIR Think Tank focused on four industry pain points impacting travelers. First, how to make the traveler identification frictionless. Second, how to streamline the distribution of air travel products beyond air, in hospitality and ground transport. Third, how to offer a seamless shopping and travel experience to customers using multiple carriers in their journey. Fourth, how to make payment invisible, using existing forms of customer identification.

As every year, I'm grateful to the people of our air travel industry who dedicated time and energy to tackle new challenges. I look forward to joining the discussions around the ideas proposed in this paper. I trust that disruptive projects will come out of these ideas, leading to innovation for passengers' experience.

Sincerely yours,



Executive Summary

The AIR Think Tank, launched in 2018, is led by a group of retail-minded individuals that are keen to transform the aviation industry into retailers.

The team includes airlines, strategic partners, supporting organizations and IATA. Together, the team developed the following ideas:



Project DNA



Project Honeymoon



Project Husky



Project Panini

These ideas reinforce the goal of collaboration across the industry. It is essential that the entire value chain works together to partner better and deliver shared solutions within a trusted framework. To be successful retailers, airlines must work together with airports, travel agents and governments in a much more harmonized and coordinated way. This is the key to push all the 2018 and future Think Tank ideas forward. Furthermore, the ideas in this paper are intended as a call to action for all the players in the industry.

Each of the four ideas will be elaborated in this industry White Paper. In addition, the team built proof of concepts for each idea, that will be presented at the IATA AIR Symposium in October 2018.

Overview of the content

Section 1

AIR Overview – background, vision, scope, etc.

Section 2

AIR Think Tank – vision, scope, structure and members

Section 3

2018 New Ideas – introduces the four new ideas

Section 4

Conclusion – outlines the next steps and conclusion

AIR Overview

Background

The world is going digital as are airlines' passengers. Customers are getting more demanding and major digital players like Amazon and Google, which are dominating the relationship with digital customers, have raised their expectations with personalized offers, real-time information and frictionless transactions. At the same time, legacy network carriers must deal with complex business processes which make it challenging to positively address those expectations and are facing competition of low-cost carriers which operate in simpler, "direct" ways.

Airlines' future performance depends on how quickly they can transform their legacy processes into digital retailing business processes, dedicated to fulfilling their customers' digital needs and offer them a seamless travel experience.

Definition of retailing in aviation

Retailing is the activity of distributing and selling goods or services to the final customer. In the specific case of the airline industry, it covers the shop, order and pay processes. It enables airlines to provide the right product or service to the traveler, delivered through airlines' direct and indirect channels, at the right time, through an easy to understand and customer-friendly process.

Successful retailing requires airlines to know and understand their customers better, to be able to provide personalized offers that meet their needs.

Vision and horizon

The AIR portfolio will enhance airline distribution and payment capabilities to support:

- Products flexibility (merchandizing, non-air)
- Consistency across channels (no technical limitations)
- Consent on forms of payment (from customers) and remittance (from agents) and their costs

This vision falls into horizon 2, where disruption takes place from current processes (i.e. horizon 1), with roadmaps in place but not visionary (i.e. horizon 3).

Portfolio

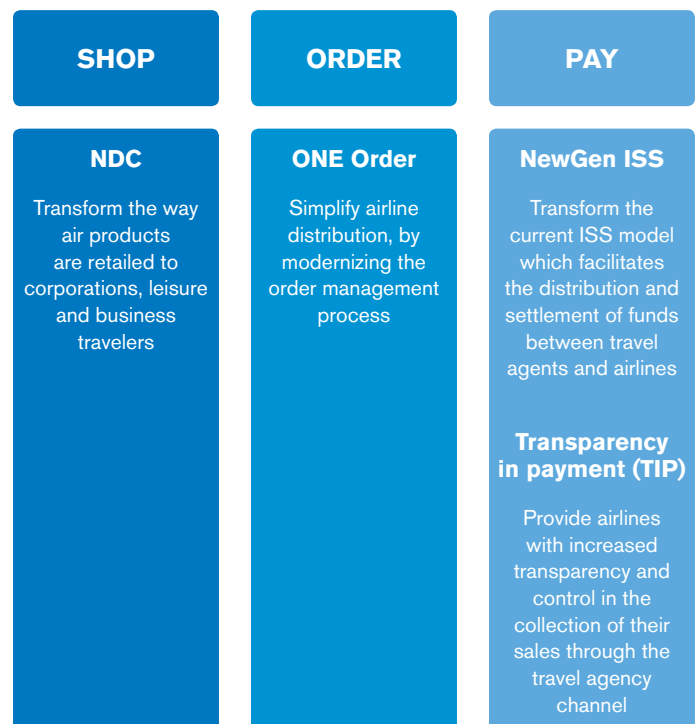
In 2015, IATA presented its vision to enable consumers to "shop-order-pay" for air products across all channels. Since then, IATA has been the initiator of many projects, actions, events aiming at helping the airline industry to build stronger airline industry retailing processes.

The objective of the AIR portfolio is to consolidate all those activities under a unique name to strongly communicate IATA's retailing vision. AIR will become a reference providing the big picture of the industry roadmap towards retailing.

It is also a catalyst for innovation and speed. Industry stakeholders will refer to the AIR portfolio to support their investment and implementation decisions.

Scope

The AIR portfolio is currently composed of four projects and a set of activities:



AIR Overview

Activities

AIR Business Travel Summit

The AIR Business Travel Summit is a yearly event reflecting on the industry's progress on the journey towards airline retailing by gathering Airlines, Corporate Buyers, Travel Management Companies, Travel Agent Associations and IT providers.

AIR Competition

The AIR Competition aims at igniting new ideas across the travel industry. Finalists will win a range of prizes and get a chance to enter the IATA incubation program. The best ideas will be showcased on stage at the AIR Symposium.

AIR Hackathons

Building on the success of previous NDC Hackathons, the AIR Hackathons gathers developers to make them work on innovative solutions enhancing airline retailing based on IATA standards.

AIR Publications

The AIR publications (White Papers, Strategy paper, Case studies etc.) are contributing to building the AIR innovation profile and ensure a consistent message across all AIR-related activities.

NDC Hackathon - Berlin 2016



AIR Symposium

In 2018, IATA is launching the first ever Airline Industry Retailing (AIR) Symposium. The AIR Symposium will focus on distribution and payment from a customer perspective. The AIR Symposium will be a fantastic opportunity to show case the results of all AIR events such as the AIR Think Tank, AIR Hackathon winners and the AIR competition.

AIR Think Tank

The Aviation Industry Retail (AIR) Think Tank (TT) provides a platform for participants to ideate with key stakeholders across the industry. The scope covers aviation industry retail and new technology related to retailing. The objective is to identify key areas of innovation for retailing, define new concepts, deliver proofs of concepts and bring strategic partners on board at the earliest possible stage of the new AIR initiatives.

AIR Webinars

The AIR Webinars are contributing to building the AIR innovation profile and ensure a consistent message across all AIR-related activities to key industry stakeholders.

NDC Hackathon - Silicon Valley 2017



AIR Think Tank

The AIR Think Tank was initiated in 2018. Evolving from the IATA Simplifying the Business (StB) program (see www.iata.org/stb for more info), the structure was based on the StB Think Tank.

The StB program was closed at the end of 2017. It was an industry change program that ran from 2004 to 2017 aimed to transform the passenger journey. The StB Think Tank was launched a couple of years later in 2011, based on a need to focus on innovation and new ideas to transform processes.

Building on the success of the StB Think Tank, the AIR Think Tank was initiated in 2018. The scope is narrower and more focused – specifically on distribution and retail.

Vision

The goal of the AIR Think Tank is to guide the industry to transform into true retailers. This is achieved through a robust ideation process where the group brainstorms potential ideas that can help materialize the vision and articulate the ideas throughout the year.

Members

The AIR Think Tank is composed of IATA airlines, strategic partners and supporting organizations. It is open to all. The team, including IATA, consists of a maximum of 30 members.

Output

The output of each yearly Think Tank is an industry White Paper and proof of concepts for each idea. The aim is to turn these into IATA projects that could lead to the creation of industry standards and mass adoption.

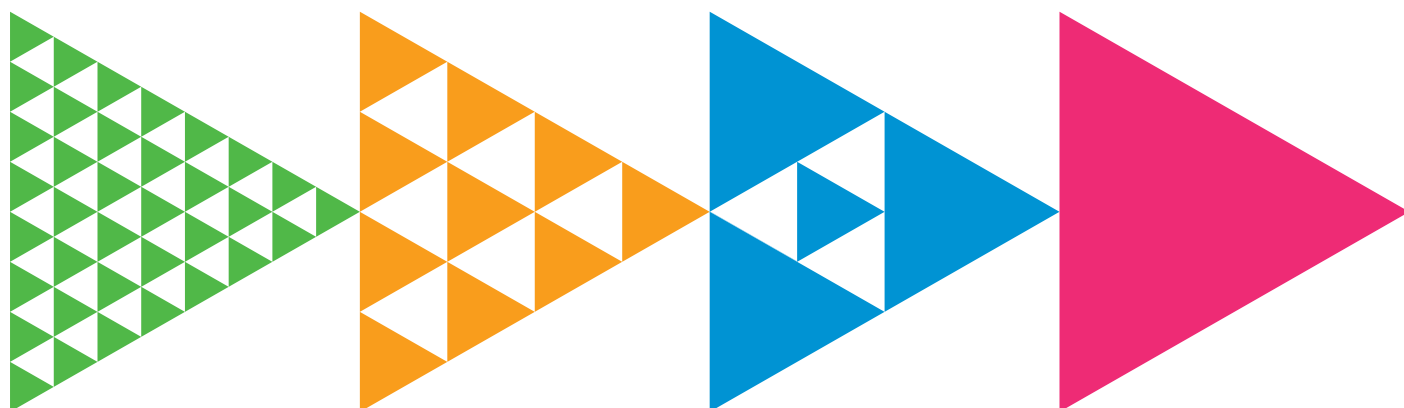
Structure

The AIR Think Tank kicks off each year in January. There are four face-to-face meetings that run from January up until the delivery at the IATA AIR Symposium in October.

The first meeting in 2018 was in Sunnyvale California, in partnership with Plug and Play (a major incubator in the Silicon Valley), where the team sat through a couple of days of startup pitches (startups were sourced by Plug and Play) followed by a day of brainstorm/ideation. Idea themes were selected and subgroups for each were created.

During the next meeting in Dublin, the subgroups narrowed the themes into one idea per subgroup and started work on articulating the ideas.

The following meetings in Athens and Chicago was where the teams completed the content of this White Paper and the proof of concepts presented at the 2018 AIR Symposium.



2018 New Ideas



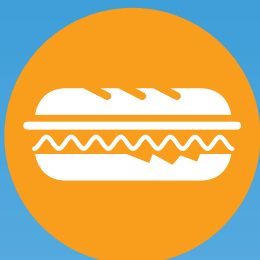
Project DNA



Project Honeymoon



Project Husky



Project Panini

2018



Vision

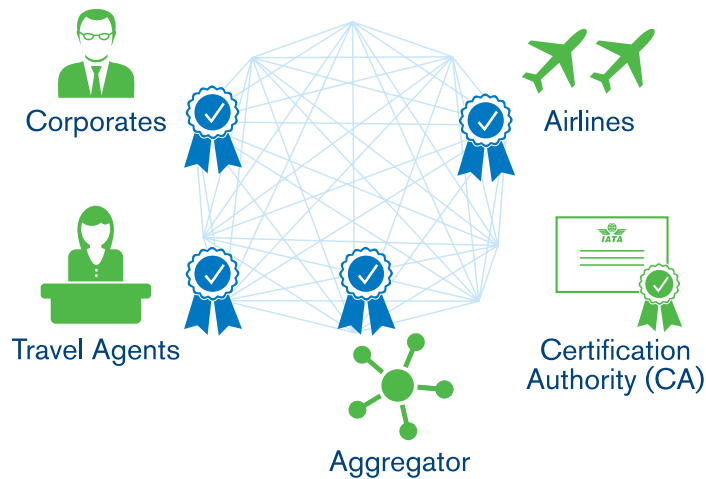
Digital transformation in the aviation industry is creating great opportunities for new ways of doing business, new market sellers and enhanced passenger experiences.

The more transformational projects we move forward, the greater the need to have a reliable way to do business in a

secure environment where actors can know who they are doing business with.

There are multiple challenges emerging when there is a proliferation of actors including travel sellers, buyers, and intermediaries in the shop/book/buy process.

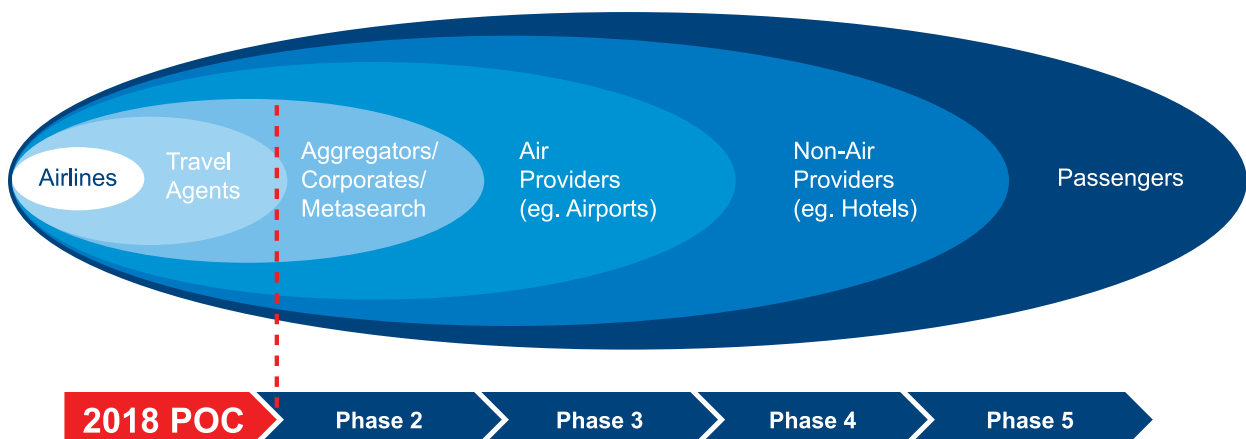
The short-term vision is for IATA to become a digital Certification Authority so that all business partners can be properly identified:



This year PoC focuses on the Travel Agent to Airline use cases.

In the near future we see the integration of Aggregators and probably corporate buyers.

In the long term, as per the hereunder schema, we believe this solution could be expanded to many other players within and beyond AIR, including passengers themselves:

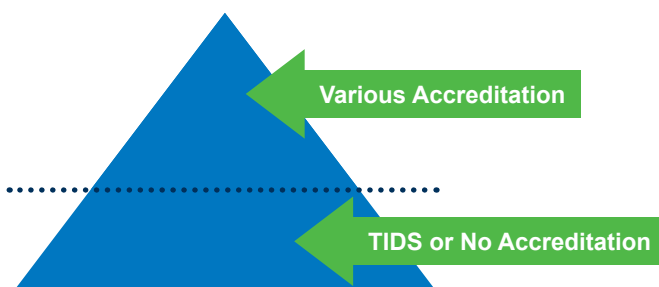




Current Situation

There is currently only a subset of all agencies that are accredited. Other agencies are either registered via the lightweight Travel Industry Designator Service (TIDS) or are completely unknown. Furthermore, there are inconsistent identification methodologies across many travel actor types.

Many market sellers are not even identified in the selling process, e.g. although the majority of corporate travel is sold based on an Online Booking Tool, there is no recognition of this important value chain data point.



ISSUES

- Cumbersome & expensive process for accreditation
- Some mid-tier use top tier as a consolidator due to complexity/expense
- Commercial Risk
- Many unidentified Travel Agencies
- Lack of transparency into the chain of buyers

CURRENT CODE VARIATIONS

- IATA provides codes for accredited agents
- Go Global, Go Standard, Go Lite
- IATA also provides TIDs (Travel Industry Designators) to non-accredited agents) perhaps replaced by Go-Lite
- Airline Designators (BA, AA, KL ...)
- Airline Accounting Codes (125, 001, 074)
- Location Identifiers (Cities, airports, metropolitan areas, surface transportation locations).

There are a myriad of identification types across many entities

Case for Change

The increase of players in the shop/order/pay process have created many challenges. These challenges have increased the need for:

- Travel buyers to quickly *get down to business*, without incurring onerous paperwork and cost to start doing business
- Travel sellers to identify uniquely in the marketplace whom they are dealing with, being it an agency, a group of agencies, aggregator, corporate buying tools etc.
- Travel buyers to know who the travel sellers are e.g. in case of airlines going out of business, have poor service track record, are on shaky ground, or simply not well known
- Travel sellers to identify the whole chain of the travel buyer, e.g. is this an individual agency, or is it part of a group? Is it an aggregator? And if it is, what agencies is it aggregating?
- The travel buyer to identify the whole chain of the travel seller, e.g. is it an airline, a virtual airline, a special department of the airline etc.
- The various actors in having a central repository to get safely and securely information about buyers, sellers, and intermediaries using a unique, centralized, and trusted by the industry authority
- The various entities to have a uniform identification for all other actors involved in the shop/order/pay process
- The industry to extend the quantities and qualities of IDs, as some are running out
- The industry to map individual entities into a uniform cross-industry, widely recognized, identification format and certification mechanism
- The industry to create a “trustworthiness” mechanism where each player can guarantee fulfillment of its role; trustworthiness to be dynamically measured that is dependent on the player role and “behavior”



There are already several ongoing IATA industry initiatives that also require a strong identity management solution including NDC, ONE Order, Open APIs and the travel blockchain.

Solution

To solve the global selling / buying identification problem, it is envisioned to create a Digital Centralized Authority (DCA) system that can i) provide a travel system-wide unique identification (ID), ii) provide a secure signature mechanism system that certifies the transactions are done by the declared entities and iii) define a central authority that enables the secure exchange of IDs and signatures.

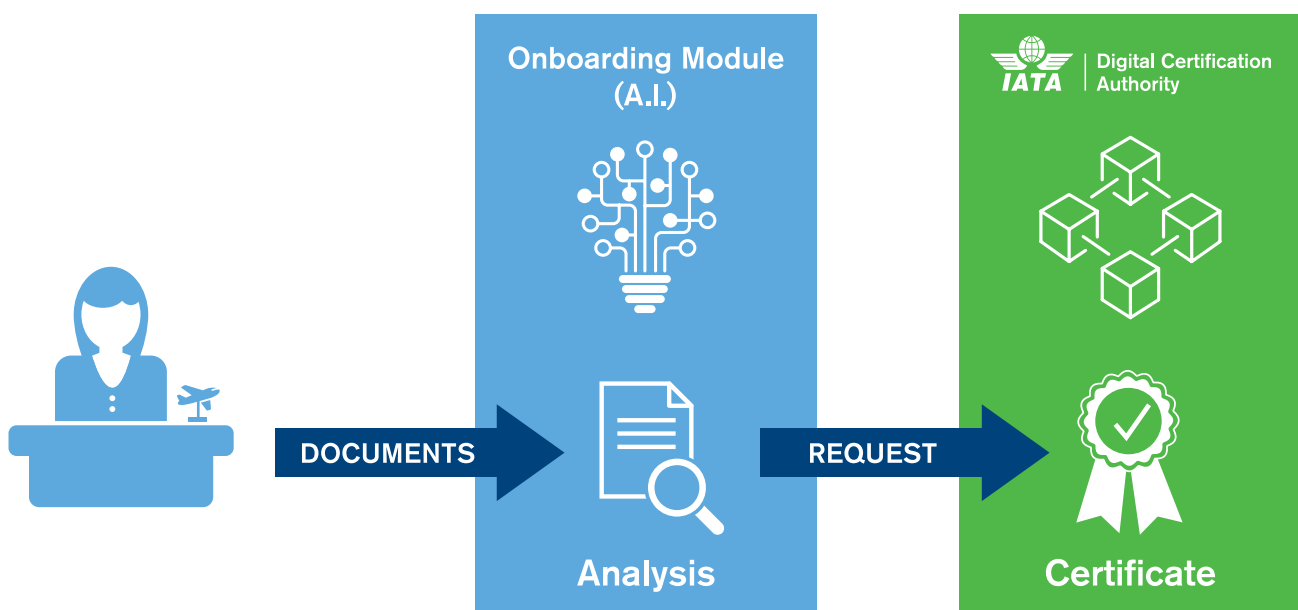
The main benefit of this DCA is that each party is uniquely identified in the travel industry and, at the same time, some basic level of trustworthiness can be established between parties.

We developed a proof of concept using the following entities: an airline, a travel agent and the Digital Certification Authority (DCA). During the process of shop/order/pay, the entities involved, after having registered with the DCA, can initiate and conclude transactions in an authenticated and uniquely identified way.

To start using the system, two transactions are needed:

1. Entity registration (enrollment), and
2. Entity validation

Ancillary transactions including (a) listing of the IDs by entity name, (b) ability to update information about an entity, and (c) removal/suspension of an Entity, will be discussed at a later stage.





Entity Registration

The Entity registration process will be done via the web in a self-serve way, automated as much as possible to reduce complexity, time to market, and registration cost. To achieve this, a module using artificial intelligence will analyze and validate the documents provided by the travel agents during their registration.

Entity registration is the process by which the entity submits to the DCA a request for an ID. Depending on the type of entity, being it a travel seller, buyer, intermediary or other, the system will require a series of documentation that will certify the entity is indeed what it is supposed to be. The type and number of documents required vary by geography and other factors. Using this documentation, the system can, optionally, determine the “trustworthiness” of the entity in providing the related service in being it to sell, buy, or intermediate travel products.

The documentation is optional, and, in the least stringent scenario of no documentation provided, the “trustworthiness” level is set to the bare minimum (level 0). While the IDs and trustworthiness are recorded in the DCA, for efficiency any additional information might be requested and recorded in separate parts of the system. For the PoC purposes, the trustworthiness is included in the scope of the DCA, however, for the MVP the DCA will only include the identity of entities. All other attributes (e.g. trust, credit, rating) will reside outside of the DCA.

Trustworthiness of an entity can be determined by (a) documentation provided, (b) history of success/failure of shop/order/pay transactions, and/or (c) a central authority (e.g. IATA).

During the enrollment process, after the desired documentation has been provided, the entity registering will receive back:

1. A unique ID, identifying the entity in the travel ecosystem, and
2. A pair of public key/private key, to be used to sign initial communication between

Entity Validation

After an entity is registered, it can perform shop/order/pay actions in the travel ecosystem using its ID.

The entity validation is the process by which an entity identifies itself, and the DCA certifies that the ID is legitimate. This transaction will be triggered when two entities - the sender and the receiver (e.g. travel buyer and a travel seller) want to perform a shop/order/pay of a travel product.

Each time a shop/order/pay request is initiated, the sender must sign the message with the certificate (i.e. private key) it has received from the DCA. Then receiver of the request can check the validity of the certificate by asking the DCA for more information about the sender. This process will ensure the entities involved can interact securely, knowing who exactly they are digitally communicating with.

The original shop/order/pay request will use the NDC standard and it will contain the (a) entity ID, that e.g. identify the buyer and the (b) message signature, that allows validation the entity ID and the message are legitimate. This pair can be validated against a DCA that will guarantee the entities involved are the one they declare to be.

The validation can be unidirectional, where the receiver will validate the sender (e.g. the travel seller validates the travel buyer to be who it is said to be) however, it might also be bi-directional, where the receiver will validate the sender, as well as the sender will validate the receiver. This is the case (e.g. when the travel buyer also validates the travel seller) so to ensure the seller is authorized to sell the offered travel product.

There can be cascading of Entities, where each Entity can have a parent Entity. This enables a hierarchy of e.g. the travel sellers and/or the travel buyers. Example of this is when e.g. a travel agency has sub-agencies. There is no limit on the number of levels of the hierarchy; the trustworthiness of the chain is dictated by the “least” trustworthy link. It will be the responsibility of the Receiver to navigate the chain of IDs and to determine the overall trustworthiness of the Sender.



Validation Mechanism

The validation mechanism (unidirectional) works as follows: the travel buyer sends an NDC request with its ID, and its public key and the message content encrypted with its private key to a travel seller.

When the travel seller receives the message, it will ask the DCA for the public key of the travel buyer using the given ID; if such ID is found, then the travel buyer is identified. The DCA will then return an acknowledgment including, the ID-related public key, the eventual parent ID of this entity, and its trustworthiness. The travel seller will use this Public Key to decrypt the signed message received from the buyer: if the now decrypted signature (containing the buyer Public Key) matches the Public Key of the buyer received from the DCA, then the travel buyer is recognized and validated.

Validation Outcome

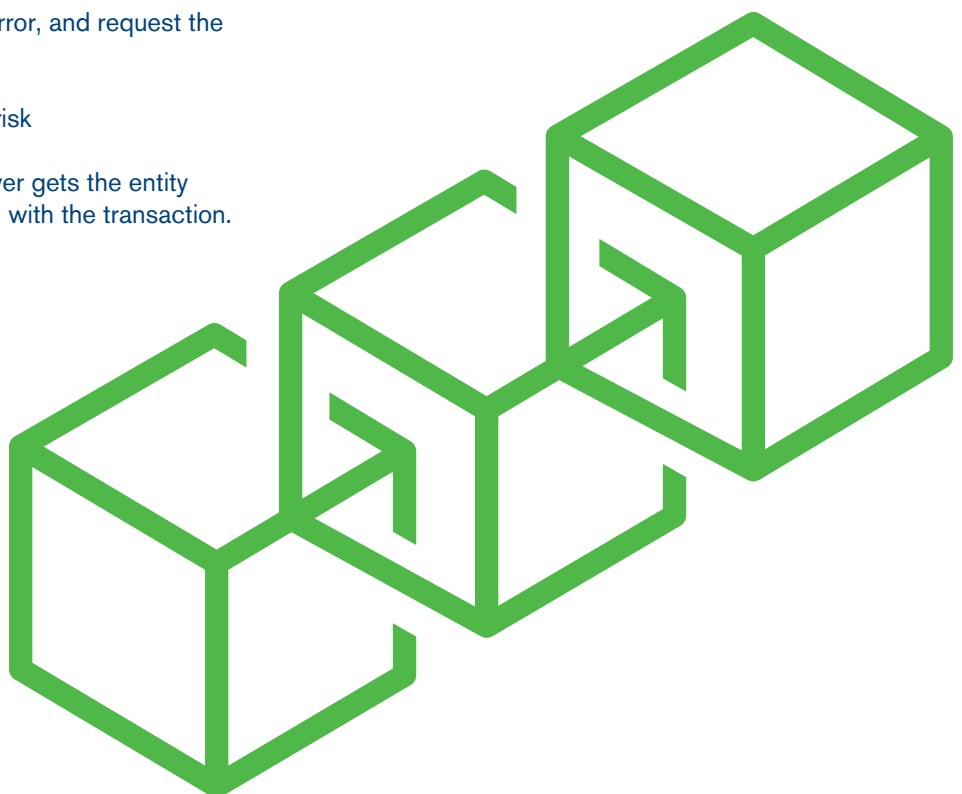
When the DCA is inquired during a shop/order/pay transaction, the following scenarios can occur:

- The entity is misrepresented: the public keys do not match, so the validation mechanism fails; the transaction should be interrupted at once.
- The entity is not recognized: this occurs if the DCA does not have the ID inquired, or the ID is missing from the original NDC request. In this case:
 - The receiver can reply with an error, and request the involved entity to register, or
 - Proceed anyway but at its own risk
- The entity is recognized: the receiver gets the entity “trustworthiness” and can proceed with the transaction.

Changes in the DCA

The DCA will be an efficient system designed for fast and high throughput storing for each entity, only its ID, the parent ID, private/public key, and trustworthiness (in case of the PoC). Anything else related to the entities will be stored in a separate system accessible by the entity ID (appropriate security mechanism will be in place to access this separate database).

A blockchain system is in place on the DCA to ensure tracking of trustworthiness and parent ID (ID and keys are immutable). A similar mechanism is applied to the related systems to ensure tracking of modifications of relevant information (e.g. entity name, address, bank account etc.).





Next Steps

Market/Industry Validation

After this year's PoC, we need to validate the interest from the industry and validate both the players scope (from airlines, agents, aggregators, etc.) as well as the level of granularity we want to identify different players (company, location, office, employee, computer, etc.).

Once this is validated, the relevant industry bodies will be requested to change required standards and IATA will put together a project to build the solution and drive industry adoption. This will include other IATA initiatives with identity elements like ONE ID, digital finance and the Travel Blockchain.

Project

During 2019, a Minimal Viable Product (MVP) could be delivered so that some airlines and agents can start doing business using the new "Global selling/buying IDs".

IATA is already the certification authority for many things (e.g. standards, codes). Now IATA is entering the digital era. IATA Digital Certification Authority (DCA) is a platform to facilitate digital ID management in the commercial aviation distributions space (e.g. agents, airlines, aggregators,

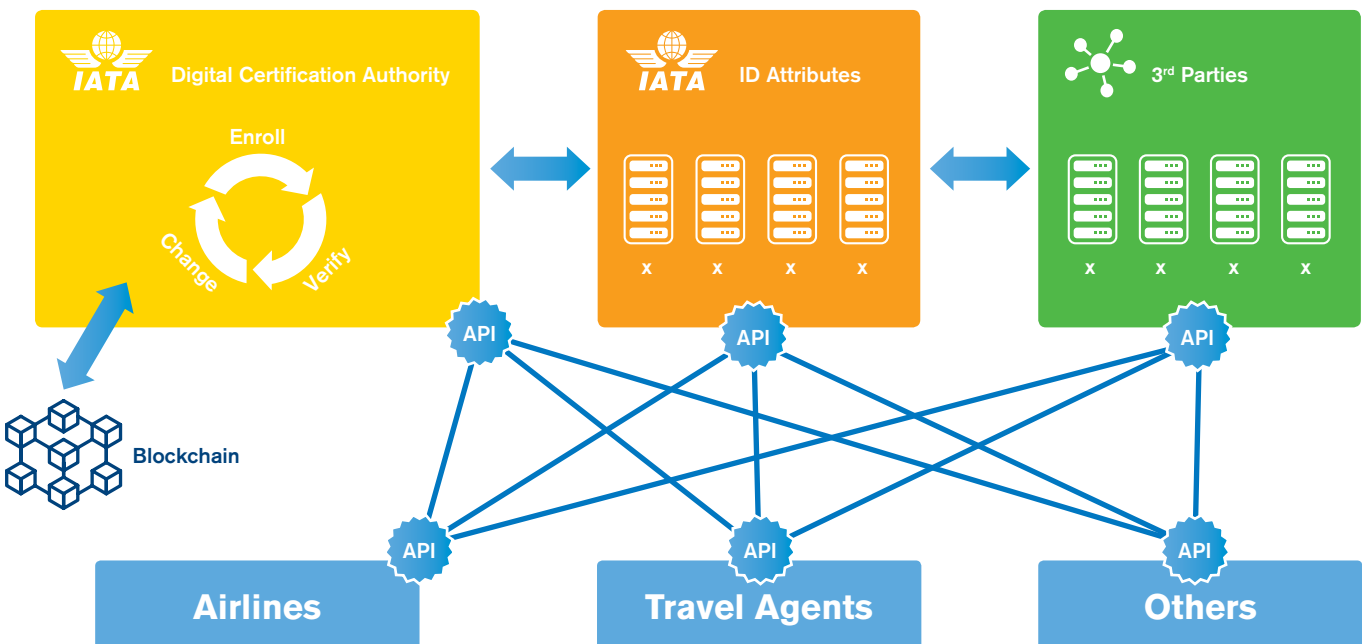
passengers, operations) leveraging emerging technology such as blockchain, artificial intelligence and biometrics. This platform is a critical requirement for adoption of NDC and ONE Order if IATA intends to maintain its BSP operations.

To the sustain our member airlines' needs, IATA can build a solution that will provide real time access to trustworthy high-quality data to enable partners in the value chain to do business in a safe and secure manner. (In a digital world you need to have assurance that you are doing business with a legitimate party).

The envisaged scope of the digital ID goes beyond just the identity of entities (agents, airlines, and aggregator) but also covers the identity attributes and the content being transported through the web.

The scope could include:

- Identity of entities (e.g. agent ID)
- Attributes of entities (e.g. agent accreditation status)
- Integrity of content (e.g. integrity of the offer)
- Availability of the certification verification engine
- Multi-Sales layers (e.g. a corporate tool for corporate bookings)





Vision

Codeshare relationships need to evolve for the future world of NDC interline and the implementation of ONE Order.

In today's world, codeshare agreements provide value to airlines, particularly in terms of overcoming specific challenges with the indirect distribution model and providing greater network reach. However, the proposition is complex and confusing for customers. For the airlines, the nature of the underlying technology is an obstacle to distribution, fulfillment and settlement for ancillaries across partners.

The intent is to move the industry to a retailer/reseller and supplier model with associated agreements for the supply and resale of products and bundles by extending the interline model to accommodate the benefits of the codeshare model without having its limitations.

This would enable a simpler and clearer experience for the customer, while being able to remove system and process complexity from our airline ecosystems driving cost reduction and enabling new revenue opportunities. Additionally, this simplification would enable airlines and non-air partners to become more agile when pursuing partnerships.

Moreover, the aim is to keep the current benefits, expand the ability to sell ancillaries across partners, simplify the concept and make it all more transparent for our customers as we enter a new retail-oriented world.

Current Situation

Interline agreements allow validating airlines to sell and service flights on other airlines. These validating carriers do not need to be a marketing or an operating carrier. A special case of interline is codeshare.

Codesharing is a marketing arrangement in which an airline places its designator code on a flight operated by another airline and sells tickets for that flight¹.

Current codeshare agreements enable a stronger level of partnership between airlines over interline agreements by providing partner schedule visibility, sales and servicing capability to marketing airlines that extend their reach to additional markets and schedules. Codeshare has a significant marketing value by extending the brand equity to flights supplied by an airline with less brand equity for the target market. Unfortunately, the extension of the brand creates a false expectation in the eyes of the passenger, who expects to fly a certain airline, and ends up flying another.

For an operating carrier with less brand equity in the target market or with less distribution ability, codeshare expands their usual customer base to include that of the marketing carrier, funneling their customers' sales into them and, with careful revenue management practices, can optimize revenue for connecting traffic.

Our vision is to redefine the concept of codeshare and evolve the commercial agreements between carriers.

¹ US DOT definition of Code Sharing.



However, these benefits for marketing and operating carriers come at a cost:

1. Customer Experience: Despite the fine print, customers may be rightfully confused when the airline they buy from isn't the airline they end up flying. Neither is it easy to decipher at which airline counter they need to check-in, or to which airline they can report any complaint for unfulfilled service, like a misplaced bag. In addition to this, the move towards "branded fares", bundles of flights and ancillaries, is adding confusion for customers because airlines want to differentiate themselves from competition with exclusive, non-generic names covering different offers that are not comparable.

2. Systems integration: Schedules, booking, servicing and settlement integration need to be worked through. A glitch in schedule synchronization can cause customers to not be aware of a potential misconnect.

3. Process complexity: Variations of codeshare exist where either the marketing carrier or the operating carrier may be responsible for PNR management – leading to additional complexity in codeshare messaging integration, both from customer and from airline perspective.

Example 1 Shopping for CDG-AMS-DXB on C9*/9A connecting to 9A

Courtesy of Travelport Digital

Example 2 Flight information display at CDG showing both C9 and 9A flight numbers

CDG T1 Domestic Departures					Tuesday January 1 2019	10:22
Time	Destination	Flight	Gate	Remarks		
09.45	Amsterdam	FR 3007	103	DEPARTED		
09.55	Amsterdam	AZ 357	2	DEPARTED		
10.55	Amsterdam	IE 8789	7	BOARDING		
11.45	Amsterdam	9A 1640	4	CODE SHARE/CHECK-IN		
11.45	Amsterdam	C9 2008	4	CODE SHARE/ CHECK-IN		
11.45	Amsterdam	BA 8789	4	CODE SHARE/CHECK-IN		
11.45	Amsterdam	OS 2011	4	CODE SHARE/ CHECK-IN		
11.45	Amsterdam	LX 8789	4	CODE SHARE/CHECK-IN		
11.45	Amsterdam	GF 2011	4	CODE SHARE/ CHECK-IN		

Courtesy of Travelport Digital



Case for Change/Recommendations

In a retailing world, the offer must be transparently described. To enable this, we need to move to a clearer definition of what is being supplied and by whom, so they can be clearly communicated to the customer.

To achieve this, we need to redefine codeshare by evolving the relationships that carriers have with each other. The key is moving towards a retailer/reseller and supplier model with associated agreements for the supply and resale of products and bundles. This will line up alongside the concepts envisaged with NDC Interline and ONE Order and extend to allowing airlines to specify through NDC concepts (e.g. airline profile, offers etc.) the level of other carrier involvement in fulfilling a request (e.g. interline, “codeshare”, alliance, joint venture).

These new agreements need to provide clarity on product, and the nature of the partnership. This introduces new and clear concepts of “retailing/reselling carrier” and “supplying carrier”. The “retailing/reselling carrier” responds to a customer request and generates an offer or set of offers

constructed from a set of products from one or more suppliers. In the simplest case, that supplier is just the “retailing/reselling carrier” itself. Where the products supplied to be part of those offers come from other airlines then those other airlines are a “supplying carrier”.

The IATA NDC interline standard will support this concept of joined agreement by the carriers at time of shopping. The IATA ONE Order standard will underpin this to facilitate both carriers’ understanding when a product has been delivered and consumed by the customer and from that, they both have an accurate understanding of what payments are due between them.

The customer would benefit from explicitly seeing product detail in their order. This would make it clearer to them what products they are entitled to, which products they will earn benefits on and who is responsible for the delivery of that product.

The table below documents some of the key features of codeshare today and illustrates how those requirements will be catered for in the future:

Why is codeshare used today?	How is this requirement met in the future of NDC interline?
To create a preferential display in GDS, as online connections have preference over interline connections.	Airlines have control over what is offered. Customers may choose to order displays based on a fuller set of parameters.
To allow a fare to price within existing industry fare selection rules, where it otherwise would not be.	Airlines have control over their own offers, and do not rely on third party pricing engines.
To provide the ability to sell a partner’s stand-alone flight, and have this priced and fulfilled within GDS.	Airlines have control over their own offers, and their own fulfilment. The airline determines what it is willing to sell and does not require a third party.
To simplify the complexity of Reservation Booking Designator (RBD) mapping and fare applicability in interline itineraries.	Airlines have control over their own offers, and their own fulfilment. The airline determines what it is willing to sell and does not require a third party.
To expand brand reach, extend the use of the airline designator beyond their own operating network, and build own product definition.	Providing clear and transparent information about interline itineraries reinforces the airline that is the “retailer” of the itinerary, while still disclosing who the operating airline(s) are, and what products and services will be offered.
To support passenger handling, and access to different product aspects (lounges, inflight food and beverage etc), especially where these services have become increasingly “unbundled”.	Providing clear and transparent information the products and services will be offered, both by each operating airline but also by the airline who is “retailing” the itinerary. This may also include identification of interline services such as through check-in and through-tagging of bags.
To provide special access to inventory beyond standard interline selling processes (e.g. Blockspace).	Can be controlled directly by business rules driving the request and response process, with better transparency of what is being requested and what can be provided.
To provide for different interline billing outcomes, or different commission calculations to the marketing carrier.	Interline billing values are established at time of shopping and interline and codeshare commissions can be established separately with every interaction.
To support Frequent Flyer Programme (FFP) reciprocity, and services linked to status (tiers) such as reciprocal lounge access.	Explicit product offering can be defined by the “Retailing” carrier with every interaction, and transparently displayed to the customer. Frequent Flier Program reciprocity (or services linked to status tier such as lounge entry) can form part of this offering.
To influence the outcome of selection rules (IATA Resolution or local regulations) determining baggage provisions.	The retailing carrier should not be able to enforce its own baggage allowance on the supplying carrier. This means that the baggage allowances of products/bundles being combined and offered to a customer must be transparent.



Solution

In summary, many of the requirements that are today fulfilled by codeshare can be easily fulfilled without codeshare within NDC interline processes. However, some changes will be required to allow airlines to better identify partners with whom they have a special relationship, i.e. a “honeymoon”.

In summary, for honeymoon relationships, the airlines would:

- Define a ‘reseller contract’ containing all the conditions of the agreement for the airlines but also the service to the customer. The contract would be standardized and digitized to cover all conditions like FFP, baggage, check-in, etc.
- Ensure that at time of sale the ‘customer facing conditions’ would be visible on airline.com, or on GDS for transparency. The airline specific conditions (revenue share, etc.) would be invisible to consumer but processed by the supplying and retail system for the DCS, revenue management, loyalty, etc.
- Explicitly explain the level of other carrier involvement in fulfilling a request e.g. interline, “codeshare”, alliance, joint venture. To make the life of consumer simple and make marketing easier we imagine the retailing airlines would create pre-defined ‘levels’ such as:
 - ‘alliance partner’ = FFP, lounge access, same baggage allowance, same level of service, same refund policy
 - ‘premium partner’ = FFP, different level of service, different baggage policy
 - ‘standard partner’ = like an interline plus a couple of small benefits
- Retain the “marketing reach” offered by legacy codeshare constructs through the new ‘reseller contracts’ through which they can then clearly advertise offers that extend to destinations beyond their own networks
- Enable a seamless experience for customers whose journey is fulfilled multiple carriers leveraging those carriers’ customer facing systems (web/app check in, seat selection, bag tracking etc.)

Note the red sections highlighting the partnership between Kronos & Athena - the clarity that Kronos is the carrier providing the offer to the customer and the clear representation of the Athena flight in the itinerary using a 9A flight number and the addition of a “Connection Guarantee” product from Kronos. Through this, the customer knows exactly what they will be buying and from whom.

Example 3 New shopping for CDG-AMS-DXB

Courtesy of Travelport Digital



Benefits

The benefits we expect to be delivered by this initiative include:





- Simpler and clearer experience for the customer throughout the journey (shopping, paying and experience)
- A new approach to commercial agreements between carriers that allow for explicitness in the products that can be supplied and then resold
- Innovation in the partner offerings that can be presented to a customer by a retailing carrier enabled by those new commercial agreements
- Removal of significant system and process complexity for the airlines
- A simple and clearer model, in line with ONE Order, for settlement between partner carriers
- Standardized contracts for different levels of integrated cooperation enabling quicker “plug and play” approaches for airlines wanting to join an alliance or build a Joint Venture. This will result in nimbleness for adapting to the competitive environment and easier welcome for small airlines and non-air partners
- Lower cost of service delivery as digital channels will be more effective requiring less human intervention

Next Steps

To progress this key simplification for the industry we need to:

- Explore changes to interline framework agreements through the relevant groups within the IATA standards governance
- Pursue the required changes to Offer and Order standards needed to support the new model
- Work with a trial set of airlines to explore how we could implement those new agreements

Example 4 Simplified Flight Information Display

Time	Destination	Flight	Gate	Remarks
09.45	Amsterdam	 FR 3007	103	DEPARTED
09.55	Amsterdam	 AZ 357	2	DEPARTED
10.55	Amsterdam	 IE 8789	7	BOARDING
11.45	Amsterdam	 9A 1640	4	CHECK-IN

Courtesy of Travelport Digital



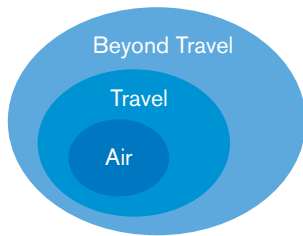
Vision

This paper dives into the opportunity that NDC APIs represent for airlines to sell more than air products. More generally, this paper examines how travel retailers – airlines, and travel agents, hotels and other emerging retailers etc. can leverage APIs and the associated API economy to sell more than just core travel components – transport, accommodation, destinations, etc. – to their customers and thus, offer a more comprehensive retail experience.

“Software is eating the world” said Marc Andreessen in 2011. Indeed, APIs are not new. Many corporations already use APIs or are planning to implement them. Data-rich industries (technology, media and information services) lead the way but APIs are also well established within the travel industry already.

Therefore, rather than simply just highlighting the business value of APIs for travel retailers, this paper is really championing a standard approach to the adoption of APIs across the travel value chain – arguing that only a standard/ collaborative approach will enable the industry to reap all the business benefits of APIs.

Project Husky - NDC Beyond Air

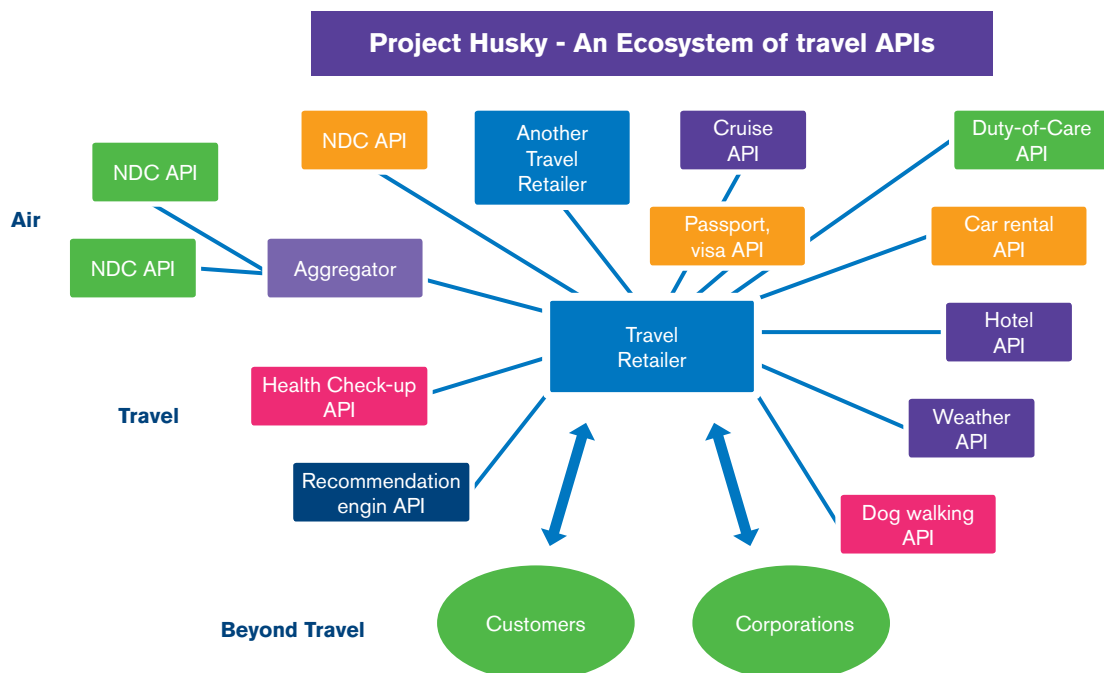


An API is a mechanism for exchanging data and/or sharing functionality between business partners. API stands for Application Programming interface and is the mechanism powering many of today’s web and mobile applications.

The value of APIs for the industry has already been examined; see for instance the following extensive study “Industry Direction for Open APIs – A discussion” available at www.iata.org/whatwedo/stb/documents/OpenAPI.pdf and the brief NDC InFocus 2-pager detailing how API can help airlines, available on the NDC site at <http://www.iata.org/ndc>.

The vision is to establish a customer-centric, digital travel ecosystem that connects airlines, travel agents, hotels and the myriad of other (travel) retailers – where APIs are the basic building blocks of the ecosystem. At its core, this travel ecosystem is powered by APIs. These APIs are modular, not monolithic. They are delivering the connected ecosystem.

The ambition is to grow a strong travel ecosystem with partners that repurpose, re-bundle, cross-sell, up-sell products, provide comprehensive retail experiences that the original travel supplier could not have reached alone.





Current Situation

Expanding NDC beyond air would allow for consolidation of the travel retail experience into a single point of interaction. From a customer standpoint, this allows for an entire trip (travel, accommodation, activities, food & beverage, etc.) to be managed from their preferred travel vendor. From a vendor perspective, this allows content providers to widen their distribution network and expands the breadth of products and services that each provider can sell.

Organizations are now part of a dynamic ecosystem. Pace of change, demands from consumers and competition are increasing. Everyone and everything is connected; there are billions of consumers connected now via tens of billions of devices (e.g. smart phones, tablets, TVs, cars, etc.). APIs are the fundamental building blocks of this ecosystem. They make existing capabilities accessible, so that it is possible to use them in new ways, quickly and easily. They provide new ways to reach customers, generate revenue and build partnerships.

Indeed, like most industries, the travel industry has fundamentally changed over the past 10 years, with online and mobile becoming primary channels by which customers interact with their travel suppliers. This adds significant complexity and costs. APIs provide a scalable answer to this complexity.

Customers are also demanding more from their travel providers. They want better travel options, more streamlined check-in processes, and better overall travel experiences. With the advent and wide acceptance of digital companies like Uber, Airbnb, Amazon, etc., customers are increasingly expecting real time information and service at their fingertips. That said, the travel ecosystem, spans many purchase decisions / interactions and these many travel retailers today only focus on a few of those services.

This leads to significant fragmentation, difficult travel management from a traveler perspective, and missed selling opportunities for travel retailers. For example, business travelers want/need a tool that not only books their travel in a customized manner, but also keeps their whole itinerary (including flights, hotels, car rental and many other aspects.) up to date as they make changes to their plans or indeed plans are changed involuntarily. And their company wants all of this to be integrated with their traveler tracking systems and their expense application.

Travel retailers must adapt to this new context. They need to easily share data with other travel providers, create new partnerships (possibly on the fly), and create new comprehensive travel experiences - APIs can help meet these challenges.

In summary, APIs help organizations deliver faster, more cost effectively and create new partnerships and revenue streams. Travel retailers that succeed will be those that adopt APIs, use APIs to provide comprehensive, end-to-end retail and travel experiences.

Case for Change

Airlines are moving from being travel suppliers to being travel retailers. NDC already allows them to easily provide their content through an API to third parties and/or internal digital solutions (e.g. airline.com, chatbot). Already, airlines can see the potential of APIs to sell more than just flights. Cross-selling, up-selling opportunities do not necessarily end with a booking. Airlines can use APIs to drive ancillary sales – more legroom, upgrades, etc. throughout the journey.

They can also leverage APIs from partners to further improve their customers' travel experiences. For instance, some airlines make the actual transportation to/from the airport to destination easier via APIs. Integration with taxis, car services ensures that a car is always ready for a passenger when he or she lands.

Airlines are also leveraging APIs to enter into partnerships with hotel chains for instance, offering shopping and servicing of both hotel and flight on their respective APIs. As a direct result, these airlines and hotels are able to offer a more comprehensive shopping/booking experience; something customers are keen on.

Travel retailers can even look outside the travel industry and leverage non-travel APIs and offer new partnerships to offer differentiated services; e.g. dog walking, pet-minding services while the traveler is away from home. Already, they can integrate with business apps to make expensing a trip easier for a business traveler.

In summary, the case is clear; airlines and other travel retailers are already experiencing the potential of APIs. This "Project Husky" concept strengthens individual business cases for NDC by creating new revenue opportunities. However, only a standard/systematic approach will really allow the travel industry to scale its efforts in this area and reap the full benefits APIs can bring and do so in a cost-effective manner.

For travelers, consumers, "Project Husky" gives them access to whatever they need – beyond air, beyond travel. Customers could now have access to all their travel/non-travel products via their preferred travel retailers; either travel agent, hotel, airport or airline.



Solutions

We have been exploring three promising areas:

- a) **Adapting the NDC standards** – In order to enable the sale and servicing of non-air products, NDC could move its original focus beyond air products and services. For instance, NDC messages could be fine-tuned to allow the sale of hotels, activities and niche products like health/passport-checks. Adapting NDC like this will allow airlines themselves to become true travel retailers. It could also allow other travel retailers (e.g. hotel, cruise) to sell and service air products. A win-win proposal.
- b) **Collaborating with the Open Travel Alliance (OTA)** – Demonstrate that NDC and OTA messages can be integrated; ensure that an airline's NDC API can sell and service hotel, car, rail products etc. (supported by an OTA API).
- c) **Evangelize NDC Offer and Order Management concepts** to non-air travel providers.

Proof of concepts

We have worked on two PoCs.

In the first PoC, the main goal has been to test the feasibility and usability of the NDC standards for non-air content; as well as to test the business process and flows with several different stakeholders and integrators.

In this PoC, the airline (Finnair) pushes non-air content, through its NDC API, to its chatbot (also powered by NDC). Non-air content is sourced either directly from non-air providers or from a 3rd party repository. Examples of non-air content are husky sledding, Arctic ice swimming, and city tours.

This non-air content is then entered into Finnair's shopping/merchandizing engine (Amadeus product) and published through Finnair's NDC API to Finnair's NDC powered chatbot (powered by Caravelo). The chatbot is then trained to sell the non-air content in a customer friendly way.

When a customer buys the product, a SSR is created in the PNR, as well as an order in the central repository. Fulfillment happens between the third-party repository and Finnair directly. Customer service is also handled directly between the customer and the non-air provider.

In general, the POC was successful and will be produced/expanded to include more products. These products will also be implemented into Finnair's direct channels (non-NDC). Skyscanner will join the POC next, ingesting non-air content through Finnair's NDC API.

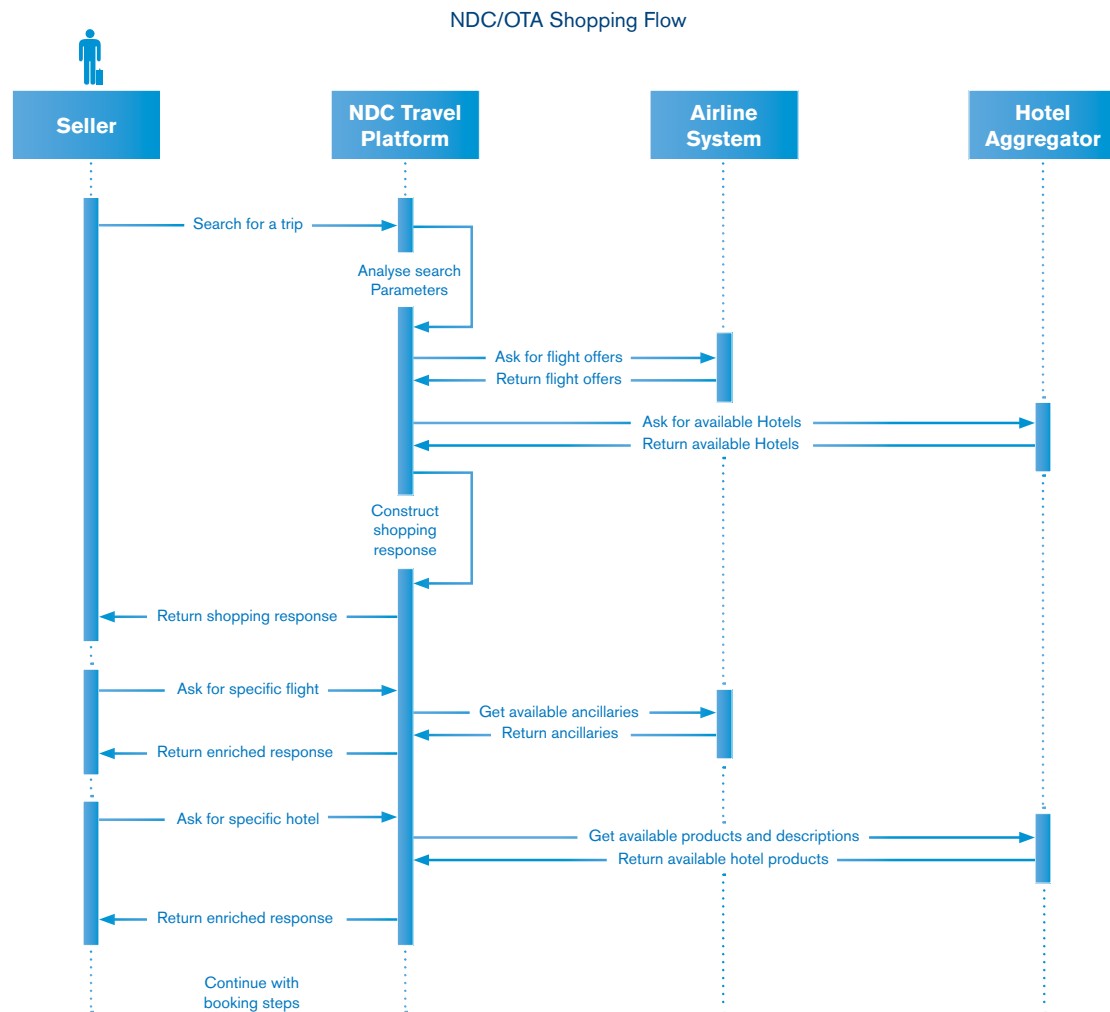
Lessons learned and future considerations:

- The EU package travel directive needs to be considered for these types of sales
- Booking process automation is proven to be complex and some manual processes had to be adopted for the PoC
- ONE Order is needed to simplify delivery, accounting and settlement between partners
- Post-booking process and flows (e.g. refunds) should be a key consideration moving forward
- Partners need to live up to the airline's customer experience standards

The second PoC is a collaborative effort between NDC and OTA, with support from JR Technologies and Links Rez. The goal of this PoC is to demonstrate how the OTA and NDC models can integrate and, how the OTA entities; e.g. hotel reservations, could fit in the NDC use cases and flows. This approach will enable NDC actors to sell and fulfill air and non-air products, in a standard manner.

We have considered the following design items:

- Create a common query interface that can filter flight and hotel offers at the same time
- Propose a generic TravelShopping request / response message pair with offers for any type of product
- Generalize the current NDC service definition to use only generic concepts for the description of the product and create specialized types for each different product type i.e. flights, room plans, hotels, seats, bags
- Push any other air related attributes from the offer level further down as part only of the air related products
- Follow the same approach above for the creation and the description of an order
- Integrate OTA defined types for the description of hotel related products



The NDC-OTA PoC supports the following main use-case:

1. Search for flight and room
2. Get offers for flights and à-la-carte offers for hotels
3. Select flight and hotel
4. Get further offering for the selected flight and details on room offers for the selected hotel
5. Add personal details and create a single order with the selected products

The following use-case is also implemented:

1. Search using flight criteria
2. Use merchandizing rules to push hotel products based on the flight criteria

Next Steps

Given these two successful PoCs, the key next steps will include:

- Further discussion/collaboration with OTA and other standard bodies to ensure that our standards / models can interoperate
- Take outcomes of the two PoCs to industry standard forums and champion evolution of the NDC schemas so that they can support non-air products and services
- Additional engagement with non-air suppliers and advocate the core NDC concepts of Offer and Order Management. Having true order management capabilities across all travel suppliers will simplify fulfillment and servicing



Vision

Disruptions are an unavoidable part of every airline's operations. Research shows that customer satisfaction — measured by Net Promoter Score (NPS) — is significantly lower for passengers experiencing disruptions.

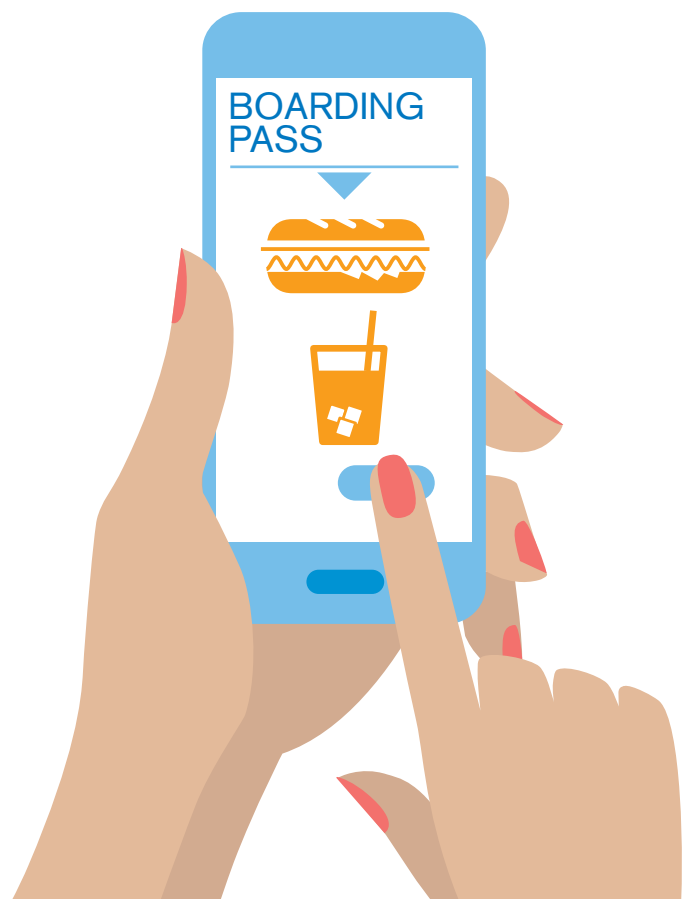
Airlines and their technology providers have made significant strides in managing automated re-accommodation of disrupted customers to alternate flights that get them to their destination. In this paper, we look at additional services crucial to assisting disrupted customers. A key lever is to take care of customers, providing them with food and accommodation, covering their basic needs on the spot. In some areas/countries this is regulated as a legal obligation; however, most IATA airlines often go beyond the legal minimum to keep their customers loyal and avoid negative commentary on social media.

In these cases, complimentary meals are provided to customers through existing restaurants, bars and food stores at the airports. Customers usually present a voucher as a form

of payment and a form of identification, to get their service delivered at the expense of the airline issuing the voucher. Vouchers must be recognized and accepted by the point of sales at the airport, which means individual agreements between airline and each shop must be concluded long before the disruption occur.

However, during disruptions, the distribution of vouchers can be a stressful and time-consuming experience. Anxious customers must stand in long queues to receive these paper vouchers.

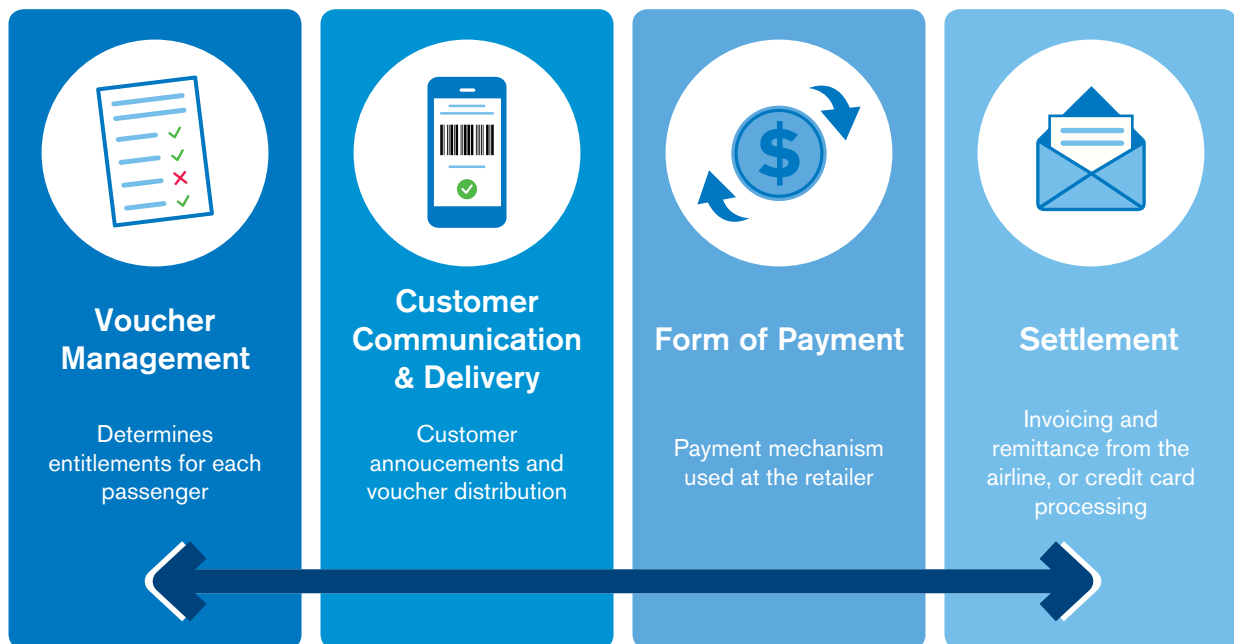
Our vision is to dramatically simplify the process of distributing and using vouchers by enabling passengers to use their boarding pass to pay for these services. Using a widely available document like the boarding pass eliminates the need for manual distribution of vouchers and empowers passengers to be in control of their airport experience during a stressful disruption.





Current Situation

An IATA airline survey conducted by the Think Tank provided a perspective on how meal vouchers are managed today. The four key capabilities are described below:



Voucher Management

- Airlines manage rules for compensation commensurate with the extent of disruption and the customer profile
- Vouchers are issued based on pre-defined rules

Customer Communication & Delivery

- Disruption communication takes many forms – usually announcements by airline staff, airport displays and digital notifications
- Delivery of vouchers are usually manual from customer service counters, but kiosks and mobile delivery are also prevalent

Form of Payment & Identification

- The paper or electronic voucher is shown to the retailer at time of purchase, often along with government issued identification
- The vouchers may contain a virtual credit card that can be used by the retailer as a form of payment

Settlement

- If virtual credit cards are used, retailers leverage traditional credit card settlement
- Without such cards, retailers collect paper vouchers and invoice the airline for payment that can be used by the retailer as a form of payment

For manual vouchers, a key pain point for customers is locating customer service counters at an unfamiliar airport, queuing up for considerable amounts of time for paper vouchers to be issued. Digital vouchers help alleviate this issue – but during international travel, not all customers have access to smartphones, and even those with smartphones do not always have adequate internet connectivity.



Case for Change




The key strategic imperatives driving our approach are:

- An easy and efficient process for customers to receive and redeem vouchers
- A simple process for retailers to join as suppliers, enabling more choice for customers
- A solution that can be a global standard across all IATA airlines and the airports they serve

The vision was to develop an extensible technology framework that improves the customer experience during disruption and simplifies collaboration across a vibrant ecosystem of retailers and airlines at a global scale.

With the right framework in place, additional commercial opportunities open – from marketing offers from airport retailers to creating a platform for new retail technology solutions.

When implemented, the solution would bring benefits to all three stakeholders involved:

 For Passengers	 For Airlines	 For Retailers
<ul style="list-style-type: none"> ▪ Knows they have redeemable value ▪ Knows the amount ▪ Knows where they can spend it ▪ Doesn't need to queue ▪ Doesn't need to apply or request - push model ▪ Works offline or in mobile 	<ul style="list-style-type: none"> ▪ Improved customer experience ▪ Full control of refund and voucher policy ▪ Reduce staff handling times, especially in IROPS ▪ Minimize financial cost ▪ Liability is countable and time restricted ▪ Benefit from breakage ▪ Can agree commission with retailers ▪ Minimal fraud risk 	<ul style="list-style-type: none"> ▪ Consistent integration ▪ Low Friction Checkout / Quick Scan ▪ Minimal Staff Training ▪ Improved customer experience ▪ No charge backs or liability, minimal fraud

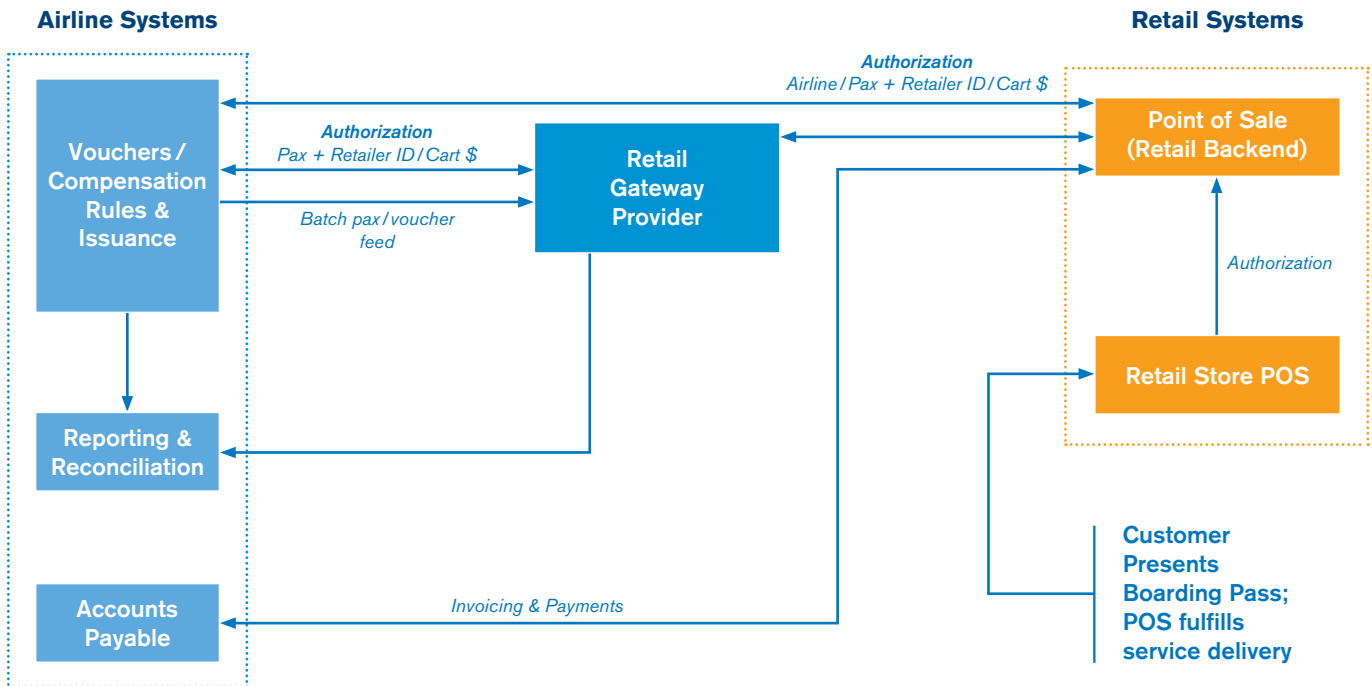
Solution

The solution approach tries to implement this vision while addressing some potential challenges:

1. Integrating thousands of retailers with hundreds of airlines is not an easy task without standardized messaging and retail marketplace/intermediaries
2. It is not feasible for airlines to push out lists of passengers and their voucher amounts to all possible retailers that a passenger might transact with

We address these challenges by:

- Focusing on integration between retail point of sale system (POS) technology providers and airlines
- Proposing standardized messaging between POS systems and the airlines
- Enabling a market for “retail gateway providers” to participate – to help airlines as well as retailers integrate with each other efficiently and go to market faster
- Keeping options open for invoicing and settlement between retailers and airlines



In the figure above:

1. The participating airline and retailer reach an agreement to partner together.
2. When a passenger is disrupted, the vouchers / compensation system within the airline manages the list of passengers and their entitled voucher amounts.
3. Airline staff may announce the entitlements to passengers or send follow-up notifications (apps, emails, etc.) to the passengers, indicating that they can use their boarding pass to pay for food and beverages at the airport.
4. A customer presents her/his boarding pass at a retail store. The retail POS backend sends a standardized authorization message to the airline, providing information from the boarding pass along with the retailer's identity and the cart amount that needs to be authorized.
5. The airline responds with an authorized/declined message based on the remaining balance of the voucher compared to the cart value passed along from the retailer.
 - a) To support common retail practices, CANCEL and REFUND messages will also be enabled in this framework, along with partial usage of funds.
6. The retailer completes the sale using an "invoice" form of payment along with other forms of payment collected from the passenger for any overages.
7. The airline voucher system would notify the customer electronically of the remaining balance in the voucher.
8. The airline reconciles the entitlements, with the invoicing from the retailer and remits payment to the retailer.

As quick and easy **invoicing, settlement and payment is** key to promote adoption by the retailers, IATA SIS² can be leveraged to simplify settlement.

² Key factor of success for retailer payment are A/ easy enrollment of the shop, as the shops can be very small companies, and capabilities will be used on non-regular basis and B/ very quick payment (within 10 days would be considered as acceptable)



Retail Gateway Providers

A Retail Gateway Provider can simplify this flow by allowing airlines to reach large amounts of retailers across airports around the world, and by enabling retailers to attract business from several airlines, without each airline and retailer having to implement point-to-point integration.

In the scenario above, a retail gateway provider may be involved in bringing these parties together and sign agreements with each entity. POS systems could dispatch the same standard authorization message to a single retail gateway for all participating airlines. Retail gateways have two options in this scenario:

1. They can authorize the sale with the airline's voucher system in real-time – using the same standard message.
2. Airlines could batch load the impacted passengers and their entitlements to the retail gateway provider – and when the retail gateway gets the authorization message from the retailer, could respond to the request without polling the airline systems.

Reporting from retail gateway providers will need to be reconciled with the invoicing from retailers prior to airlines issuing payment.

There are companies that are beginning to play a similar role today – and we anticipate standardization of integration and messaging would improve the efficiency with which they onboard airlines as well as retail partners.

Role of Order Management

While it is feasible to extend ONE Order to play the role of a voucher management system, the Think Tank opted to leave that decision at the hands of airlines. Most airlines have an internal process and system to manage vouchers today – and the focus of this group was to promote global adoption by minimizing the impact on airlines and retailers.

Application to Hotels and Transportation Providers

The solution described in this paper can be extended, with a few enhancements, to transportation providers with a similar authorization system leveraged by transportation network providers (like Uber) or taxi companies to pre-authorize the ride. In the case of a taxi company:

1. The passenger would present the boarding pass to the driver
2. The driver contacts her/his company and provides the name, location and destination of the journey
3. The company gets a pre-authorization of the anticipated charge against the airline's voucher system – or from the retail gateway.
4. At the end of the journey, the exact fare is authorized
5. The invoicing and settlement patterns are similar

For hotels however, there are some unique needs:

- Handling different segments of customers by level / hotel category
- Volatile inventory of available rooms in a local region, especially for a large disruption
- Managing hotel booking

Due to these specific needs, a boarding pass or a retail gateway is unlikely to play a significant role in simplifying the process of searching and booking hotel rooms for disrupted passengers. At best, the boarding pass plays a role in identifying the passenger at the hotel, during check-in.



Next Steps

In 2017, airlines connected 20,000 cities together around the world. As travel brings the world closer together, focusing on simple, effective methods of helping passengers during times of disruption can help improve the customer experience.

Effectively solving the complex problems of serving customers across thousands of potential retailers working with hundreds of airlines requires three ingredients:

- Incentives – enabling retailers, gateway providers and airlines to increase sales and improve customer experience
- Market – enabling airlines to tap into retailers at scale by leveraging retail gateway providers, enabling retailers to benefit from additional business opportunities
- Flexibility – leaving room for extensible solutions for automated settlement or expansion into other retail sectors beyond food & beverages that can be accelerated by the same foundation

As we look ahead, we have identified opportunities to take this idea forward:

1. Create a workgroup to standardize integration and settlement between retailers and airlines.
2. Partner with retail POS technology providers and airlines to conduct a PoC. Existing retail gateway providers will also be contacted.
3. New revenue opportunities: extend this concept towards Marketing Couponing purposes, including specific boarding-pass like coupons that do not allow to pass security checks.



Conclusion

IATA realizes the importance of the industry becoming more like retailers and moving towards digitalization. Through programs like the AIR Think Tank, IATA is leading and supporting the industry in the path towards the future. With a focus on innovation with speed, our industry needs to move full speed forward.

The airlines participating in the Think Tank are also leaders and fully onboard with the shared vision. It is important that more airlines join the effort, either through the Think Tank, or other similar exercises and processes to ensure we move forward together.

In 2019, we will build off the great momentum initiated in 2018 and encourage the industry to get involved.

The 2018 team is excited to present the ideas and proofs of concepts at the 2018 AIR Symposium and will be retaining key points from the discussions to incorporate into and improve the 2019 version of the Think Tank.

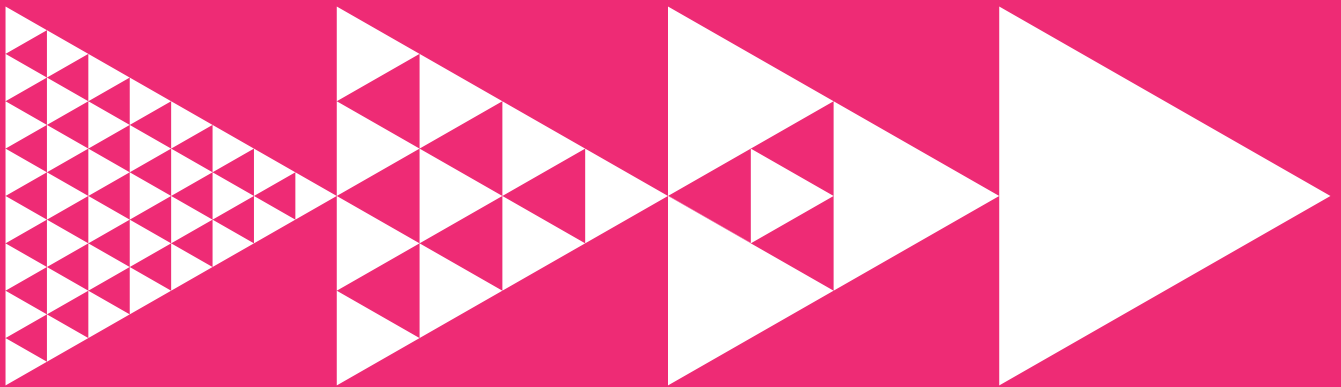
In addition, the progress of existing ideas will also be monitored and communicated in future White Papers.



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A special thank you to the contributors of this paper.

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