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Addressing the Volume Problem in NDC

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Contents

Introduction

There has been a great deal of interest lately in the potential problem that NDC traffic between travel sellers, airlines and intermediaries will be too much to handle economically in the available systems. In truth the problem is not only one of communications capacity but the more costly computing resources needed to support the volumes of offers that may be generated.

This paper has been produced by T2RL to consider the problem and to assess some existing proposals that have been put forward by industry players. It also considers the proposition put forward by Amadeus that substantial take-up of NDC distribution would put unsustainable stress on NDC offer management systems.

Context

Amadeus published a paper entitled "Scaling NDC for the digital travel players: The NDC Offer Repository" in July 2022[1]. This proposes the creation of a large repository of pre-built NDC offers to serve travel inquiries "at the top of the funnel". These are defined as early-stage inquiries that are unlikely to lead to immediate order creation. In large part the Amadeus paper reflects a proposal called "Project Robot" which was made in the IATA Airline Industry Retailing (AIR) Think Tank paper in 2019[2].

Shortly afterwards ATPCO announced the creation of an NDC Order Posting Service. Although this is addressing a different set of problems it involves the creation of an NDC order repository which shares some characteristics with the Amadeus proposition around offers. At the same time ATPCO has convened a working group to address the commercial, technical and architectural issues around the growth of NDC networks.

The basic premise to be considered is that there are many NDC shopping requests that are a) anonymous and b) repeated many times, for which the results could be stored in an online repository. An offer repository would allow such requests to be serviced rapidly and without placing additional burdens on airlines' inventory and pricing systems.

[1] https://amadeus.com/en/insights/blog/introducing-ndc-offer-repository-solution-ndc-scalability-challenge

[2] https://www.iata.org/contentassets/a356383b9fad4161929ea98b82d6500a/air_tt_whitepaper_2019.pdf

Fundamental Issues

Since its initial announcement in 2012 the core proposition of NDC has been that all shopping requests should be served in real time from an airline's offer management system (OMS). Without this some of the key value propositions of NDC such as dynamic pricing, bundling and personalisation of offers are effectively impossible to deliver.

Set against this is the assertion that as volumes of NDC queries rise it will be impossible for OMSs and networks to keep pace with demand at an acceptable cost.

There is significant tension between these two positions and both need to be tested in order to determine the best way forward for the industry.

Testing the Premises

Offers Must be Made in Real Time

NDC shopping requests are very versatile in terms of the information provided to the airline. At the most basic level they may be made anonymously with minimal information provided about the ultimate customer or the travel seller. Even at this level though some information may be inferred about the location of the seller and the currency to be used for pricing. The exact flight selections and combinations will definitely affect the pricing of offers driven by modern revenue management and inventory systems regardless of the identity of the shopper. Offer pricing may also change rapidly, especially for offers made shortly before flight departure.

Amadeus's paper proposes the creation of a repository of offers that may be stored and reused to serve anonymous shopping requests. While this is superficially attractive there are several potential pitfalls.

- There would need to be an orchestration capability that decided which shopping requests could be served from the repository and which must be routed to the airline. The rules for this orchestration are unlikely to be simple.
- The NDC standard requires every offer to have a unique OfferID. This is then used in the order creation transaction. Airline order management systems would need to be adapted to allow multiple orders to be created against the same offer.
- Offers in the repository would have to have an expiration date and time. This is unlikely to be a simple calculation that is valid for every offer.

- Offers held in the repository may no longer be valid when the seller attempts to create an order. If this happens at a significant rate it will reduce confidence in the airline and its selling systems.

These are all arguments for continuing with the assumption that all offers are created in real time in response to shopping requests. For there to be significant savings in processing and therefore cost, the proportion of requests that could be served from a repository would need to be high. Exactly how high would be determined empirically based on experience.

The premise of the Amadeus paper is that there is a substantial number of "early stage" requests made by customers who have not crystalised their requirements and are in effect "shopping around". In practice this would largely be discretionary travellers using online travel agents. Corporate travellers served by TMCs generally have much less flexibility in their plans and are also likely to be accessing TMC and corporate negotiated fares which require them to be identified at the shopping stage.

Based on our understanding of NDC shopping behaviours we agree that there is likely to be a subset of offers that may be reused after storage in a repository. In order to justify the cost of creating and maintaining the repository there would have to be many millions of NDC shopping transactions per airline per day. The exact number is subject to evaluation based on experience that does not yet exist. A very large number of NDC shopping requests will continue to have to be served in real time if the benefits of the standard are not to be lost.

Offer Management Systems Cannot Handle the Volumes

There are two separate but related questions to be addressed here. Is it physically possible to build an OMS that is capable of handling an arbitrarily large number of transactions, and is it economically sensible to do so?

The answer to the first question must surely be positive. In recent years airlines and their technology providers have followed global trends and moved their processing requirements into the cloud. By doing so they have access to computing resources that are to all intents and purposes infinitely scalable. There are no obvious physical constraints on transaction volumes.

The picture is not so simple when it comes to economic constraints. Amadeus and some other PSS providers have sought to compensate for diminishing GDS revenue by increasing the cost of shopping transactions against the PSS. If the airline's OMS depends on access to data in the PSS then the costs of serving NDC offers could become prohibitive. Hence the proposed repository in the Amadeus paper may be addressing a problem that Amadeus (among others) has created by its own commercial policies.

This prompts the further question "Is the high cost of queries against the PSS based on actual technology costs incurred by the providers or is it due to excessive charging for these transactions?". Is the need for an offer repository real? If the PSS vendors are unable or unwilling to moderate their pricing, could there be an architectural solution that reduced the need for the OMS to initiate transactions against the PSS?

Open Questions

If we assume that the case for an offer repository is sound there remain a number of open questions that are not fully addressed in either the Amadeus or the IATA paper. These need to be examined carefully before any commitment to proceed with a development.

How would transaction flows to and around the repository be orchestrated?

A smart orchestration layer seems to be required and the IATA paper has more detailed thinking on this than does the Amadeus one. Who would build and operate this layer? Would it be embedded in the repository or created as an architecturally separate application? How would connectivity between the layers be managed? Would IATA define an open standard?

Is the ideal architecture for a repository multi-tenant or should each NDC airline have its own? If multi-tenant who should own and operate it?

Amadeus no doubt intends there to be a single repository to serve the whole industry and that Amadeus would be the ideal entity to own and operate it. The risks inherent in placing a critical piece of distribution infrastructure into the hands of a commercial enterprise with limited incentive to minimise costs for the airlines should be self-evident.

What would be the business model for such a repository? Would the airlines be charged for storing offers or for serving them from the repository or both?

In the first stages of GDS deployment in the early 1990s costs were shared between travel agencies and airlines. Gradually that model shifted to one in which airlines shouldered the

whole cost of the service and agencies became net recipients of funds. Any offer repository would have to have a business model that was attractive to the airlines and which had safeguards against unwelcome evolution over time.

How would the industry avoid having the ownership and management of the repository become a new distribution bottleneck whose proprietor could demand unrestricted charges from airlines?

One solution to this question would be to have the repository owned and operated as an industry utility by an airline-owned body. ATPCO might be the most obvious candidate but there could be others.

If a repository becomes established will the stored offers effectively become the new "filed fares"? How would this impact existing processes around fare filing and storage?

An industry that switched to 100% NDC for its indirect distribution would not need filed fares at all. This has long been noted in the industry working groups but it has been equally observed that such a state of affairs is unlikely to arise for a very long time if at all. A sufficiently heavily-used offer repository could effectively take the place of filed fares, provided the data within it was consumable by those with a legitimate need to do so.

Who owns the data?

A repository of NDC offers that achieved a high level of market coverage would be a fantastically valuable store of data for use in revenue management, network planning, marketing and no doubt other activities within and outside airlines. It is vitally important that ownership and access to this data resource be established in a way that is equitable to all parties involved before the repository enters service.

Conclusions and Next Steps

Amadeus has made a proposal that is based on arguments that are plausible but far from proven. Before taking any concrete steps towards establishing an offer repository it is vitally important that interested parties including airlines, agencies and technology providers fully understand the proposition and its implications.

ATPCO has created a working group of its airline members to examine the issues around the growth of the new distribution capabilities. This would be an excellent forum to

consider this set of issues among many others. In broad terms there are at least three potential solutions to the volume challenge:

1. Each airline builds an offer management environment that has sufficient capacity to accommodate the volume demands placed upon it
2. One or more offer repositories are created to cache anonymous offers along the lines of the Amadeus proposal
3. One or more intelligent network nodes are created to generate or finalise offers on behalf of airlines. The specification and ownership of such nodes would need to be agreed across the industry.

These potential solutions may not be mutually exclusive. It is possible to project a future in which all three solutions co-exist in a hybrid offer network.

T2RL does not believe that there is yet sufficient data to establish a clear way forward. We would support an assessment of the merits of the proposal by a group of experts from the different sectors of the industry. In this respect the ATPCO working group offers a vehicle by which this could happen in a timely and well-managed way.

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