NDC Payments: reference architecture and process flows

October 2016
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Agenda

• A. Executive summary

• B. Context and Methodology

• C. Reference architecture and payment workflows
Estimate of merchant fees
– Current situation: $6.0bn of card merchant fees paid by airlines


Other channels (including direct): $210bn
ARC: $88bn
BSP: $219bn

60% card penetration
90% card penetration
32% “card” penetration

Card Merchant fees
$2.8bn + $1.7bn + $1.5bn = $6.0bn

Note 1: assumes merchant fees represent 2.2% of pax revenue for card transactions (source: Financial Think Tank: Supporting Airlines Achieving Sustained Business Health)
Note 2: card penetration is calculated as the % of BSP “card” transaction amount when airlines are the “merchant of record” (hence pay merchant fees)
Source: IATA
It has been hard for airlines to manage these merchant fees because of the complexity of the payments ecosystem.

A. Executive Summary

Note 1: PSP stands for Payment Service Providers
Note 2: the umbrella term ‘Travel Agency’ includes Online Travel Agencies (OTA)
First reason for airlines to better manage payments: 4 key structural changes in the payments ecosystem (mostly in favor of airlines)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>• Multi-channel purchases (e.g. social media payments such as Twitter)</td>
<td>• In-app payment via the buyer’s mobile (e.g. Apple Pay)</td>
<td>• Reduction in interchange fees (esp. in the EU)</td>
<td>• PayPal, Google, Amazon, Apple, Alipay, etc.</td>
</tr>
<tr>
<td>• Expectation for simple and fast customer experience (e.g. Uber)</td>
<td>• Mobile / tablets as a mobile Point of Sale for airline staff</td>
<td>• Ability to surcharge (varies by country)</td>
<td>• Real-time / instant bank transfers (e.g. Faster Payments in the UK)</td>
</tr>
<tr>
<td></td>
<td>• Contactless cards (based on NFC technology)</td>
<td>• Many other regulatory changes in payments (esp. in the EU)</td>
<td>• Virtual cards</td>
</tr>
</tbody>
</table>
Second reason for airlines to better manage payments: NDC will enable airlines to meet their payments-related objectives

### Key airline objectives for NDC payments

1. Lower fraud
2. Agility in terms of e.g. payment methods accepted, payment flows options, etc.
3. Lower cost of payments:
   - Lower internal airline costs
   - Lower merchant fees
4. Increase in revenue / market reach
5. Build different offers depending on each payment instrument

### Guiding principles for NDC payment workflows

- Leveraging existing infrastructure
- Remaining aligned with regulations
- Preventing additional requirements to become PCI DSS compliant
- Integration of emerging payment methods
- Minimising negative impact on customer experience
Multiple payment connectivity options for maximum agility applicable to all use cases

**A. Executive Summary**

Simplified overview of potential payment workflow options

- **Travel Agency**
- **Direct or via aggregator (A1)**
- **OMS**
- **Inter-PSP platform**
- **Option B**
- **Option D**
- **Airline’s PSP**
- **Airline’s Acquirer**

**Note:** OMS = Order Management System
Improvements from NDC payments: flexible technical options and more efficiency, lower fraud and increased revenue / market reach

NDC improvements related to payments across priority use cases

<table>
<thead>
<tr>
<th>Use cases</th>
<th>NDC improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. E-commerce “unsecured” card transaction (“Standard” card acceptance via travel agents)</td>
<td>Streamlined / efficient card acceptance (similar to online direct card transactions)</td>
</tr>
<tr>
<td>2. E-commerce “secured” card transaction (card acceptance with 3D Secure via travel agents)</td>
<td>Ability for airlines to deploy 3D Secure for travel agency sales</td>
</tr>
<tr>
<td>3-4. Alternative form of payment transaction (wallet / bank transfer acceptance via travel agents)</td>
<td>Higher conversion rates / incremental revenues, and lower fees in some cases (e.g. iDEAL)</td>
</tr>
</tbody>
</table>

Note: this document is only focused on use cases when the Airline is the Merchant of Record (MOR) for sales via travel agents. In addition to these use cases, BSP “cash” and IATA EasyPay (IEP) will be two other alternatives not covered in this document.
Use case 1: e-commerce “unsecured” card transaction
Summary of 3 technical options

<table>
<thead>
<tr>
<th>Use case 1 workflow overview: 3 options</th>
<th>Prerequisites for airlines</th>
<th>Impact / benefits for airlines</th>
</tr>
</thead>
</table>
| **“Travel agent to Airline” option (A1)** | ▪ Airline needs to be PCI compliant (and TAs also need to be PCI compliant), hence might be more feasible for large airlines  
▪ Or need for technical solution (e.g. secure “tokenisation” layer) to de-scope airlines from PCI compliance  
▪ Bilateral connectivity with TAs, or messages via aggregator | ▪ Most efficient technical approach for payment data to be collected by the airline  
▪ Mirrors existing processes for online direct card transactions |
| **“PSP to PSP” option (D)** | ▪ Need for an inter-PSP platform to route payments-related messages (esp. card authorisations) with very high uptime / speed | ▪ No need for airlines (or TAs) to handle card data, and therefore no PCI compliance issues  
▪ Mirrors existing processes for online direct card transactions |
| **“Travel agent to airline’s PSP” option (B)** | ▪ Requires “call back” functionality whereby the airline previously provides the TA with destination details for payment messages (including details on the airline’s PSP involved in the payment flow)  
▪ Connectivity between TAs and the airline’s PSP(s)  
▪ Need for the TA to be PCI compliant | ▪ No need for airlines to handle card data, and therefore no PCI compliance issues  
▪ Mirrors existing processes for online direct card transactions |

**Note:** TAs = Travel Agents
## Use case 2: e-commerce “secured” card transaction (3D Secure)

### Summary of 2 scenarios

#### Use case 2 workflows: 2 scenarios (based on technical option A1)

<table>
<thead>
<tr>
<th>Scenario 1: split authentication / authorisation</th>
<th>Prerequisites for airlines</th>
<th>Impact / benefits for airlines</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Diagram" /></td>
<td>3D Secure driven by TA (and using the TA’s Merchant ID) and TA provides outcome of 3D Secure to the Airline</td>
<td>Ability to deploy strong authentication (3D Secure) on card transactions via TAs (when the Airline is Merchant of Record)</td>
</tr>
<tr>
<td></td>
<td>Airline to include outcome of 3D Secure into the card authorisation request that will be driven by the Airline (and using the Airline’s Merchant ID)</td>
<td>Liability shift to the card issuer when 3D Secure is used</td>
</tr>
<tr>
<td></td>
<td>Feasible as long as it is approved by the schemes, and if the changes and exceptions are agreed in the scheme rules</td>
<td>Mirrors existing authorisation processes for online direct sales</td>
</tr>
</tbody>
</table>

#### Scenario 3: authentication and authorisation driven by Airline

<table>
<thead>
<tr>
<th><img src="#" alt="Diagram" /></th>
<th>Prerequisites for airlines</th>
<th>Impact / benefits for airlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Secure</td>
<td>3D Secure and card authorisation requests driven by the Airline (and using the Airline’s Merchant ID)</td>
<td>Ability to deploy strong authentication (3D Secure) in a dynamic manner based on risk</td>
</tr>
<tr>
<td>TA needs to provide sufficient data for airlines to score transactions and decide when 3D Secure is required</td>
<td>Liability shift to the card issuer when 3D Secure is used</td>
<td></td>
</tr>
<tr>
<td>TA to initiate customer redirect for 3D Secure as required / instructed by the Airline, and to provide outcome of 3D Secure to the Airline</td>
<td>Mirrors existing authorisation processes for online direct sales</td>
<td></td>
</tr>
<tr>
<td>Airline to include the outcome of 3D Secure into the card authorisation request</td>
<td></td>
<td></td>
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</tbody>
</table>

**Note:** high-level workflows described above are based on the “travel agent to Airline” technical option. Flow charts will be similar for technical options B & D with both scenarios 1 and 3 - for D, same principle will apply, except that the file exchanges will occur through the inter-PSP platform and not between TAs and airlines.

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**A. Executive Summary**
### Use case 4: Alternative Form of Payment (e.g. iDEAL) transaction

#### Summary of 2 options

<table>
<thead>
<tr>
<th>Use case 4 workflows: 2 options</th>
<th>Prerequisites for airlines</th>
<th>Impact / benefits for airlines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“Travel agent to Airline” option</strong></td>
<td>Contract between the Airline and the AFOP provider</td>
<td>Ability to deploy AFOPs (that are currently available for direct sales) for sales via TAs (when the Airline is Merchant of Record)</td>
</tr>
<tr>
<td></td>
<td>Ability for the Airline to identify redirect information and provide it to the TA</td>
<td>Payment guarantee when it is provided by the AFOP</td>
</tr>
<tr>
<td></td>
<td>TA to initiate customer redirect as required / instructed by the Airline</td>
<td>Mirrors existing AFOP processes for online direct sales</td>
</tr>
<tr>
<td></td>
<td>TA to provide outcome of AFOP redirect to the Airline</td>
<td></td>
</tr>
<tr>
<td><strong>“Collecting PSP” option</strong></td>
<td>Contract between the Airline and the Collecting PSP (entity that will handle data exchanges and that will collect funds on behalf of the Airline)</td>
<td>Ability to deploy AFOPs in cases when the Airline does not have or does not want to have a contract with each local AFOP</td>
</tr>
<tr>
<td></td>
<td>Ability for Airline to handle ticketing based on messaging by the Collecting PSP and to receive funds from / handle reconciliation messages from the Collecting PSP</td>
<td>Payment guarantee when it is provided by the AFOP</td>
</tr>
</tbody>
</table>

**Note 1:** overall workflows would be very similar for use case 3 when a customer redirect is required (e.g. requiring the buyer to log into the PayPal website)

**Note 2:** AFOP = Alternative Form Of Payment
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B. Context and Methodology

Context: IATA introduced the NDC (New Distribution Capability) standard in 2015 to enable “airline retailing”

Industry standard brings lower cost, innovation, ease-of-comparison and interoperability

Source: IATA’s website
Airlines will manage offers / orders as part of NDC

Source: IATA
IATA retained Edgar, Dunn & Company (EDC) to flesh out the “payment” piece of NDC.

Need to develop a reference architecture and process flows for “Payment” across key use cases.

Source: IATA’s website
There were the primary and secondary objectives for this study

**Primary objective for this study**
- Define and validate the reference architecture and main data / fund flows for the “payments” module of NDC
  - The payment reference architecture will describe the main entities and interfaces / systems involved in a NDC payment transaction when the airline is the merchant of record, and their interactions
  - The data / fund flows will describe the different types of exchanges of data between entities (e.g. at time of authorisation and at time of clearing) and exchange of funds
  - The payment-related reference architecture and process flows will need to be validated with key stakeholders

**Secondary objectives for this study**
- Identify emerging alternative forms of payment (AFOPs) that airlines could leverage
- Identify trends related to POS terminals for merchants (e.g. multi-merchant POS)
- Describe benefits related to NDC’s payments module for airlines
  - This will include an executive summary describing the main benefits for airlines (mostly in qualitative terms)
This study focusing on “payments” module of NDC is based on the following scope and key assumptions

### What is included in the scope of this study?

<table>
<thead>
<tr>
<th>Type of transactions</th>
<th>Channels</th>
<th>Geography</th>
<th>Type of payment methods</th>
<th>Business Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transactions in scope: Purchase of airline tickets</td>
<td>Indirect channels with customer-facing interfaces: 1. E-commerce / m-commerce 2. Call centres</td>
<td>Top countries for IATA NDC in 3 key regions:  • Europe  • Americas  • APAC</td>
<td>Payment methods: 1. International card Plastic cards (e.g. MasterCard, Visa) Lodge accounts (e.g. Amex BTA) 2. Existing alternative payment methods  • Wallets (e.g. PayPal)  • Bank transfers (e.g. iDEAL in the NL) 3. Emerging alternatives (e.g. EU instant payments)</td>
<td>Business Model:  • Only includes cases when the airline is the “merchant of record” (MOR), and assumes that airlines’ current partners (PSPs, acquiring banks, etc.) will remain the same  • Excludes use cases when TA is MOR when accepting cards (and handled as “cash” trn via BSP)  • Exclude new use cases related to IATA EasyPay</td>
</tr>
</tbody>
</table>

Note: *excluded from scope - does not include a detailed description of what airlines need to do to be PCI-DSS compliant (but the study scope includes which entities and processes need to be PCI DSS compliant)
Agenda

- A. Executive summary
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IATA and EDC agreed to deep dive on 5 priority use cases

<table>
<thead>
<tr>
<th>Use case 1: e-commerce “unsecured” transaction</th>
<th>Use case 2: e-commerce “secured” transaction</th>
<th>Use case 3: e-commerce purchase with a wallet (e.g. PayPal)</th>
<th>Use case 4: e-commerce purchase with a bank transfer (e.g. iDEAL)</th>
<th>Use case 5: call centre purchase with a lodge card</th>
</tr>
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<tbody>
<tr>
<td>Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) without any strong authentication</td>
<td>Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) combined with 3D Secure</td>
<td>Purchase via the website of a travel agency involving the usage of a wallet such as PayPal (that will then end up as a card transaction or as a direct debit for the payer)</td>
<td>Purchase via website of a travel agency involving usage of a real-time bank transfer e.g. iDEAL in the NL (whereby customers initiate “push” bank transfer to merchant’s bank account via a redirect)</td>
<td>Purchase via the travel agency’s call centre involving the usage of a lodge account (e.g. Amex BTA or UATP account)</td>
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</table>
It has been hard for airlines to manage these merchant fees because of the complexity of the payments ecosystem.

Overview of the typical credit card ecosystem

Might outsource to an issuer processor
Might become / replace acquirers
Might own its own PSP, and outsource to an acquirer processor
Might also use a fraud prevention vendor, and a vault / tokenisation vendor

Note 1: PSP stands for Payment Service Providers
Note 2: the umbrella term ‘Travel Agency’ includes Online Travel Agencies (OTA)
C. Reference architecture and payment workflows

For each use case, EDC mapped out the key data exchanges and funds exchanges among key stakeholders

Key payment stakeholders include:

- In the travel agency domain:
  - The travel agency (TA) itself: for instance, large OTAs are likely to host their own payment page
  - A PSP (payment service provider) / payment gateway that enables card acceptance
  - An acquirer (bank that has a card contract with the TA and that settles the TA)
- In the airline domain:
  - The airline, its own PSP(s), and its own acquirer(s)
- Other stakeholders included in workflows:
  - Payment networks (e.g. MasterCard, Visa)
  - Issuers (bank that has a contract with the traveler)
- Other stakeholders not included in workflows:
  - Card processors (used by issuers or acquirers)
  - Fraud vendors (e.g. enabling 3D Secure, fraud scoring models, etc.)
  - PCI vendors (e.g. providers of tokenisation or encryption services), etc.

Each workflow typically shows three key steps:

- Step 1: the authorisation request / authentication stage for a payment transaction
  - This is typically undertaken in real-time for each transaction at time of purchase (i.e. when consumers/travelers provide their payment details and proceed with the “buy” button) with a limited data set
- Step 2: exchange of full payment data used for clearing (so called “billing file” or “capture”)
  - This typically involves a daily exchange of files (e.g. at the end of each business day)
- Step 3: financial settlement whereby the merchant is paid
  - This is typically a daily credit transfer into the merchant’s bank account X days after clearing

Note: in an airline environment, the authorisation/capture is usually based on a dual message communication (versus a single message, where the authorisation and capture happen simultaneously)
Based on the internal / external analysis, EDC identified “guiding principles” to take into account when developing process flows

Guiding Principles

1. Leveraging existing infrastructure
   - Leveraging airlines’ and travel agents’ existing systems and architecture, including the connections with existing PSPs - the priority is to limit the changes for airlines and travel agents
   - Putting in place a flexible and modern infrastructure that can be adapted depending on the process flows and entities involved

2. Remaining aligned with regulations
   - Ensuring that airlines and travel agents are aligned / compliant with the latest and changing regulations globally

3. Preventing additional requirements to become PCI DSS compliant
   - Prevent a situation where airlines and travel agents may face “new” PCI DSS-related issues (e.g. airlines receiving sensitive PAN data directly from travel agents)

4. Integration of emerging payment methods
   - By realising the potential of emerging payments and integrating them with existing payment infrastructure, airlines and travel agents will be able to enhance business performance by reducing the cost of accepting payment and by automating processes across channels

5. Minimising negative impact on customer experience
   - E.g. when using iDEAL, the customer is redirected to its online banking page as there is currently no other options - in the near future, there may be a way for iDEAL to access customers’ accounts (following PSD2) which may improve conversion rate and customer experience. EDC’s recommendation is to avoid the “redirect” option when possible
   - E.g. a travel agent could consider sending an SMS to corporates to pay online for ticket via a call centre - although it might be efficient for travel agents, it might impact the customer experience negatively
Use case 1

e-commerce “unsecured” transaction

Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) without any strong authentication

Use case 2:

e-commerce “secured” transaction

Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) combined with 3D Secure

Use case 3:

e-commerce purchase with a wallet (e.g. PayPal)

Purchase via the website of a travel agency involving the usage of a wallet such as PayPal (that will then end up as a card transaction or as a direct debit for the payer)

Use case 4:

e-commerce purchase with a bank transfer (e.g. iDEAL)

Purchase via website of a travel agency involving usage of a real-time bank transfer e.g. iDEAL in the NL (whereby customers initiate “push” bank transfer to merchant’s bank account via a redirect)

Use case 5:

call centre purchase with a lodge card

Purchase via the travel agency’s call centre involving the usage of a lodge account (e.g. Amex BTA or UATP account)
Use case 1: e-commerce “unsecured” transaction - list of options

<table>
<thead>
<tr>
<th>Option</th>
<th>Conclusions</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Consider</td>
<td>“TA to airline”: TA sends payment data to airline’s OMS (Order Management System), and airline (via its PSP &amp; acquirer) is responsible for the authorisation and capture - this is the closest set-up to today’s current situation, but PCI impact on airlines (&amp; TAs)</td>
</tr>
<tr>
<td>A2</td>
<td>Deprioritise, with 1 exception</td>
<td>Direct link between the travel agent’s PSP and the airline. Travel agent’s PSP passes on payment data to airline, who (with its PSP and acquirer) is in charge of authorisation and capture. With an exception in national markets for dominant airlines</td>
</tr>
<tr>
<td>B</td>
<td>Consider, with ‘call-back’: “TA to airline’s PSP”</td>
<td>“TA to airline’s PSP”: the PSP of the travel agent is by-passed and connections and payment data is shared directly with the airline’s PSP. With a “call back” functionality whereby the airline provides the TA with destination details for payment messages</td>
</tr>
<tr>
<td>C</td>
<td>Deprioritise</td>
<td>Bilateral connections between the TA’s PSP and the airline’s PSP</td>
</tr>
<tr>
<td>D</td>
<td>Consider</td>
<td>“PSP to PSP”: an intermediary named a “inter-PSP platform” will be set up between the travel agents’ PSPs and the airlines’ PSPs / acquirers</td>
</tr>
<tr>
<td>E</td>
<td>Deprioritise</td>
<td>A “light RET” file will be sent directly from the TA’s PSP to IATA’s BSP and airline’s acquirer</td>
</tr>
</tbody>
</table>

Note: EDC detailed Option A1 and D in the following slides
Use case 1: e-commerce “unsecured” transaction

Emerging conclusions are based on feedback collected during validation calls and discussions with IATA:

- EDC would suggest to consider option A1: “Travel agent to Airline”
  - Based on the structural NDC principle of a data exchange between each travel agent and each airline
  - Might be feasible for large airlines that are PCI compliant and that can handle sensitive card data
  - However this option is unlikely to be feasible for smaller airlines or airlines that are not (and do not want to become) PCI compliant, and for travel agencies that face the same PCI compliance issue, unless there is a technical solve (e.g. encryption via Secure Layer or tokenisation engine within the airline)

- EDC would suggest to deprioritise option A2 (with an exception in national markets for dominant airlines)
  - This option may be applicable to certain cases (i.e. exceptions) - taking into account exceptions in the national market of a flag carrier where a direct connection may be feasible between the travel agent’s PSP and this specific airline
  - Combines the PCI issues of option A1 along with the business challenge (and technical complexity) of getting each travel agency’s PSP to connect with each airline
  - Could be complex for TA’s PSP to set up integration with each airline (exceptions might include national market of flag carrier)

- EDC would suggest to consider option B, with the ‘call-back’ option: “Travel agent to airline’s PSP”
  - Feasible with a “call back” functionality whereby the airline provides the TA with destination details for payment messages -> not dependent on involving a new player
  - Concerns about PCI impact for small TAs not handling PAN data currently + TA would need to integrate with a large number of airline’s PSPs (same exception as for A2)

- EDC would suggest to deprioritise Option C
  - PSPs might not be keen on integrating with other PSPs

- EDC would suggest to consider option D: “PSP to PSP”
  - A third party provider could have the role of intermediary to avoid PCI issues for airlines and to provide efficient routing of payment data / messages
  - Feasible technical solution that could be efficient, but unclear business case (due to large capex and on-going maintenance with unclear revenue sources)
  - Involvement of IATA Weblink to be discussed

- EDC would suggest to deprioritise Option E
  - Airlines might lose control of the payment element
  - Not relevant if BSP are not involved in NDC “credit card” transactions
  - IEP and BSP “Cash” transactions are out of scope
Use case 1: e-commerce “unsecured” transaction - Option A1: “Travel agent to Airline”

1. Traveler purchases an airline ticket via a travel agent’s website, which checks availability and pricing (via the aggregator or via a bilateral).
2. The traveler provides the TA with their card data.
3. The traveler is on the TA’s payment page or redirected to the PSP’s hosted page (if this set up is in place).
   *Software-based encryption using Secure Layer’s public key*
4. Encrypted payment data shared with the airline.
5. Airline would decrypt the payment data by accessing private keys in Secure Layer.
6. The airline’s PSP would send the authorisation request to the airline’s acquirer (authorisation confirmation message is then sent to the airline by the airline’s PSP), and then send the capture file to the airline’s acquirer (after the message for the capture is sent from the airline to the airline’s PSP) or the airline bills directly its acquirer.
7. Settlement done by the airline’s acquirer to the airline.
C. Reference architecture and payment workflows

Use case 1: e-commerce “unsecured” transaction - Option D: “PSP to PSP”

NDC future state - Option D: “PSP to PSP”

1. The buyer books and purchases an airline ticket via a travel agent’s website, which checks availability and pricing (via the aggregator or via a bilateral)
2. The buyer provides the TA with their card data
3. The buyer is on the TA’s payment page or redirected to the PSP’s hosted page (if this setup is in place). TA’s PSP communicates with the ‘inter-PSP platform’
4. The inter-PSP platform routes the authorisation request to the airline’s PSP and receives a response (if required)
5. Authorisation confirmation message is sent to the airline by the airline’s PSP (message includes the PSP reference number)
6. Transaction data file is routed via the inter-PSP platform (if required) to the airline’s PSP, and “release” message for the capture is sent from the airline to the airline’s PSP
7. Airline’s PSP sends Level 3 data to airline’s acquirer for capture (or airline bills its acquirer directly, removing step 6)
8. Standard clearing process
9. Standard settlement process

Note: the “inter-PSP platform” could be a third-party technical provider or IATA’s own gateway, connecting to the airline’s acquirer or airline’s PSP
C. Reference architecture and payment workflows

**Use case 2**

**Use case 1:** e-commerce “unsecured” transaction
- Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) without any strong authentication

**Use case 2:** e-commerce “secured” transaction
- Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) combined with 3D Secure

**Use case 3:** e-commerce purchase with a wallet (e.g. PayPal)
- Purchase via the website of a travel agency involving the usage of a wallet such as PayPal (that will then end up as a card transaction or as a direct debit for the payer)

**Use case 4:** e-commerce purchase with a bank transfer (e.g. iDEAL)
- Purchase via website of a travel agency involving usage of a real-time bank transfer e.g. iDEAL in the NL (whereby customers initiate “push” bank transfer to merchant’s bank account via a redirect)

**Use case 5:** call centre purchase with a lodge card
- Purchase via the travel agency’s call centre involving the usage of a lodge account (e.g. Amex BTA or UATP account)
C. Reference architecture and payment workflows

Use case 2: e-commerce “secured” transaction – 3 scenarios

NDC future state - list of option

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Conclusions</th>
<th>Descriptions</th>
</tr>
</thead>
</table>
| 1        | Consider if changes and exception agreed in scheme rules | Authentication by travel agency / Authorisation by airline  
- i. The travel agent decides whether to activate 3D Secure or not. The agent is responsible for the authentication phase and will transmit the 3DS data to the airline or to the airline’s PSP  
- ii. The airline / the airline’s PSP is in charge of the card authorisation |
| 2        | Deprioritise | Customer redirect to airline  
- The buyer will be redirected to the airline’s payment page |
| 3        | Consider | Authentication and authorisation by airline without customer redirect to the airline’s payment page  
- The airline’s PSP will initiate 3D Secure but the buyer will not be redirected to the airline’s payment page |

Note 1: MID = Merchant Identification Number  
Note 2: EDC focused on Option A1 and detailed Scenario 1 and 3 in the following slides
Emerging conclusions are based on feedback collected during validation calls and discussions with IATA:

- EDC would suggest to consider option A1
  - It would be complex to enable 3D Secure through option A2
- EDC would suggest to consider option B
- EDC would suggest to consider option D
- EDC would suggest to consider scenario 1 and scenario 3 and deprioritise scenario 2
  - Scenario 1 - authentication by TA / Authorisation by airline
    - The only downside is that 3D Secure is initiated by travel agents: airlines would therefore not be able to implement a dynamic 3D Secure policy (e.g. selective usage of 3DS based on risk factors), where they enforce or skip 3DS on a transaction by transaction basis
    - Appears feasible as long as it is allowed/approved by schemes and could work using an API
- Scenario 2 - customer redirect to airline
  - Most TAs will probably not accept to enable their clients to be redirected to airline’s payment page and clumsy customer experience
- Scenario 3 - authentication and authorisation by airline without customer redirect to the airline’s payment page
  - Airline will be able to activate 3DS if required
  - Scenario 3 is untested and it is unclear whether it might generate significant downtime or failure risks. There may also be a need to add a list of data fields to indicate in the NDC standard to be submitted by the TAs
Use case 2: e-commerce “secured” transaction
Option A1: “Travel agent to airline” - Scenario 1

1. Buyer purchases an airline ticket via a travel agent’s website, which checks availability and pricing (via the aggregator or via a bilateral).
2. The buyer provides the TA with their card data.
3. The buyer is on the TA’s payment page or redirected to the PSP’s hosted page (if this set up is in place). *Software-based encryption using Secure layer’s public key.
4. Cardholder authentication (3D Secure) using the TA’s MID - redirect to issuer initiated by the travel agent’s PSP.
5. Encrypted payment data shared with the airline (including results from 3DS authentication).
6. Airline would decrypt the payment data by accessing private keys in Secure Layer.
7. The airline’s PSP would do the authorisation request using the airline’s MID and the 3DS result data provided by the TA.
8. Authorisation confirmation message is sent to the airline by the airline’s PSP.
9. Message for the capture is sent from the airline to the airline’s PSP, which sends the capture file to the airline’s acquirer, or the airline bills directly its acquirer.
10. Settlement done by the airline’s acquirer to the airline.

Note: flow charts will be similar for Options B & D with both scenarios 1 and 3 - for D, same principle will apply, except that the file exchanges will occur through the inter-PSP platform and not between TAs and airlines.
Use case 2: e-commerce “secured” transaction

Option A1: “Travel agent to airline” - Scenario 3

1. Buyer purchases an airline ticket via a travel agent’s website, which checks availability and pricing
2. The buyer provides the TA with their card data
3. The buyer is on the TA’s payment page or redirected to the PSP’s hosted page (if this set up is in place). *(Software-based encryption using Secure Layer’s public key)*
4. TA provides encrypted payments data to the airline (prior to 3DS) along with required fields for risk scoring
5. Cardholder authentication (3D Secure): airline decides whether to activate 3DS or not. MPI look up by airline’s PSP
6. TA provides encrypted payments data to the airline (prior to 3DS) along with required fields for risk scoring
7. Airline sends redirect URL fields to TA
8. TA directs buyer to issuer and receives 3DS result data
9. Issuer or airline’s PSP would decrypt the payment data by accessing private keys in Secure Layer (would also take place after step 4)
10. The airline’s PSP would send the authorisation request via the airline’s acquirer
11. Authorisation confirmation message is sent to the airline by the airline’s PSP
12. Message for capture is sent from the airline to the airline’s PSP, which sends the capture file to the airline’s acquirer, or the airline bills directly its acquirer
13. Settlement done by the airline’s acquirer to the airline

Note: flow charts will be similar for Options B & D with both scenarios 1 and 3 - for D, same principle will apply, except that the file exchanges will occur through the inter-PSP platform and not between TAs and airlines
Use case 3

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<tr>
<th>Use case 1: e-commerce “unsecured” transaction</th>
<th>Use case 2: e-commerce “secured” transaction</th>
<th>Use case 3: e-commerce purchase with a wallet (e.g. PayPal)</th>
<th>Use case 4: e-commerce purchase with a bank transfer (e.g. iDEAL)</th>
<th>Use case 5: call centre purchase with a lodge card</th>
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<td>Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) without any strong authentication</td>
<td>Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) combined with 3D Secure</td>
<td>Purchase via the website of a travel agency involving the usage of a wallet such as PayPal (that will then end up as a card transaction or as a direct debit for the payer)</td>
<td>Purchase via website of a travel agency involving usage of a real-time bank transfer e.g. iDEAL in the NL (whereby customers initiate “push” bank transfer to merchant’s bank account via a redirect)</td>
<td>Purchase via the travel agency’s call centre involving the usage of a lodge account (e.g. Amex BTA or UATP account)</td>
</tr>
</tbody>
</table>
C. Reference architecture and payment workflows

Use case 3: e-commerce purchase with a wallet, e.g. PayPal – list of options

NDC future state - list of options

**Option A**

- **Sender**
  - Buyer's PayPal account
  - Account deducted $100

- **Primary receiver**
  - Travel Agency's PayPal account
  - $100 to $90

- **Secondary receiver**
  - Airline's PayPal account
  - Account credited $90

**Option B**

- **Sender**
  - Buyer's PayPal account
  - Account deducted $100

- **Receiver 1**
  - Travel Agency's PayPal account
  - Account credited $10

- **Receiver 2**
  - Airline's PayPal account
  - Account credited $90

- **Option A**
  - Chained payment: when a buyer is ready to check out, the travel agent will use the “Pay call” to set up the chained payment
  - In a chained payment, a payment is made to a primary receiver (i.e. travel agent). The primary receiver keeps some of the payment and pays the rest to one or more secondary receivers (i.e. airlines) (i.e. the sender pays the primary receiver an amount, from which the primary receiver pays secondary receiver(s))
    - The sender deals only with the primary receiver and does not know about the secondary receiver, including how the payment is split among receivers

- **Option B**
  - Parallel payment: in a parallel payment, a payment is sent to multiple receivers (up to six)
  - In these cases, the sender knows the receiver(s) and the amount paid to each one

Source: PayPal
Emerging conclusions are based on feedback collected during validation calls and discussions with IATA:

- EDC would suggest to **deprioritise option A**
  - Most of the stakeholders agreed with the fact that there are concerns that travel agent will “touch” the airline’s funding - it can be risky
- EDC would suggest to **consider option B**
  - It might be feasible but need to be tested and confirmed if technically possible
- However, some airlines would prefer treating a wallet like a card (e.g. via UATP as currently done for PayPal), and would treat this similar to a 3D Secure process flow
Use case 4

Use case 1: e-commerce “unsecured” transaction
Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) without any strong authentication

Use case 2: e-commerce "secured" transaction
Purchase via the website of a travel agency involving the usage of a plastic card (e.g. Amex, MasterCard or Visa) combined with 3D Secure

Use case 3: e-commerce purchase with a wallet (e.g. PayPal)
Purchase via the website of a travel agency involving the usage of a wallet such as PayPal (that will then end up as a card transaction or as a direct debit for the payer)

Use case 4: e-commerce purchase with a bank transfer (e.g. iDEAL)
Purchase via website of a travel agency involving usage of a real-time bank transfer e.g. iDEAL in the NL (whereby customers initiate “push” bank transfer to merchant's bank account via a redirect)

Use case 5: call centre purchase with a lodge card
Purchase via the travel agency’s call centre involving the usage of a lodge account (e.g. Amex BTA or UATP account)
Use case 4: e-commerce purchase with a bank transfer (e.g. iDEAL) – “Travel agent to airline”

1. Buyer purchases an airline ticket via a travel agent’s website, which checks availability and pricing (via the aggregator or via a bilateral).
2. The buyer selects iDEAL (or similar Alternative Forms of Payment - AFOP -).
3. The traveler is on the TA’s payment page or redirected to the PSP’s hosted page (if this set up is in place). *Software-based encryption using Secure Layer’s public key
4. TA provides payments data to airline
5. Airline’s PSP sends a payment request to the iDEAL’s acquirer and obtains redirect URL data from the AFOP (e.g. iDEAL)
6. Airline sends redirect iDEAL URL fields to TA as a “merchant reference” field
7. TA redirects buyer to issuer \ AFOP provider and receives result data
8. Encrypted payment data shared with the airline (including results from IDEAL authentication) 
9. Airline would decrypt the payment data by accessing private keys in Secure Layer (would also take place after step 4)
10. The airline’s PSP would handle the required message exchanges with the AFOP (e.g. retrieve payment status from iDEAL) and communicates the result to the airline
11. Settlement done by the AFOP to the airline

Legend: Data exchanged - Financial data
Use case 4: list of options if a “super-merchant” / collecting provider (e.g. CPSP for iDEAL) is required

NDC future state - main roles depending on the option

<table>
<thead>
<tr>
<th>Option</th>
<th>Conclusions</th>
<th>Descriptions</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Consider (if relevant)</td>
<td>IATA could play the role of single CPSP (collecting PSP) for all airlines and all volumes, i.e. in all cases</td>
</tr>
<tr>
<td>B</td>
<td>Deprioritise</td>
<td>IATA could play the role of technical PSP and could partner with a CPSP for the collecting activities</td>
</tr>
<tr>
<td>C</td>
<td>Deprioritise</td>
<td>IATA could play the role of CPSP for small volume of transactions (i.e. for small/medium airlines) and larger airlines (i.e. with larger volumes) could use their own CPSPs</td>
</tr>
<tr>
<td>D</td>
<td>Consider</td>
<td>An existing and external entity could play the role of single CPSP for all transactions</td>
</tr>
</tbody>
</table>

Note 1: EDC detailed Options A & D in the following slide
Note 2: the direct option (i.e. direct connection between the airline and AFOP) was included at a later stage, but not on this diagram - see ‘Emerging conclusions’ slide
Use case 4: e-commerce purchase with a bank transfer

Emerging conclusions are based on feedback collected during validation calls and discussions with IATA:

EDC would suggest to consider options “direct”, A and D

- **Direct option** (i.e. direct connection between the airline and the AFOP provider) could work if it is a widespread AFOP accepted by TA, e.g. PayPal, iDEAL
- **Option A**: IATA as the collecting PSP (collecting PSP) for all airlines and all volumes, i.e. in all cases
  - Would be easier to have a single CPSP having contracts with all TAs and airlines
  - Becoming a CPSP would require (a) becoming a payment institution, (b) going through a certification process (e.g. security assessment of data centres), and (c) contracting with one of the iDEAL acquirers (e.g. BNP Paribas, Deutsche Bank, ING, PPRO)
- **Option D**: partnership with an existing CPSP to cover all airlines
  - Could be easier to have a single CPSP having contracts with all TAs and airlines
  - Both options are based on the same principle of a CPSP that would handle all transactions for all airlines. This would either be insourced (option A) or outsourced (option D) to an existing CPSP such as Global Collect or WorldPay

EDC would suggest to deprioritise options B and C

- **Option B**: IATA as technical PSP and partnership with an existing CPSP for the collecting activities
  - It is similar to option D (requiring a partnership with an existing CPSP) and could add operational complexity without any additional value
- **Option C**: IATA could play the role of CPSP for small volume of transactions (i.e. for small/medium airlines) and larger airlines (i.e. with larger volumes) could use their own CPSPs
  - Possible technically (combination of A and D) but would be more complex as the TA’s PSP would need to point to the correct CPSP depending on the airline and more cumbersome to maintain
Use case 4: e-commerce purchase with a bank transfer (e.g. iDEAL) – Option A or D: a CPSP

1. The buyer books and purchases an airline ticket via a travel agent's website, which checks availability and pricing (via the aggregator or via a bilateral)
2. The buyer is on the TA's payment page or redirected to the PSP's hosted page, and selects iDEAL / their bank
3. The TA's PSP provides the CPSP with key data (amount, issuer BIC) so that the CPSP can send a payment request to the iDEAL's acquirer. The acquirer responds with the URL for the issuer and a transaction ID: these items are passed on by the CPSP to the TA's PSP
4. The TA's PSP redirects the buyer (through the TA) to its issuer and the buyer goes through the authentication process and validates the payment. The TA's PSP can then inform the CPSP that the payment status can be retrieved from iDEAL
5. Confirmation that payment was successful
6. Fund transferred by SEPA Credit transfer (max. D+1) from the issuer to iDEAL's acquirer. Funds are then transferred to the CPSP (via the airline's acquirer) and finally credited to the airline (or directly from the CPSP to the airline)

Note: during payment authorisation at the Issuer, both the CPSP’s and the merchant’s name are presented on the same screen to the buyer.
## Use case 5

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Use case 5: call center purchase with a lodge card – list of options

NDC future state - list of options

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<tr>
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<th>Descriptions</th>
</tr>
</thead>
<tbody>
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<td>A</td>
<td>Consider “TMC to airline”</td>
<td>Direct link between the TMC and the airline</td>
</tr>
<tr>
<td>B</td>
<td>Consider, with ‘call-back’: “TMC to airline’s PSP”</td>
<td>Connection between the TMC and the airline’s PSP; With a “call back” functionality whereby the airline provides the TMC with destination details for payment messages</td>
</tr>
<tr>
<td>C</td>
<td>Consider “TMC to airline’s PSP” via platform</td>
<td>“TMC to airline’s PSP” via platform; An intermediary, a “platform” (e.g. IATA gateway) will be set up between TMC and the airline’s PSP or acquirer</td>
</tr>
<tr>
<td>D</td>
<td>Deprioritise</td>
<td>A “light RET” will be sent directly from the TMC to IATA’s BSP and the airline’s acquirer</td>
</tr>
</tbody>
</table>

Note: same principles will apply for workflows for a purchase with a lodge card to the Use case 1 - EDC has not included detailed workflows
Emerging conclusions are based on feedback collected during validation calls and discussions with IATA:

- EDC would suggest to **consider option A** “TMC to airline”
  - Based on the structural NDA principle of a data exchange between each TMC and each airline
  - Might be feasible for large airlines that are PCI compliant and that can handle sensitive card data
  - However, this option is unlikely to be feasible for smaller airlines or airlines that are not (and do not want to become) PCI compliant, and for TMCs that face the same PCI compliance issue, unless there is a technical solve (e.g. Secure Layer) to address PCI issues

- EDC would suggest to **consider option B, with the “call-back” option: TMC to airline’s PSP”**
  - Feasible with a “call back” functionality whereby the airline provides the TMC with destination details for payment messages -> not dependent on involving a new player
  - Concerns about PCI impact for small TMCs not handling PAN data currently and TMC would need to integrate with a large number of airline’s PSPs

- EDC would suggest to **consider option C: TMC to airline’s PSP” via platform**
  - Feasible technical solution, but unclear business case

- EDC would suggest to **deprioritise option D**
  - Airlines might lose control of the payment element
  - A “light RET” will be sent directly from the TMC to IATA’s BSP and the airline’s acquirer
  - Not required if the BSP is not involved in NDC