

Generic Transaction Patterns

Open API for FSP Interoperability Specification

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Open API for FSP Interoperability Specification

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1 Preface

This section contains information about how to use this document.

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1.1 Conventions Used in This Document

The following conventions are used in this document to identify the specified types of information

Type of Information	Convention	Example
Elements of the API, such as resources	Boldface	/authorization
Variables	Italics within angle brackets	<ID>
Glossary terms	Italics on first occurrence; defined in <i>Glossary</i>	The purpose of the API is to enable interoperable financial transactions between a <i>Payer</i> (a payer of electronic funds in a payment transaction) located in one <i>FSP</i> (an entity that provides a digital financial service to an end user) and a <i>Payee</i> (a recipient of electronic funds in a payment transaction) located in another FSP.
Library documents	Italics	User information should, in general, not be used by API deployments; the security measures detailed in <i>API Signature</i> and <i>API Encryption</i> should be used instead.

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1.2 Document Version Information

Version	Date	Change Description
1.0	2018-03-13	Initial version

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2 Introduction

This document introduces the four generic transaction patterns that are supported in a logical version of the Interoperability API. Additionally, all logical services that are part of the API are presented on a high-level.

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2.1 Open API for FSP Interoperability Specification

The Open API for FSP Interoperability Specification includes the following documents.

2.1.1 General Documents

- *Glossary*

2.1.2 Logical Documents

- *Logical Data Model*
- *Generic Transaction Patterns*
- *Use Cases*

2.1.3 Asynchronous REST Binding Documents

- *API Definition*
- *JSON Binding Rules*
- *Scheme Rules*

2.1.3.1 Data Integrity, Confidentiality, and Non-Repudiation

- *PKI Best Practices*
- *Signature*
- *Encryption*

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3 Logical API Services

The Interoperability API consists of a number of logical API resources. Each resource defines one or more services that clients can use to connect to a server that has implemented the API. This section introduces these services.

Note: API services identified in this section may not be relevant to (and therefore may not appear in) the generic transaction patterns identified in Section 4. For example, some services are used for provisioning of information, are part of error cases, or are for retrieving information that is not necessary in a generic transaction pattern.

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3.1 Common Functionality

This section introduces functionality that is used by more than one logical API resource or service.

3.1.1 Party Addressing

A Party is an entity such as an individual, a business, an organization that has a financial account in one of the FSPs. A party is addressed by a combination of an *ID type* and an *ID*, and possibly also a *subtype* or *sub ID*. Some examples of *ID type* and *ID* combinations are:

- *ID type*: **MSISDN**, *ID*: **+123456789**
- *ID type*: **Email**, *ID*: **john@doe.com**

3.1.2 Interledger

The API includes basic support for the Interledger Protocol (ILP) by defining a concrete implementation of the Interledger Payment Request protocol¹(ILP) in the logical API resources **Quotes** and **Transfers**. More details of the ILP protocol can be found on the Interledger project website², in the Interledger Whitepaper³, and in the Interledger architecture specification⁴.

¹ <https://interledger.org/rfcs/0011-interledger-payment-request/> - Interledger Payment Request (IPR)

² <https://interledger.org/> - Interledger

³ <https://interledger.org/interledger.pdf> - A Protocol for Interledger Payments

⁴ <https://interledger.org/rfcs/0001-interledger-architecture/> - Interledger Architecture

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3.2 API Resource Participants

In the API, a *Participant* is the same as an FSP that is participating in an Interoperability Scheme. The primary purpose of the logical API resource **Participants** is for FSPs to find out in which other FSP a counterparty in an interoperable financial transaction is located. There are also services defined for the FSPs to provision information to a common system.

3.2.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.2.1.1 Lookup Participant Information

The logical API service request **Lookup Participant Information** is used from an FSP to request from another system, which could be another FSP or a common system, information regarding in which FSP a counterparty in an interoperable financial transaction is located.

- Successful response: **Return Participant Information**
- Error response: **Return Participant Information Error**

3.2.1.2 Create Participant Information

The logical API service request **Create Participant Information** is used to provision information regarding in which FSP a party is located.

- Successful response: **Return Participant Information**
- Error response: **Return Participant Information Error**

3.2.1.3 Create Bulk Participant Information

The logical API service request **Bulk Create Participant Information** is used to provision information regarding in which FSP one or more parties are located.

- Successful response: **Return Bulk Participant Information**
- Error response: **Return Bulk Participant Information Error**

3.2.1.4 Delete Participant Information

The logical API service request **Delete Participant Information** is used to remove information regarding in which FSP a party is located.

- Successful response: **Return Participant Information**
- Error response: **Return Participant Information Error**

3.2.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.2.2.1 Return Participant Information

The logical API service response **Return Participant Information** is used to return information from the requests **Lookup Participant Information**, **Create Participant Information**, and **Delete Participant Information**.

3.2.2.2 Return Bulk Participant Information

The logical API service response **Return Bulk Participant Information** is used to return information from the request **Create Bulk Participant Information**.

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3.2.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.2.3.1 Return Participant Information Error

The logical API service error response **Return Participant Information Error** is used to return error information regarding the requests **Lookup Participant Information**, **Create Participant Information**, and **Delete Participant Information**.

3.2.3.2 Return Bulk Participant Information Error

The logical API service error response **Return Bulk Participant Information Error** is used to return error information regarding the request **Create Bulk Participant Information**.

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3.3 API Resource Parties

In the API, a *Party* is an individual, a business, an organization, or a similar entity, that has a financial account in one of the FSPs. The primary purpose of the logical API resource **Parties** is for FSPs to ascertain information regarding a counterparty in an interoperable financial transaction, such as name and birth date of the Party.

3.3.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.3.1.1 Lookup Party Information

The logical API service request **Lookup Party Information** is used by an FSP to request from another FSP information regarding a counterparty in an interoperable financial transaction.

- Successful response: **Return Party Information**
- Error response: **Return Party Information Error**

3.3.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.3.2.1 Return Party Information

The logical API service response **Return Party Information** is used to return information from the request **Lookup Party Information**.

3.3.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.3.3.1 Return Party Information Error

The logical API service error response **Return Party Information Error** is used to return error information regarding the request **Lookup Party Information**.

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3.4 API Resource Transaction Requests

In the API, a *Transaction Request* is a request from a Payee to a Payer to transfer electronic funds to the Payee, which the Payer can accept or reject. The primary purpose of the logical API resource **Transaction Requests** is for a Payee FSP to send the request to transfer to the Payer FSP.

3.4.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.4.1.1 Perform Transaction Request

The logical API service request **Perform Transaction Request** is used to send a Transaction Request from a Payee FSP to the Payer FSP; that is, to ask if a Payer will accept or reject a transaction from the Payer to the Payee.

- Successful response: **Return Transaction Request Information**
- Error response: **Return Transaction Request Information Error**

3.4.1.2 Retrieve Transaction Request Information

The logical API service request **Retrieve Transaction Request Information** is used from a Payee FSP to a Payer FSP to request information regarding a previously-sent Transaction Request.

- Successful response: **Return Transaction Request Information**
- Error response: **Return Transaction Request Information Error**

3.4.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.4.2.1 Return Transaction Request Information

The logical API service response **Return Transaction Request Information** is used to return information from the requests **Perform Transaction Request** or **Retrieve Transaction Request Information**.

3.4.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.4.3.1 Return Transaction Request Information Error

The logical API service error response **Return Transaction Request Information Error** is used to return error information regarding the requests **Perform Transaction Request** or **Retrieve Transaction Request Information**.

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3.5 API Resource Quotes

In the API, a *Quote* is the price for performing an interoperable financial transaction from the Payer FSP to the Payee FSP. The primary purpose of the logical API resource **Quotes** is for a Payer FSP to request a Payee FSP to calculate the Payee FSP's part of the quote.

3.5.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.5.1.1 Calculate Quote

The logical API service request **Calculate Quote** is used from a Payer FSP to ask a Payee FSP to calculate the Payee FSP's part of the quote to perform an interoperable financial transaction. The Payee FSP should also create the ILP Packet and the condition (see Section 3.1.2 for links to more information) when receiving the request.

- Successful response: **Return Quote Information**
- Error response: **Return Quote Information Error**

3.5.1.2 Retrieve Quote Information

The logical API service request **Retrieve Quote Information** is used by a Payer FSP to request that a Payee FSP ask for information regarding a previously-sent **Calculate Quote** request.

- Successful response: **Return Quote Information**
- Error response: **Return Quote Information Error**

3.5.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.5.2.1 Return Quote Information

The logical API service response **Return Quote Information** is used to return information from the requests **Calculate Quote** or **Retrieve Quote Information**.

3.5.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.5.3.1 Return Quote Information Error

The logical API service error response **Return Quote Information Error** is used to return error information regarding the requests **Calculate Quote** or **Retrieve Quote Information**.

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3.6 API Resource Authorizations

In the API, an *Authorization* is an approval from a Payer to perform an interoperable financial transaction by entering the applicable credentials in a Payee FSP system. An example where this kind of approval is used, is when a Payer is using an ATM that is managed by another FSP. The primary purpose of the logical API resource **Authorizations** is for a Payer FSP to request a Payee FSP to ask the Payer to enter the credentials.

3.6.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.6.1.1 Perform Authorization

The logical API service request **Perform Authorization** is used from a Payer FSP to ask a Payee FSP to enter the applicable credentials to approve an interoperable financial transaction.

- Successful response: **Return Authorization Result**
- Error response: **Return Authorization Error**

3.6.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.6.2.1 Return Authorization Result

The logical API service response **Return Authorization Result** is used to return information from the request **Perform Authorization**.

3.6.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.6.3.1 Return Authorization Error

The logical API service error response **Return Authorization Error** is used to return error information regarding the request **Perform Authorization**.

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3.7 API Resource Transfers

In the API, a *Transfer* is hop-to-hop ILP (see Section 3.1.2 for links to more information) transfer of funds. The transfer also contains information regarding the end-to-end interoperable financial transaction. The primary purpose of the logical API resource **Transfers** is for an FSP or Switch to request that the next entity in the chain of the ILP Payment perform the transfer involved in the interoperable financial transaction.

3.7.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.7.1.1 Perform Transfer

The logical API service request **Perform Transfer** is used by an FSP or Switch to request the next entity in the chain of the ILP Payment to reserve the transfer involved in an interoperable financial transaction.

- Successful response: **Return Transfer Information**
- Error response: **Return Transfer Information Error**

3.7.1.2 Retrieve Transfer Information

The logical API service request **Retrieve Transfer Information** is used by an FSP or Switch to request the next entity in the chain of the ILP Payment for information regarding the transfer involved in an interoperable financial transaction.

- Successful response: **Return Transfer Information**
- Error response: **Return Transfer Information Error**

3.7.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.7.2.1 Return Transfer Information

The logical API service response **Return Transfer Information** is used to return information from the requests **Perform Transfer** or **Retrieve Transfer Information**. On receiving the response **Return Transfer Information**, the FSP or Switch should validate the fulfilment (see Section 3.1.2 for links to more information) and commit the reserved transfer if the validation is successful.

3.7.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.7.3.1 Return Transfer Information Error

The logical API service error response **Return Transfer Information Error** is used to return error information regarding the requests **Perform Transfer** or **Retrieve Transfer Information**.

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3.8 API Resource Transactions

In the API, a *Transaction* is an end-to-end interoperable financial transaction between the Payer FSP and Payee FSP. The primary purpose of the logical API resource **Transactions** is for a Payer FSP to request end-to-end information from the Payee FSP regarding an interoperable financial transaction; for example, in order to get a token or code that the Payer can use to redeem a service or product.

3.8.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.8.1.1 Retrieve Transaction Information

The logical API service request **Retrieve Transaction Information** is used by a Payer FSP to request that a Payee FSP get information regarding a previously-performed interoperable financial transaction (by using the logical API resource **Transfers**, see Section 3.7).

- Successful response: **Return Transaction Information**
- Error response: **Return Transaction Information Error**

3.8.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.8.2.1 Return Transaction Information

The logical API service response **Return Transaction Information** is used to return information from the request **Retrieve Transaction Information**.

3.8.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.8.3.1 Return Transaction Information Error

The logical API service error response **Return Transaction Information Error** is used to return error information regarding the request **Retrieve Transaction Information**.

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3.9 API Resource Bulk Quotes

In the API, a *Bulk Quote* is a collection of individual quotes (see Section 3.5 for information regarding a single quote) for performing more than one interoperable financial transaction from the Payer FSP to the Payee FSP. The primary purpose of the logical API resource **Bulk Quotes** is for a Payer FSP to request a Payee FSP to calculate the Payee FSP's part of the bulk quote.

3.9.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.9.1.1 Calculate Bulk Quote

The logical API service request **Calculate Bulk Quote** is used by a Payer FSP to request that a Payee FSP calculate the Payee FSP's part of the quotes to perform more than one interoperable financial transaction. The Payee FSP should also create the ILP Packet and the condition (see Section 3.1.2 for links to more information) per quote when receiving the request.

- Successful response: **Return Bulk Quote Information**
- Error response: **Return Bulk Quote Information Error**

3.9.1.2 Retrieve Bulk Quote Information

The logical API service request **Retrieve Bulk Quote Information** is used by a Payer FSP to request that a Payee FSP ask for information regarding a previously-sent **Calculate Bulk Quote request**.

- Successful response: **Return Bulk Quote Information**
- Error response: **Return Bulk Quote Information Error**

3.9.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.9.2.1 Return Bulk Quote Information

The logical API service response **Return Bulk Quote Information** is used to return information from the requests **Calculate Bulk Quote** or **Retrieve Bulk Quote Information**.

3.9.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.9.3.1 Return Bulk Quote Information Error

The logical API service error response **Return Bulk Quote Information Error** is used to return error information regarding the requests **Calculate Bulk Quote** or **Retrieve Bulk Quote Information**.

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3.10 API Resource Bulk Transfers

In the API, a *Bulk Transfer* is a collection of hop-to-hop ILP (see section 3.1.2 for links to more information) transfers of funds. The transfers also contain information regarding the end-to-end interoperable financial transactions. The primary purpose of the logical API resource **Bulk Transfers** is to enable an FSP or Switch to request that the next entity in the chain of the ILP Payment perform the transfers involved in the interoperable financial transactions.

3.10.1 Requests

This section identifies the logical API service requests that can be sent from a client to a server.

3.10.1.1 Perform Bulk Transfer

The logical API service request **Perform Bulk Transfer** is used by an FSP or Switch to request that the next entity in the chain of the ILP Payment reserve the transfer involved in an interoperable financial transaction.

- Successful response: **Return Bulk Transfer Information**
- Error response: **Return Bulk Transfer Information Error**

3.10.1.2 Retrieve Bulk Transfer Information

The logical API service request **Retrieve Bulk Transfer Information** is used from an FSP or Switch to request that the next entity in the chain of the ILP Payment for information regarding the transfer involved in an interoperable financial transaction.

- Successful response: **Return Bulk Transfer Information**
- Error response: **Return Bulk Transfer Information Error**

3.10.2 Responses

This section identifies the logical API service responses that can be sent back to a client from a server.

3.10.2.1 Return Bulk Transfer Information

The logical API service response **Return Bulk Transfer Information** is used to return information from the requests **Perform Bulk Transfer** or **Retrieve Bulk Transfer Information**. On receiving the response **Return Bulk Transfer Information**, the FSP or Switch should validate the fulfilments (see Section 3.1.2 for links to more information) and commit the reserved transfers if the validations are successful.

3.10.3 Error Responses

This section identifies the logical API service error responses that can be sent back to a client from a server.

3.10.3.1 Return Bulk Transfer Information Error

The logical API service error response **Return Bulk Transfer Information Error** is used to return error information regarding the requests **Perform Bulk Transfer** or **Retrieve Bulk Transfer Information**.

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4 Generic Transaction Patterns

This section provides information about the three primary transaction patterns defined in the Interoperability API:

- *Payer-Initiated Transaction*
- *Payee-Initiated Transaction*
- *Bulk Transaction*

Each transaction pattern defines how funds can be transferred from a Payer located in one Financial Service Provider (FSP) to a Payee located in another FSP.

Both the *Payer-Initiated Transaction* and the *Payee-Initiated Transaction* patterns are intended for a single transfer of funds from one Payer to one Payee. The significant difference between the two patterns is in which of the participants in the transaction is responsible for the initiation of the transaction.

The *Bulk Transaction* pattern should be used when a single Payer would like to transfer funds to multiple Payees, possibly in different FSPs, in a single transaction.

This section also provides information about *Payee-Initiated Transaction using OTP*, which is an alternative to *Payee-Initiated Transaction*.

Additionally, the section provides high-level information about all logical services that are part of the API.

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4.1 Payer-Initiated Transaction

In a *Payer-Initiated Transaction*, the Payer initiates the transaction.

4.1.1 Business Process Pattern Description

The *Payer-Initiated Transaction* pattern should be used whenever a Payer would like to transfer funds to another party whose account is not located in the same FSP.

In most implementations, Payee involvement is limited to receiving a notification in the event of a successful transaction. Exceptions in which the Payee is more involved are:

- In countries that require the Payee to confirm receipt of funds.
- Cases in which the Payee should accept the terms of the transaction (for example, Agent-Initiated Cash-In).

4.1.2 Participants and Roles

The actors in a *Payer-Initiated Transaction* are:

- **Payer** – The payer of funds in a financial transaction.
- **Payee** – The recipient of funds in a financial transaction.

The intermediary objects used in a *Payer-Initiated Transaction* to perform the transaction are:

- **Payer FSP** – The FSP in which the Payer's account is located.
- **Switch (optional)** – An optional entity used for routing of requests between different FSPs. This object can be removed if requests should be routed directly between a Payer and Payee FSP.
- **Account Lookup System** – An entity used for retrieving information regarding accounts or participants. Could be hosted in a separate server, in the Switch, or in the different FSPs.
- **Payee FSP** – The FSP in which the Payee's account is located.

4.1.3 Business Process Sequence Diagram

Figure 1 shows the UML sequence diagram for a *Payer-Initiated Transaction*.

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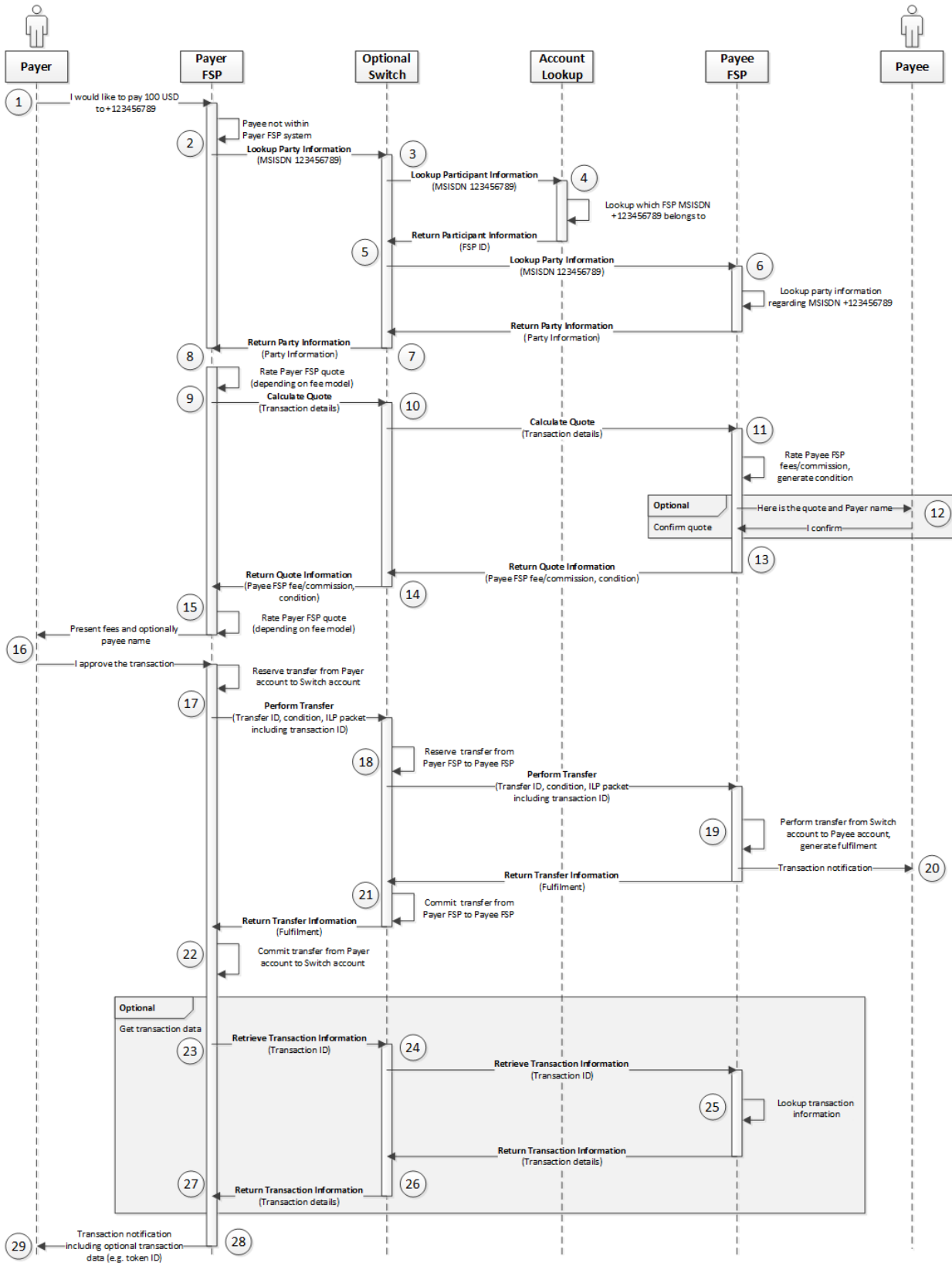


Figure 1 – Payer-Initiated Transaction

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4.1.4 Internal Processing Steps

This section provides descriptions of and assumptions made for all steps in the sequence shown in Figure 1.

Lookup Counterparty

1. **Description**

The Payer initiates the transaction by requesting to send funds to a Payee, using the Payer FSP's front-end API (outside the scope of this API).

Assumptions

None.

2. **Description**

The Payer FSP tries to find the Payee within the FSP system. Because the Payee cannot be found in the Payer FSP system, the request **Lookup Party Information** is sent by the Payer FSP to the optional Switch to get information regarding the Payee, including in which FSP the Payee is located.

Assumptions

The Payee is assumed to be in a different FSP than the Payer. Also, a Switch is assumed to be placed between the Payer FSP and the Payee FSP to route the messages between FSPs. The Switch is optional in the process, as the request **Lookup Party Information** could also be sent directly to the Payee FSP if there is no Switch in-between. As the Payer FSP should not know in which FSP the Payee is located if there is no Switch present, the request might need to be sent to more than one FSP.

3. **Description**

The Switch receives the request **Lookup Party Information**. The Switch then tries to find in which FSP the Payee is located by sending the request **Lookup Participant Information** to the Account Lookup System.

Assumptions

An Account Lookup System is assumed to exist in a different server than the Switch. It is possible that the Account Lookup System is in the same system as the Switch.

4. **Description**

The Account Lookup System receives the request **Lookup Participant Information**. It then performs an internal lookup to find in which FSP the Payee is located. When the lookup is completed, the response **Return Participant Information** is sent to inform the Switch about which FSP the Payee is located in.

Assumptions

The Payee can be found by the Account Lookup System.

5. **Description**

The Switch receives the response **Return Participant Information**. As the Switch now knows in which FSP the Payee is located, the Switch sends the request **Lookup Party Information** to the Payee FSP to get more information about the Payee.

Assumptions

None.

6. **Description**

The Payee FSP receives the request **Lookup Party Information**. The Payee FSP then does an internal lookup to find more information regarding the Payee and sends the response **Return Party Information** to the Switch.

Assumptions

None.

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7. Description

The Switch receives the response **Return Party Information**. The Switch then routes the **Return Party Information** response to the Payer FSP to send the information about the Payee.

Assumptions

None.

8. Description

The Payer FSP receives the response **Return Party Information** containing information about the Payee.

Assumptions

None.

Calculate Quote

9. Description

Depending on the fee model used, the Payer FSP rates the transaction internally and includes the quote information in the request **Calculate Quote** to a Switch to retrieve the full quote for performing the interoperable financial transaction from the Payer FSP to the Payee FSP. The transaction details are sent in the parameters of the request to allow for the Payee FSP to correctly calculate the quote.

Assumptions

In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Calculate Quote** could also be sent directly to the Payee FSP if there is no Switch in-between.

10. Description

The Switch receives the **Calculate Quote** request. The Switch then routes the request to the Payee FSP, using the same parameters.

Assumptions

None.

11. Description

The Payee FSP receives the **Calculate Quote** request. The Payee FSP then internally calculates the fees or FSP commission for performing the transaction. It then constructs the ILP Packet containing the ILP Address of the Payee, the amount that the Payee will receive, and the transaction details. The fulfilment and the condition are then generated out of the ILP Packet combined with a local secret.

Assumptions

None.

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Optional procedure: Quote Confirmation by Payee

a. Description

Depending on the use case and the fee model used, the Payee might be informed of the quote in order to confirm the proposed financial transaction. The quote is in that case sent to the Payee using a front-end API (outside the scope of this API). The Payee receives the quote including information regarding the transaction including fees and optionally Payer name. The Payee then confirms the quote using a front-end API (outside the scope of this API), and the Payee FSP receives the confirmation from the Payee.

Assumptions

The Payee is assumed to accept and confirm the quote. If the Payee would reject the quote, an error response would be sent from the Payee FSP to the Payer FSP via the Switch to inform about the rejected quote.

End of Optional procedure

12. Description

The Payee FSP uses the response **Return Quote Information** to the Switch to return information to the Payer FSP about the quote, the ILP Packet, and the condition. The quote has an expiration time, to inform the Payer FSP until which point in time the quote is valid.

Assumptions

None.

13. Description

The Switch receives the response **Return Quote Information**. The Switch will then route the response to the Payer FSP.

Assumptions

None.

14. Description

The Payer FSP receives the response **Return Quote Information** from the Switch. The Payer FSP then informs the Payer using a front-end API (outside the scope of this API) about the total fees to perform the transaction, along with the Payee name.

Assumptions

The total quote can be calculated by the Payer FSP. Also, the Payee name was allowed to be sent during the counterparty lookup (depending on regulation on privacy laws).

15. Description

The Payer receives the transaction information including fees, taxes and optionally Payee name. If the Payer rejects the transaction, the sequence ends here.

Assumptions

The Payer is assumed to approve the transaction in this sequence. If the Payer would reject the transaction at this stage, no response regarding the rejection is sent to the Payee FSP. The created quote at the Payee FSP should have an expiry time, at which time it is automatically deleted.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

Perform Transfer

16. Description

The Payer FSP receives an approval of the interoperable financial transaction using a front-end API (out of scope of this API). The Payer FSP then performs all applicable internal transaction validations (for example, limit checks, blacklist check, and so on). If the validations are successful, a transfer of funds is reserved from the Payer's account to either a combined Switch account or a Payee FSP account, depending on setup. After the transfer has been successfully reserved, the request **Perform Transfer** is sent to the Switch to request the Switch to transfer the funds from the Payer FSP account in the Switch to the Payee FSP account. The request **Perform Transfer** includes a reference to the earlier quote, an expiry of the transfer, the ILP Packet, and the condition that was received from the Payee FSP. The interoperable financial transaction is now irrevocable from the Payer FSP.

Assumptions

Internal validations and reservation are assumed to be successful. In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Perform Transfer** could also be sent directly to the Payee FSP if there is no Switch in-between.

17. Description

The Switch receives the request **Perform Transfer**. The Switch then performs all its applicable internal transfer validations (for example, limit checks, blacklist check, and so on). If the validations are successful, a transfer is reserved from a Payer FSP account to a Payee FSP account. After the transfer has been successfully reserved, the request **Perform Transfer** is sent to the Payee FSP, including the same ILP Packet and condition as was received from the Payer FSP. The expiry time should be decreased by the Switch so that the Payee FSP should answer before the Switch answers to the Payer FSP. The transfer is now irrevocable from the Switch.

Assumptions

Internal validations and reservation are successful.

18. Description

The Payee FSP receives the request **Perform Transfer**. The Payee FSP then performs all applicable internal transaction validations (for example, limit checks, blacklist check, and so on). It also verifies that the amount and ILP Address in the ILP Packet are correct and match the amount and Payee in the transaction details stored in the ILP Packet. If all the validations are successful, a transfer of funds is performed from either a combined Switch account or a Payer FSP account to the Payee's account and the fulfilment of the condition is regenerated, using the same secret as in Step 11. After the interoperable financial transaction has been successfully performed, a transaction notification is sent to the Payee using a front-end API (out of scope of this API) and the response **Return Transfer Information** is sent to the Switch, including the regenerated fulfilment. The transfer is now irrevocable from the Payee FSP.

Assumptions

Internal validations and transfer of funds are successful.

19. Description

The Payee receives a transaction notification containing information about the successfully performed transaction.

Assumptions

None.

20. Description

The Switch receives the response **Return Transfer Information**. The Switch then validates the fulfilment and commits the earlier reserved transfer. The Switch then uses the response **Return Transfer Information** to the Payer FSP, using the same parameters.

Assumptions

The fulfilment is assumed to be correctly validated.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

21. Description

The Payer FSP receives the response **Return Transfer Information**. The Payer FSP then validates the fulfilment and commits the earlier reserved transaction.

Assumptions

The fulfilment is assumed to be correctly validated.

Optional fragment: Get Transaction Details

22. Description

In case the interoperable financial transaction contains additional information that is useful for the Payer or the Payer FSP, such as a code or a voucher token, the Payer FSP can use the request **Retrieve Transaction Information** to get the additional transaction information. The request **Retrieve Transaction Information** is sent to the Switch.

Assumptions

None.

23. Description

The Switch receives the request **Retrieve Transaction Information**. The Switch then routes the **Retrieve Transaction Information** request to the Payee FSP.

Assumptions

None.

24. Description

The Payee FSP receives the request **Retrieve Transaction Information**. The Payee FSP then collects the requested information and sends the response **Return Transaction Information** to the Switch.

Assumptions

The transaction with the provided ID can be found in the Payee FSP.

25. Description

The Switch receives the response **Return Transaction Information**. The Switch then routes the **Return Transaction Information** response to the Payer FSP.

Assumptions

None.

26. Description

The Payer FSP receives the response **Return Transaction Information**.

Assumptions

None.

End of Optional fragment

28. Description

The Payer FSP sends a transaction notification to the Payee using a front-end API (out of scope of this API), optionally including transaction details retrieved from the Payee FSP.

Assumptions

None.

29. Description

The Payer receives a transaction notification containing information about the successfully performed transaction.

Assumptions

None.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

4.2 Payee-Initiated Transaction

In a *Payee-Initiated Transaction*, the Payee (that is, the recipient of electronic funds) initiates the transaction.

4.2.1 Business Process Pattern Description

The pattern should be used whenever a Payee would like to receive funds from another party whose account is not located in the same FSP.

In all alternatives to this pattern, the Payer must in some way confirm the request of funds. Some possible alternatives for confirming the request are:

- **Manual approval** – A transaction request is routed from the Payee to the Payer, the Payer can then either approve or reject the transaction.
- **Pre-approval of Payee** – A Payer can pre-approve a specific Payee to request funds, used for automatic approval of, for example, school fees or electric bills.

Another alternative for approval is to use the business pattern *Payee-Initiated Transaction using OTP*, described in Section 4.3.

4.2.2 Participants and Roles

The actors in a *Payee-Initiated Transaction* are:

- **Payer** – The payer of funds in a financial transaction.
- **Payee** – The recipient of funds in a financial transaction.

The intermediary objects used in a *Payee-Initiated Transaction* to perform the transaction are:

- **Payer FSP** – The FSP in which the Payer's account is located.
- **Switch (optional)** – An optional entity used for routing of requests between different FSPs. This object can be removed if requests should be routed directly between a Payer and Payee FSP.
- **Account Lookup System** – An entity used for retrieving information regarding accounts or participants. Could be hosted in a separate server, in the Switch, or in the different FSPs.
- **Payee FSP** – The FSP in which the Payee's account is located.

4.2.3 Business Process Sequence Diagram

Figure 2 shows the UML sequence diagram for a *Payee-Initiated Transaction*.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

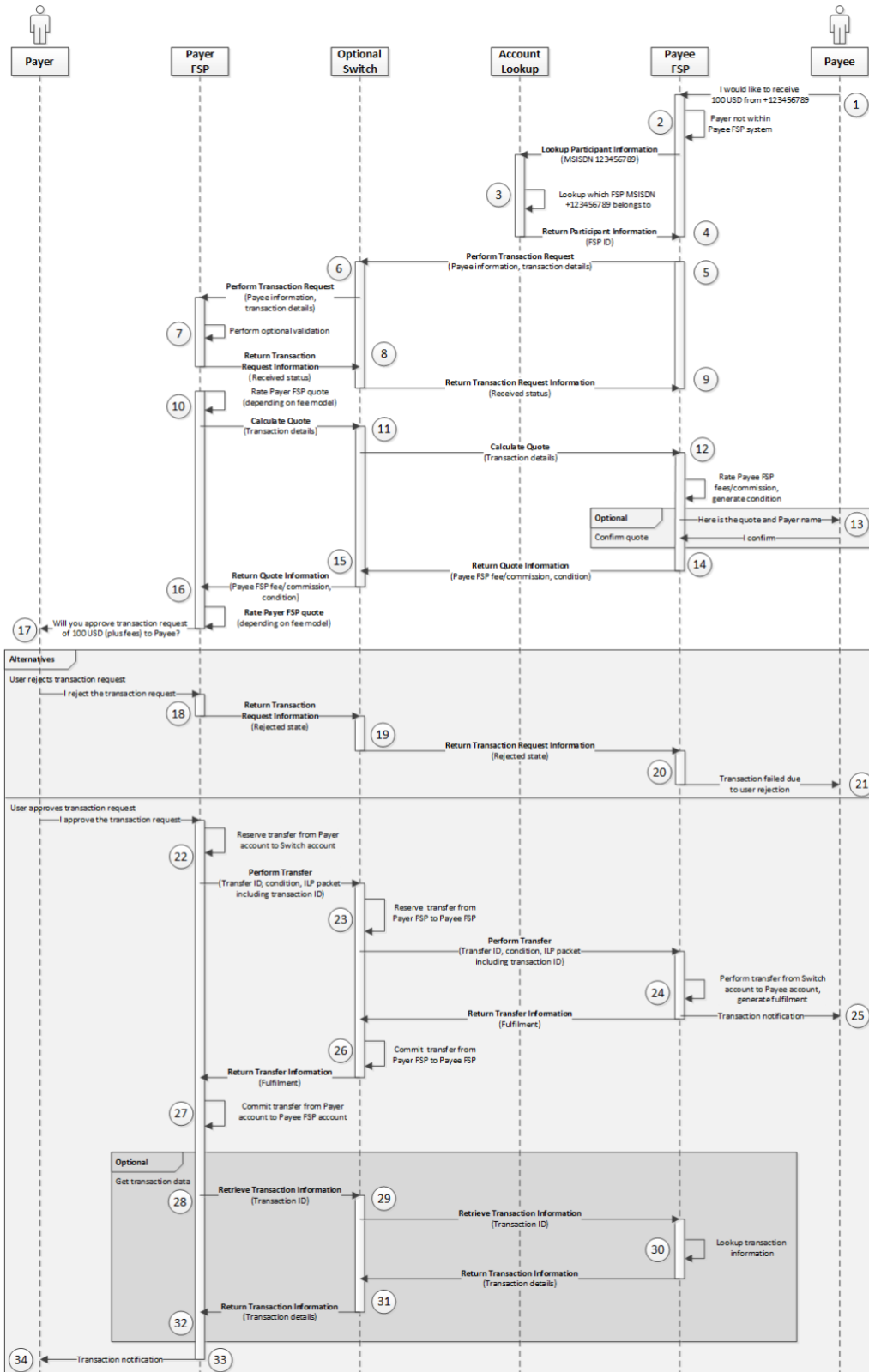


Figure 2 – Payee-Initiated Transaction

Generic Transaction Patterns

Open API for FSP Interoperability Specification

4.2.4 Internal Processing Steps

This section provides descriptions of and assumptions made for all steps in the sequence shown in Figure 2.

Lookup Counterparty

1. **Description**

The Payee initiates the transaction by requesting to receive funds from a Payer, using the Payee FSP's front-end API (outside the scope of this API).

Assumptions

None.

2. **Description**

The Payee FSP tries to find the Payer within the FSP system. Because the Payer cannot be found in the Payee FSP system, the Payee FSP sends the request to the optional Account Lookup System to get information regarding in which FSP the Payer is located.

Assumptions

The Payer is assumed to be located in a different FSP than the Payee. Also, an Account Lookup System is assumed to exist. The Account Lookup System is optional in the process, as the request **Lookup Participant Information** could also be sent directly to the Payer FSP if there is no Account Lookup System. As the Payee FSP should not know in which FSP the Payer is located if there is no Account Lookup System present, the request might need to be sent to more than one FSP. It is also possible that the Payee FSP would like more information about the Payer before a transaction request is sent; in that case the request **Lookup Party Information**, either to the Switch or directly to the Payer FSP, should be sent instead of **Lookup Participant Information** to the Account Lookup System.

3. **Description**

The Account Lookup System receives the **Lookup Participant Information**. It then performs an internal lookup to find in which FSP the Payer is located. When the lookup is completed, the response **Return Participant Information** is sent to inform the Payee FSP about which FSP the Payer is located.

Assumptions

The Payer can be found by the Account Lookup System.

4. **Description**

The Payee FSP receives the response **Return Participant Information**.

Assumptions

None.

Transaction Request

5. **Description**

The Payee FSP sends the request **Perform Transaction Request** to the Switch. The request contains the transaction details including the amount that the Payee would like to receive.

Assumptions

In this sequence, a Switch is placed between the Payee FSP and the Payer FSP to route the messages. The Switch is optional in the process, as the request **Perform Transaction Request** could also be sent directly to the Payer FSP if there is no Switch in-between.

6. **Description**

The Switch receives the **Request Transaction**. The Switch then routes the request to the Payer FSP, using the same parameters.

Assumptions

None.

7. **Description**

Generic Transaction Patterns

Open API for FSP Interoperability Specification

The Payer FSP receives the request **Perform Transaction Request**. The Payer FSP then optionally validates the transaction request (for example, whether the Payer exists) and uses the response **Return Transaction Request Information** to inform the Payee FSP via the Switch that the transaction request has been received.

Assumptions

The optional validation succeeds.

8. Description

The Switch receives the response **Return Transaction Request Information**. The Switch then sends the same response (**Return Transaction Request Information**) to inform the Payee FSP about the successfully delivered transaction request to the Payer FSP.

Assumptions

None.

9. Description

The Payee FSP receives the response **Return Transaction Request Information** from the Switch.

Assumptions

None.

Calculate Quote

10. Description

The Payer FSP rates the transaction internally based on the fee model used and includes the quote information in the request **Calculate Quote** to a Switch to retrieve the full quote for performing the interoperable financial transaction from the Payer FSP to the Payee FSP. The transaction details, including a reference to the earlier sent transaction request, are sent in the parameters of the request to allow for the Payee FSP to correctly calculate the quote.

Assumptions

In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Calculate Quote** could also be sent directly to the Payee FSP if there is no Switch in-between.

11. Description

The Switch receives the **Calculate Quote** request. The Switch then routes the request to the Payee FSP.

Assumptions

None.

12. Description

The Payee FSP receives the **Calculate Quote** request. The Payee FSP then internally calculates the fees or FSP commission for performing the transaction. It then constructs the ILP Packet containing the ILP Address of the Payee, the amount that the Payee will receive, and the transaction details. The fulfilment and the condition are then generated out of the ILP Packet combined with a local secret.

Assumptions

None

Generic Transaction Patterns

Open API for FSP Interoperability Specification

Optional fragment: Quote Confirmation by Payee

13. Description

Depending on use case and the fee model used, the Payee might be informed of the quote so that the Payee can confirm the proposed financial transaction. The quote is in that case sent to the Payee using a front-end API (outside the scope of this API). The Payee receives the quote including information regarding the transaction including fees and optionally Payer name. The Payee then confirms the quote using a front-end API (outside the scope of this API). The Payee FSP receives the confirmation from the Payee.

Assumptions

The quote is assumed to be sent to the Payer for confirmation, and the Payee is assumed to accept and confirm the quote. If the Payee would reject the quote, an error response would be sent from the Payee FSP to the Payer FSP via the Switch to inform about the rejected quote.

End of Optional fragment

14. Description

The Payee FSP uses the response **Return Quote Information** to the Switch to return information to the Payer FSP about the quote, the ILP Packet, and the condition. The quote has an expiration time, to inform the Payer FSP until which point in time the quote is valid.

Assumptions

None.

15. Description

The Switch receives the response **Return Quote Information**. The Switch then routes the response to the Payer FSP.

Assumptions

None.

16. Description

The Payer FSP receives the response **Return Quote Information** from the Switch. The Payer FSP then informs the Payer using a front-end API (outside the scope of this API) about the transaction request from the Payee, including the amount and the total fees required to perform the transaction, along with the Payee name.

Assumptions

The total quote can be calculated by the Payer FSP. Also, the Payee name was allowed to be sent during the counterparty lookup (depending on regulation on privacy laws).

17. Description

The Payer receives the transaction request information including fees, taxes and optionally Payee name.

Assumptions

If the Payer rejects the transaction request, the sequence proceeds to Step 18. If the Payer approves the transaction request, the sequence proceeds to Step 22.

Alternative: Transaction Rejection

18. Description

The Payer FSP receives the rejection of the transaction request using a front-end API (out of scope of this API). The Payer FSP then uses the response **Return Transaction Request Information** with a rejected status to inform the Switch that the transaction was rejected.

Assumptions

The Payer is assumed to reject the transaction request in Step 17.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

19. Description

The Switch receives the response **Return Transaction Request Information** from the Payer FSP. The Switch then routes the response **Return Transaction Request Information** to the Payee FSP.

Assumptions

None.

20. Description

The Payee FSP receives the response **Return Transaction Request Information** with a rejected status from the Switch. The Payee FSP then informs the Payee using a front-end API (outside the scope of this API) about the rejected transaction request.

Assumptions

None.

21. Description

The Payee receives the notification that the transaction was rejected. The process ends here as the transaction request was rejected and the Payee has been informed of the decision.

Assumptions

None.

Alternative: Perform Transfer

22. Description

The Payer FSP receives an approval of the interoperable financial transaction using a front-end API (out of scope of this API). The Payer FSP then performs all applicable internal transaction validations (for example, limit checks, blacklist check, and so on). If the validations are successful, a transfer of funds is reserved from the Payer's account to either a combined Switch account or a Payee FSP account, depending on setup. After the transfer has been successfully reserved, the request **Perform Transfer** is sent to the Switch to request the Switch to transfer the funds from the Payer FSP account in the Switch to the Payee FSP account. The request **Perform Transfer** includes a reference to the earlier quote, an expiry of the transfer, the ILP Packet, and the condition that was received from the Payee FSP. The interoperable financial transaction is now irrevocable from the Payer FSP.

Assumptions

The Payer is assumed to approve the transaction request in Step 17. Internal validations and reservation are assumed to be successful. In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Perform Transfer** could also be sent directly to the Payee FSP if there is no Switch in-between.

23. Description

The Switch receives the request **Perform Transfer**. The Switch then performs all its applicable internal transfer validations (for example, limit checks, blacklist check, and so on). If the validations are successful, a transfer is reserved from a Payer FSP account to a Payee FSP account. After the transfer has been successfully reserved, the request **Perform Transfer** is sent to the Payee FSP, including the same ILP Packet and condition as was received from the Payer FSP. The expiry time should be decreased by the Switch, so that the Payee FSP should answer before the Switch should answer to the Payer FSP. The transfer is now irrevocable from the Switch.

Assumptions

Internal validations and reservation are successful.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

24. Description

The Payee FSP receives the request **Perform Transfer**. The Payee FSP then performs all applicable internal transaction validations (for example, limit checks, blacklist check, and so on). It also verifies that the amount and ILP Address in the ILP Packet are correct and match the amount and Payee in the transaction details stored in the ILP Packet. If all the validations are successful, a transfer of funds is performed from either a combined Switch account or a Payer FSP account to the Payee's account and the fulfilment of the condition is regenerated, using the same secret as in Step 11. After the interoperable financial transaction has been successfully performed, a transaction notification is sent to the Payee using a front-end API (out of scope of this API) and the response **Return Transfer Information** is sent to the Switch, including the regenerated fulfilment. The transfer is now irrevocable from the Payee FSP.

Assumptions

Internal validations and transfer of funds are successful.

25. Description

The Payee receives a transaction notification containing information about the successfully performed transaction.

Assumptions

None.

26. Description

The Switch receives the response **Return Transfer Information**. The Switch then validates the fulfilment and commits the earlier reserved transfer. The Switch then uses the response **Return Transfer Information** to the Payer FSP, using the same parameters.

Assumptions

The fulfilment is assumed to be correctly validated.

27. Description

The Payer FSP receives the response **Return Transfer Information**. The Payer FSP then validates the fulfilment and commits the earlier reserved transaction.

Assumptions

The fulfilment is assumed to be correctly validated.

Optional fragment: Get Transaction Details

28. Description

In case the interoperable financial transaction contains additional information that is useful for the Payer or the Payer FSP; for example, a code or a voucher token, the Payer FSP can use the request **Retrieve Transaction Information** to get the additional information. The request **Retrieve Transaction Information** is sent to the Switch.

Assumptions

None.

29. Description

The Switch receives the request **Retrieve Transaction Information**. The Switch then routes the request **Retrieve Transaction Information** to the Payee FSP.

Assumptions

None.

30. Description

The Payee FSP receives the request **Retrieve Transaction Information**. The Payee FSP then collects the requested information and uses the response **Return Transaction Information** to the Switch.

Assumptions

The transaction with the provided ID can be found in the Payee FSP.

31. Description

Generic Transaction Patterns

Open API for FSP Interoperability Specification

The Switch receives the response **Return Transaction Information**. The Switch then routes the **Return Transaction Information** response to the Payer FSP.

Assumptions

None.

32. Description

The Payer FSP receives the response **Return Transaction Information** from the Switch.

Assumptions

None.

End of Optional fragment

33. Description

The Payer FSP sends a transaction notification to the Payee using a front-end API (out of scope of this API), optionally including transaction details retrieved from the Payee FSP.

Assumptions

None.

34. Description

The Payer receives a transaction notification containing information about the successfully performed transaction.

Assumptions

None.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

4.3 Payee-Initiated Transaction using OTP

A *Payee-Initiated Transaction using OTP* is very similar to a *Payee-Initiated Transaction*, but the transaction information (including fees and taxes) and approval for the Payer is shown/entered on a Payee device instead.

4.3.1 Business Process Pattern Description

The pattern should be used when a Payee would like to receive funds from another party whose account is not located in the same FSP, and both the transaction information (including fees and taxes) and approval is shown/entered on a Payee device instead.

- **Approval using OTP** – A Payer can approve a transaction by first creating an OTP in his/her FSP. An alternative to user-initiated creation of OTP is that the OTP is automatically generated and sent by the Payer FSP. The same OTP is then entered by the Payer in a Payee device, usually a POS device or an ATM. The OTP in the transaction request is automatically matched by the Payer FSP to either approve or reject the transaction. The OTP does not need to be encrypted as it should only be valid once during a short time period.

4.3.2 Participants and Roles

The actors in a *Payee-Initiated Transaction using OTP* are:

- **Payer** – The payer of funds in a financial transaction.
- **Payee** – The recipient of funds in a financial transaction.

The intermediary objects used in a *Payee-Initiated Transaction using OTP* to perform the transaction are:

- **Payer FSP** – The FSP in which the Payer's account is located.
- **Switch (optional)** – An optional entity used for routing of requests between different FSPs. This object can be removed if requests should be routed directly between a Payer and Payee FSP.
- **Account Lookup System** – An entity used for retrieving information regarding accounts or participants. Could be hosted in a separate server, in the Switch, or in the different FSPs.
- **Payee FSP** – The FSP in which the Payee's account is located.

4.3.3 Business Process Sequence Diagram

Figure 3 shows the UML sequence diagram for a *Payee-Initiated Transaction using OTP*.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

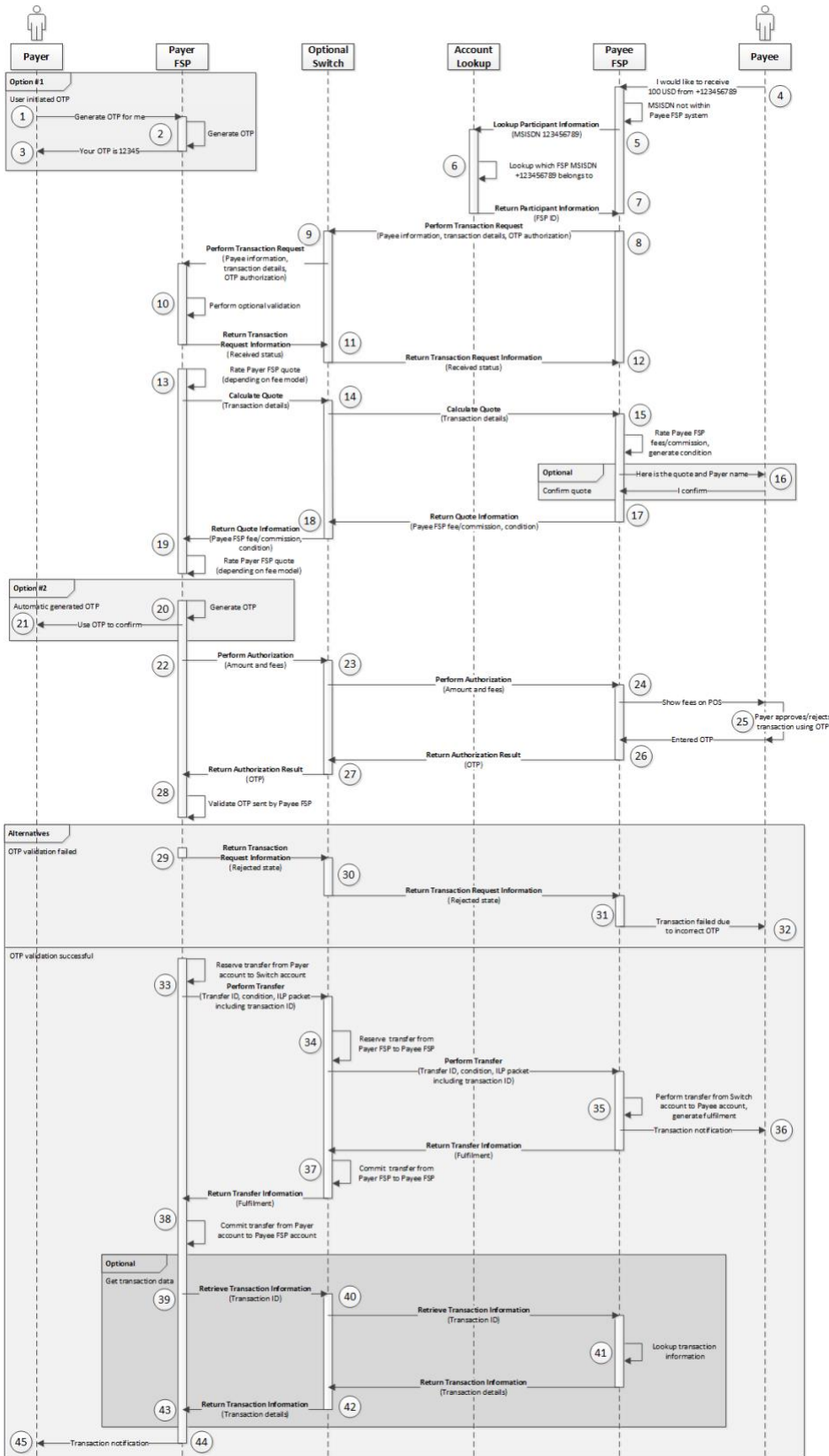


Figure 3 – Payee-Initiated Transaction using OTP

Generic Transaction Patterns

Open API for FSP Interoperability Specification

4.3.4 Internal Processing Steps

This section provides descriptions of and assumptions made for all steps in the sequence shown in Figure 3.

Optional fragment: Manual OTP request

1. **Description**

The Payer requests that an OTP be generated, using the Payer FSP's front-end API (outside the scope of this API).

Assumptions

There are two alternatives for generating an OTP; either it is generated upon request by the Payer (this option), or it is automatically generated in Step 19.

2. **Description**

The Payer FSP receives the request to generate an OTP and returns a generated OTP to the Payer, using the Payer FSP's front-end API (outside the scope of this API).

Assumptions

None.

3. **Description**

Payer receives the generated OTP. The OTP can then be used by the Payer in Step 25 for automatic approval.

Assumptions

None.

End of Optional fragment

Lookup Counterparty

4. **Description**

The Payee initiates the transaction by requesting to receive funds from a Payer, using the Payee FSP's front-end API (outside the scope of this API).

Assumptions

None.

5. **Description**

The Payee FSP tries to find the Payer within the FSP system. Because the Payer cannot be found in the Payee FSP system, the request **Lookup Participant Information** is sent by the Payee FSP to the optional Account Lookup System to get information regarding in which FSP the Payer is located.

Assumptions

The Payer is assumed to be in a different FSP than the Payee. Also, an Account Lookup System is assumed to exist. The Account Lookup System is optional in the process, as the request **Lookup Participant Information** could also be sent directly to the Payer FSP if there is no Account Lookup System. As the Payee FSP should not know in which FSP the Payer is located if there is no Account Lookup System present, the request might need to be sent to more than one FSP. It is also possible that the Payee FSP would like more information about the Payer before a transaction request is sent; in that case the request **Lookup Party Information**, either to the Switch or directly to the Payer FSP, should be sent instead of **Lookup Participant Information** to the Account Lookup System.

6. **Description**

The Account Lookup System receives the **Lookup Participant Information**. It then performs an internal lookup to find in which FSP the Payer is located. When the lookup is completed, the response **Return Participant Information** is sent to inform the Payee FSP about which FSP the Payer is located in.

Assumptions

The Payer can be found by the Account Lookup System.

7. **Description**

Generic Transaction Patterns

Open API for FSP Interoperability Specification

The Payee FSP receives the response **Return Participant Information**.

Assumptions

None.

Transaction Request

8. Description

The Payee FSP sends the request **Perform Transaction Request** to the Switch. The request contains the transaction details including the amount that the Payee would like to receive, and that the request should be validated using an OTP (possibly a QR code containing a OTP).

Assumptions

In this sequence, a Switch is placed between the Payee FSP and the Payer FSP to route the messages. The Switch is optional in the process, as the request **Perform Transaction Request** could also be sent directly to the Payer FSP if there is no Switch in-between.

9. Description

The Switch receives the request **Perform Transaction Request**. The Switch then routes the request to the Payer FSP, using the same parameters.

Assumptions

None.

10. Description

The Payer FSP receives the request **Perform Transaction Request**. The Payer FSP then optionally validates the transaction request (for example, whether the Payer exists or not) and sends the response **Return Transaction Request Information** to inform the Payee FSP via the Switch that the transaction request has been received.

Assumptions

The optional validation succeeds.

11. Description

The Switch receives the response **Return Transaction Request Information**. The Switch then uses the same response **Return Transaction Request Information** to inform the Payee FSP about the successfully delivered transaction request to the Payer FSP.

Assumptions: None.

12. Description

The Payee FSP receives the response **Return Transaction Request Information** from the Switch.

Assumptions

None.

Calculate Quote

13. Description

The Payer FSP rates the transaction internally based on the fee model used and includes the quote information in the request **Calculate Quote** to a Switch to retrieve the full quote for performing the interoperable financial transaction from the Payer FSP to the Payee FSP. The transaction details, including a reference to the transaction request, are sent in the parameters of the request to allow for the Payee FSP to correctly calculate the quote.

Assumptions

In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Calculate Quote** could also be sent directly to the Payee FSP if there is no Switch in-between.

14. Description

Generic Transaction Patterns

Open API for FSP Interoperability Specification

The Switch receives the **Calculate Quote** request. The Switch then routes the request to the Payee FSP, using the same parameters.

Assumptions

None.

15. Description

The Payee FSP receives the **Calculate Quote** request. The Payee FSP then internally calculates the fees or FSP commission for performing the transaction. It then constructs the ILP Packet containing the ILP Address of the Payee, the amount that the Payee will receive, and the transaction details. The fulfilment and the condition is then generated out of the ILP Packet combined with a local secret.

Assumptions

None.

Optional fragment: Quote Confirmation by Payee

16. Description

Depending on the fee model used and which use case it is, the Payee might be informed of the quote to be able to confirm the proposed financial transaction. The quote is in that case sent to the Payee using a front-end API (outside the scope of this API). The Payee receives the quote including information regarding the transaction including fees and optionally Payer name. The Payee then confirms the quote using a front-end API (outside the scope of this API). The Payee FSP receives the confirmation from the Payee.

Assumptions

The quote is assumed to be sent to the Payer for confirmation, and the Payee is assumed to accept and confirm the quote. If the Payee would reject the quote, an error response would be sent from the Payee FSP to the Payer FSP via the Switch to inform about the rejected quote.

End of Optional fragment

17. Description

The Payee FSP uses the response **Return Quote Information** to the Switch to return information to the Payer FSP about the quote, the ILP Packet, and the condition. The quote has an expiration time, to inform the Payer FSP until which point in time the quote is valid.

Assumptions

None.

18. Description

The Switch receives the response **Return Quote Information**. The Switch will then route the request to the Payer FSP.

Assumptions

None.

19. Description

The Payer FSP receives the response **Return Quote Information** from the Switch.

Assumptions

The total quote can be calculated by the Payer FSP.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

Optional fragment: Automatic OTP generation

20. Description

The Payer FSP automatically generates an OTP and sends it to the Payer, using the Payer FSP's front-end API (outside the scope of this API).

Assumptions

There are two alternatives for generating the OTP. Either it is generated upon request by the Payer (Step 1), or it is automatically generated (this option).

21. Description

The Payer receives the automatically-generated OTP.

Assumptions

None.

End of Optional fragment

22. Description

The Payer FSP sends the request **Perform Authorization** to the Switch, to get an authorization to perform the transaction from the Payer via a POS, ATM, or similar payment device, in the Payee FSP. The request includes the amount to be withdrawn from the Payer's account, and how many retries are left for the Payer to retry the OTP.

Assumptions

None.

23. Description

The Switch receives the request **Perform Authorization** from the Payer FSP. The Switch then routes the **Perform Authorization** to the Payee FSP.

Assumptions

None.

24. Description

The Payee FSP receives the request **Perform Authorization** from the Switch. The Payee FSP sends the authorization request to the Payee device (POS, ATM, or similar payment device) using the Payee FSP's front-end API (outside the scope of this API).

Assumptions

None.

25. Description

The Payee device receives the authorization request, and the Payer can see the amount that will be withdrawn from his or her account. The Payer then uses the OTP received in Step 3 or Step 21, depending on whether the OTP was manually requested or automatically generated. The entered or scanned OTP is then sent to the Payee FSP using the Payee FSP's front-end API (outside the scope of this API).

Assumptions

The Payer has received the OTP in Step 3 or Step 21.

26. Description

The Payee FSP receives the OTP from the Payee device. The Payee FSP then sends the response **Return Authorization Result** to the Switch containing the OTP from the Payer.

Assumptions

None.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

27. Description

The Switch receives the request **Return Authorization Result** from the Payee FSP. The Switch then routes the **Return Authorization Result** to the Payer FSP.

Assumptions

None.

28. Description

The Payer FSP receives the request **Return Authorization Result** to the Switch. The Payer FSP then validates the OTP received from the OTP generated in Step 2 or Step 20. If the Payer FSP is unable to validate the OTP (for example, because the OTP is incorrect) and this was the last remaining retry for the Payer, the sequence continues with Step 29. If the Payer FSP correctly validates the OTP, the sequence continues with Step 33.

Assumptions

None.

Alternative: OTP validation failed

29. Description

The validation in Step 28 fails and this was the final retry for the Payer. The Payer FSP then uses the response **Return Transaction Request Information** with a rejected state to inform the Switch that the transaction was rejected.

Assumptions

The OTP validation in Step 28 is assumed to fail and no more retries remains for the Payer.

30. Description

The Switch receives the response **Return Transaction Request Information** from the Payer FSP. The Switch then routes the **Return Transaction Request Information** response to the Payee FSP.

Assumptions

None.

31. Description

The Payee FSP receives the response **Return Transaction Request Information** with a rejected status from the Switch. The Payee FSP then informs the Payee using a front-end API (outside the scope of this API) about the rejected transaction request.

Assumptions

None.

32. Description

The Payee receives the notification that the transaction was rejected. The process ends here as the transaction request was rejected and the Payee has been informed of the decision. The Payer is also assumed to receive the notification via the Payee device.

Assumptions

None.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

Alternative: OTP validation succeed

33. Description

The validation in Step 28 is successful. The Payer FSP then performs all applicable internal transaction validations (for example, limit checks, blacklist check, and so on). If the validations are successful, a transfer of funds is reserved from the Payer's account to either a combined Switch account or a Payee FSP account, depending on setup. After the transfer has been successfully reserved, the request **Perform Transfer** is sent to the Switch to request the Switch to transfer the funds from the Payer FSP account in the Switch to the Payee FSP account. The request **Perform Transfer** includes a reference to the earlier quote, an expiry of the transfer, the ILP Packet, and the condition that was received from the Payee FSP. The interoperable financial transaction is now irrevocable from the Payer FSP.

Assumptions

The OTP validation in Step 28 is assumed to be successful. Internal validations and reservation are assumed to be successful. In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Perform Transfer** could also be sent directly to the Payee FSP if there is no Switch in-between.

34. Description

The Switch receives the request **Perform Transfer**. The Switch then performs all its applicable internal transfer validations (for example, limit checks, blacklist check, and so on). If the validations are successful, a transfer is reserved from a Payer FSP account to a Payee FSP account. After the transfer has been successfully reserved, the request **Perform Transfer** is sent to the Payee FSP, including the same ILP Packet and condition as was received from the Payer FSP. The expiry time should be decreased by the Switch so that the Payee FSP should answer before the Switch should answer to the Payer FSP. The transfer is now irrevocable from the Switch.

Assumptions

Internal validations and reservation are successful.

35. Description

The Payee FSP receives the **Perform Transfer**. The Payee FSP then performs all applicable internal transaction validations (for example, limit checks, blacklist check, and so on). It also verifies that the amount and ILP Address in the ILP Packet are correct, and match the amount and Payee in the transaction details stored in the ILP Packet. If all the validations are successful, a transfer of funds is performed from either a combined Switch account or a Payer FSP account to the Payee's account and the fulfilment of the condition is regenerated, using the same secret as in Step 11. After the interoperable financial transaction has been successfully performed, a transaction notification is sent to the Payee using a front-end API (out of scope of this API) and the response **Return Transfer Information** is sent to the Switch, including the regenerated fulfilment. The transfer is now irrevocable from the Payee FSP.

Assumptions

Internal validations and transfer of funds are successful.

36. Description

The Payee receives a transaction notification containing information about the successfully performed transaction.

Assumptions

None.

37. Description

The Switch receives the response **Return Transfer Information**. The Switch then validates the fulfilment and commits the earlier reserved transfer. The Switch will then use the response **Return Transfer Information** to the Payer FSP, using the same parameters.

Assumptions

The fulfilment is assumed to be correctly validated.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

38. Description

The Payer FSP receives the response **Return Transfer Information**. The Payer FSP then validates the fulfilment and commits the earlier reserved transaction.

Assumptions

The fulfilment is assumed to be correctly validated.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

Optional fragment: Get Transaction Details

39. **Description**

In case the interoperable financial transaction contains additional information that is useful for the Payer or the Payer FSP, such as a code or a voucher token, the Payer FSP can use the request **Retrieve Transaction Information** to get the additional information. The request **Retrieve Transaction Information** is sent to the Switch.

Assumptions

None.

40. **Description**

The Switch receives the request **Retrieve Transaction Information**. The Switch then routes the request **Retrieve Transaction Information** to the Payee FSP.

Assumptions

None.

41. **Description**

The Payee FSP receives the request **Retrieve Transaction Information**. The Payee FSP then collects the requested information and uses the response **Return Transaction Information** to the Switch.

Assumptions

The transaction with the provided ID can be found in the Payee FSP.

42. **Description**

The Switch receives the response **Return Transaction Information**. The Switch then routes the **Return Transaction Information** response to the Payer FSP.

Assumptions

None.

43. **Description**

The Payer FSP receives the response **Return Transaction Information** from the Switch.

Assumptions

None.

End of Optional fragment

44. **Description**

The Payer FSP sends a transaction notification to the Payee using a front-end API (out of scope of this API), optionally including transaction details retrieved from the Payee FSP.

Assumptions

None.

45. **Description**

The Payer receives a transaction notification containing information about the successfully performed transaction.

Assumptions

None.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

4.4 Bulk Transactions

In a *Bulk Transaction*, the Payer (that is, the sender of funds) initiates multiple transactions to multiple Payees, potentially located in different FSPs.

4.4.1 Business Process Pattern Description

The pattern should be used whenever a Payer would like to transfer funds to multiple Payees in the same transaction. The Payees can potentially be located in different FSPs.

4.4.2 Participants and Roles

The actors in a *Bulk Transaction* are:

- **Payer** – The sender of funds.
- **Payees** – The recipients of funds. There should be multiple Payees in a *Bulk Transaction*.

The intermediary objects used in a *Bulk Transaction* to perform the transaction are:

- **Payer FSP** – The FSP in which the Payer's account is located.
- **Switch (optional)** – An optional entity used for routing of transactions between different FSPs. This object can be removed if transactions should be routed directly between a Payer and Payee FSP.
- **Account Lookup System** – An entity used for retrieving information regarding accounts or participants. Could be hosted in a separate server, in the Switch, or in the different FSPs.
- **Payee FSP** – The FSP in which a Payee's account is located. There may be multiple Payee FSPs in a *Bulk Transaction*.

4.4.3 Business Process Sequence Diagram

Figure 4 shows the UML sequence diagram for a *Bulk Transaction*.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

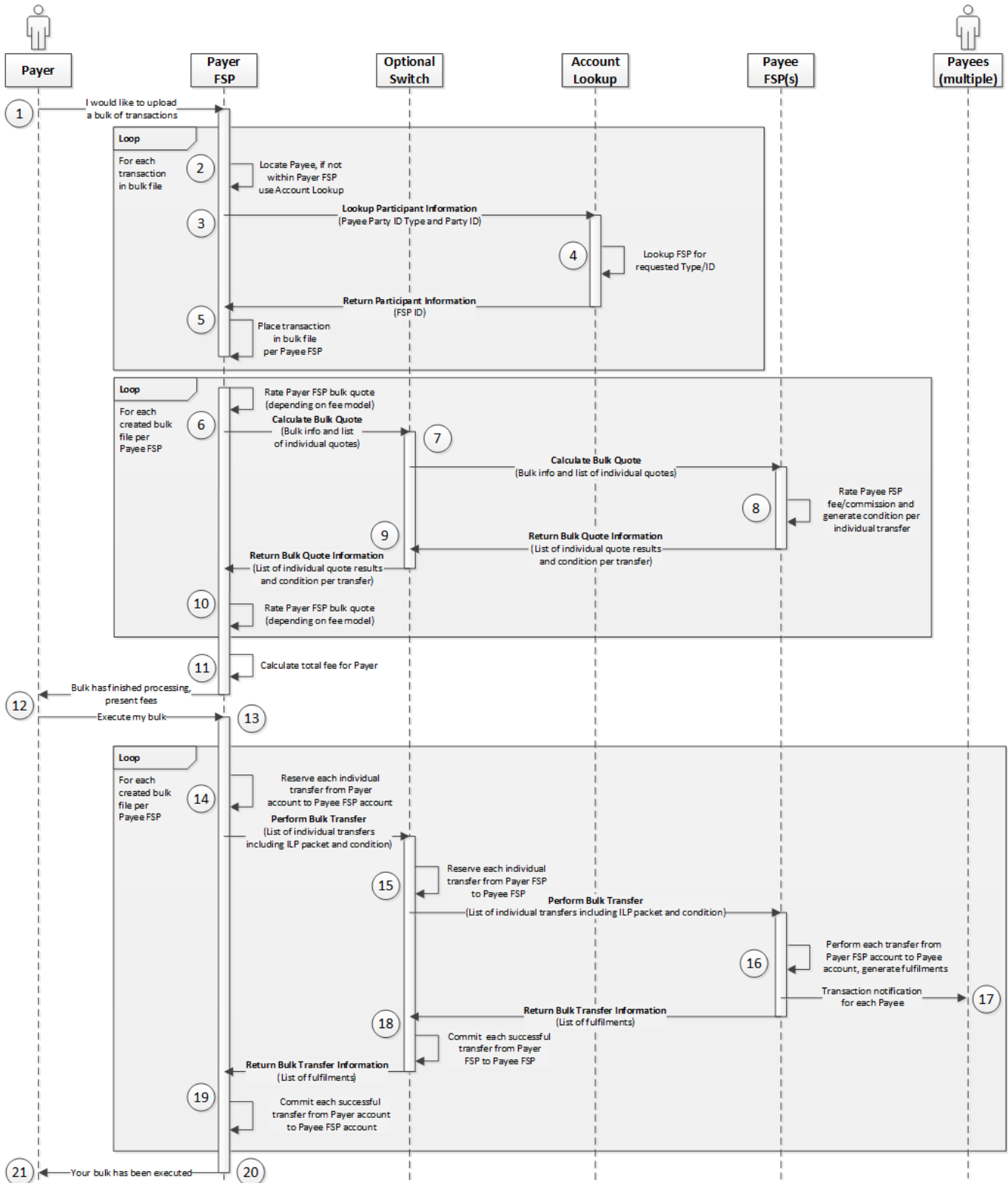


Figure 4 – Bulk Transaction

Generic Transaction Patterns

Open API for FSP Interoperability Specification

4.4.4 Internal Processing Steps

This section provides descriptions of and assumptions made for all steps in the sequence shown in Figure 4.

Lookup Counterparties

1. **Description**

The Payer initiates the bulk transaction process by uploading a bulk file to the Payer FSP, using the Payer FSP's front-end API (outside the scope of this API).

Assumptions

None.

Loop for each Transaction in bulk file

2. **Description**

Payer FSP tries to find the Payee within the Payer FSP system.

Assumptions

The Payee is assumed to be located in a different FSP than the Payer. If the Payee is within the Payer FSP, the transaction can be handled internally in the Payer FSP (outside the scope of this API).

3. **Description**

The Payer FSP sends the request **Lookup Participant Information** to the optional Account Lookup System to get information regarding in which FSP the Payer is present in.

Assumptions

The Payee is assumed to be in a different FSP than the Payer. Also, an Account Lookup System is assumed to exist. The Account Lookup System is optional in the process, as the request **Lookup Participant Information** could also be sent directly to the Payee FSPs if there is no Account Lookup System. As the Payer FSP should not know in which FSP the Payee is located in if there is no Account Lookup System present, the request might need to be sent to more than one FSP. It is also possible that the Payer FSP would like more information about the Payee before a bulk transaction is executed; for example, for additional verification purposes of the Payee name. In that case, the request **Lookup Party Information**, either to the Switch or directly to the Payee FSP, should be sent instead of the request **Lookup Participant Information** to the Account Lookup System.

4. **Description**

The Account Lookup System receives the request **Lookup Participant Information**. It then performs an internal lookup to find in which FSP the Payee is located. When the lookup is completed, the response **Return Participant Information** is sent to inform the Payer FSP about which FSP the Payee is located in.

Assumptions

The Payee can be found by the Account Lookup System.

5. **Description**

The Payer FSP receives the response **Return Participant Information**. The Payee and the related transaction is then placed in a new bulk file separated per Payee FSP.

Assumptions

None.

End of loop for each Transaction

Generic Transaction Patterns

Open API for FSP Interoperability Specification

Calculate Bulk Quote

Loop for each Payee FSP to Calculate Bulk Quote

6. **Description**

The Payer FSP uses the request **Calculate Bulk Quote** on a Switch to retrieve a quote for performing the bulk transaction from the Payer FSP to the Payee FSP. The request contains details for each individual transaction in the bulk transaction.

Assumptions

In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Calculate Bulk Quote** could also be sent directly to the Payee FSP if there is no Switch in-between.

7. **Description**

The Switch receives the **Calculate Bulk Quote** request. The Switch then routes the request to the Payee FSP, using the same parameters.

Assumptions

None.

8. **Description**

The Payee FSP receives the **Calculate Bulk Quote** request. The Payee FSP then internally calculates the fees or FSP commission for performing each individual transaction in the bulk transaction. For each individual transaction, the Payee FSP then constructs an ILP Packet containing the ILP Address of the Payee, the amount that the Payee will receive, and the transaction details. The fulfilment and the condition is then generated out of the ILP Packet combined with a local secret. It then uses the response **Return Bulk Quote Information** to the Switch to inform the Payer FSP about the fees involved in performing the bulk transaction and the ILP Packet and condition. The bulk quote has an expiration date and time, to inform the Payer FSP until which time the bulk quote is valid.

Assumptions

The bulk quote can be calculated by the Payee FSP.

9. **Description**

The Switch receives the response **Return Bulk Quote Information**. The Switch then routes the response to the Payer FSP.

Assumptions

None.

10. **Description**

The Payer FSP receives the response **Return Bulk Quote Information** from the Switch.

Assumptions

None.

End of loop for each Payee FSP

11. **Description**

The Payer FSP calculates any internal bulk fees and taxes, and informs the Payer using a front-end API (outside the scope of this API) about the total fees and taxes to perform the bulk transaction.

Assumptions

None.

Generic Transaction Patterns

Open API for FSP Interoperability Specification

12. Description

The Payer receives the notification about the completed processing of the bulk transaction and the fees and taxes to perform the bulk transaction. The Payer then decides to execute the bulk transaction.

Assumptions

The Payer is assumed to execute the bulk transaction. If the Payer would reject the bulk transaction at this stage, no response is sent to the Payee FSP. The created bulk quote at the Payee FSPs should have an expiry date; that is, at which time it's automatically deleted.

Perform Bulk Transfer

13. Description

The Payer FSP receives the request to execute the bulk transaction from the Payer.

Assumptions

None.

Loop for each Payee FSP to perform Bulk Transfer

14. Description

The Payer FSP performs all applicable internal transaction validations (for example, limit checks, blacklist check, and so on) for the bulk transaction to the Payee FSP. If the validations are successful, a transfer of funds is reserved from the Payer's account to either a combined Switch account or a Payee FSP account, depending on setup. After the transfer has been successfully reserved, the request **Perform Bulk Transfer** is sent to the Switch. The request **Perform Bulk Transfer includes** a reference to the earlier bulk quote, an expiry of the bulk transfer, and the ILP Packets and condition per transfer that was received from the Payee FSP. The interoperable financial transaction is now irrevocable from the Payer FSP. The interoperable bulk transaction is now irrevocable from the Payer FSP.

Assumptions

In this sequence, a Switch is placed between the Payer FSP and the Payee FSP to route the messages. The Switch is optional in the process, as the request **Perform Bulk Transfer** could also be sent directly to the Payee FSP if there is no Switch in-between.

15. Description

The Switch receives the request **Perform Bulk Transfer**. The Switch then performs all applicable internal transfer validations (such as limit checks, blacklist check, and so on). If the validations are successful, a transfer is reserved from a Payer FSP account to a Payee FSP account. After the transfer has been successfully reserved, the request **Perform Bulk Transfer** is sent to the Payee FSP, including the same ILP Packets and conditions for each transfer that were received from the Payer FSP. The expiry time should be decreased by the Switch so that the Payee FSP should answer before the Switch should answer to the Payer FSP. The bulk transfer is now irrevocable from the Switch.

Assumptions

Internal validations and reservation are successful.

16. Description

The Payee FSP receives the request **Perform Bulk Transfer**. The Payee FSP then performs all applicable internal transaction validations (such as limit checks, and blacklist checks) for each individual transaction in the bulk transaction. If the validations are successful, a transfer of funds is performed from either a combined Switch account or a Payer FSP account, depending on setup, to each of the Payees' accounts and the fulfilment of each condition is regenerated, using the same secret as in Step 8. After each transfer to a Payee has been successfully performed, a transaction notification is sent to the Payee using a front-end API (out of scope of this API). After each of the individual transactions in the bulk transaction has been completed, the response **Return Bulk Transfer Information** is sent to the Switch to inform the Switch and the Payer FSP of the result including each fulfilment. The transactions in the bulk transaction are now irrevocable from the Payee FSP.

Assumptions

Generic Transaction Patterns

Open API for FSP Interoperability Specification

Internal validations and transfers of funds are successful.

17. **Description**

Each Payee receives a transaction notification containing information about the successfully performed transaction.

Assumptions

None.

18. **Description**

The Switch receives the response **Return Bulk Transfer Information**. The Switch then validates the fulfilments and commits the earlier reserved transfers. The Switch then uses the response **Return Bulk Transfer Information** to the Payer FSP, using the same parameters.

Assumptions

Each individual transaction in the bulk transaction is assumed to be successful in the Payee FSP, and the validation of the fulfilments is also assumed to be correct. If one or more of the transactions in the bulk transaction were unsuccessful, the earlier reserved, now unsuccessful, transfer or transfers in the Switch would need to be cancelled.

19. **Description**

The Payer FSP receives the response **Return Bulk Transfer Information**. The Payer FSP then commits the earlier reserved transfers. After the bulk transaction has been successfully committed, a transaction notification is sent to the Payer using a front-end API (out of scope of this API).

Assumptions

Each individual transaction in the bulk transaction is assumed to be successful in the Payee FSP, and the validation of the fulfilments is also assumed to be correct. If one or more of the transactions in the bulk transaction were unsuccessful, the earlier reserved transfer in the Payer FSP would need to be updated with the total amount of all successful transactions before being committed.

End of loop for each Payee FSP

20. **Description**

After each of the Payee FSPs has executed their part of the bulk transaction, a response is sent to the Payer using a front-end API (out of scope for this API).

Assumptions

None.

21. **Description**

The Payer receives a bulk transaction notification containing information about the successfully performed bulk transaction.

Assumptions

None.