PolishAPI

Specification of an interface for the needs of services provided by third parties on the basis of access to payment accounts

Document developed by the PolishAPI Project Group

18 September 2018
Version 2.1

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1 Glossary of Terms used in the Document

Account Information Service (AIS) – as defined in Art. 66 of PSD2.

Account Information Service Provider (AISP) – TPPs using the XS2A interface to access information about the PSU's payment account.

Confirmation of the Availability of Funds (CAF) – a service defined in Art. 65 of PSD2.

External Authorization Tool (EAT) – a system providing the SCA procedure, i.e. the strong authentication of PSU.

European Banking Authority (EBA) – the European Banking Authority.

ETSI – European Telecommunication Standardisation Institute.

OAuth2 – Oauth2 is an open authorisation standard. It allows users to share their private resources (e.g. pictures, films, contacts) stored at a given site with another party without a necessity to fathom the complexities of authorisation, usually providing the user name and a token (one-time passwords).

Payment Initiation Service Provider (PISP) – TPPs using the XS2A interface to initiate the a payment transaction debited to the PSU's account.

Payment Initiation Services (PIS) – as defined in Art. 67 of PSD2.

Payment Instrument Issuer Service Provider (PIISP) – TPPs using the XS2A interface to confirm the availability at the PSU's payment account of an amount necessary to effect the payment transaction performed on the basis of an instrument issued by the PIISP.

Payment Services Directive (PSD) – Directive 2007/64/EC of the European Parliament and of the Council on payment services in the internal market.

Payment Services Directive 2 (PSD2) – Directive 2015/2366 of the European Parliament and of the Council on payment services in the internal market and repealing Directive 2007/64/EC.

Payment Services User (PSU) – natural or legal person making use of a payment service in the capacity of either payer or payee, or both.

Payment account – an account held in the name of one or more payment service users which is used for the execution of payment transactions.

Regulatory Technical Standard (RTS) – Commission Delegated Regulation (EU) No. 2018/389 of 27 November 2017 supplementing Directive (EU) 2015/2366 of the European Parliament and of the Council with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication.

Revised Payment Services Directive (PSD2) – Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market (revised payment services directive).

Strong Customer Authentication (SCA) - means an authentication based on the use of two or more elements (components) categorised as knowledge (something only the user knows), possession (something only the user possesses) and inherence (something the user is) that are independent, in that the breach of one does not compromise the reliability of the others, and is designed in such a way as to protect the confidentiality of the authentication data.

Swagger – is an open source software which helps design, build, document and consume the RESTful Web services.

TS 119 495 – (v. 1.1.1) a technical specification of the standard concerning the qualified certificate profile for the needs of the Payment Services Directive (Electronic Signatures and Infrastructures (ESI); Sector Specific Requirements; Qualified Certificate Profiles and TSP Policy Requirements under the Payment Services Directive 2015/2366/EU), published in January 2018.

Granting Consent – a process in result of which the PSU grants TPP consent to access his/her account held by the ASPSP in order to effect a service, including the AIS, PIS and CAF services.

Authentication – a process in result of which the ASPSP verifies the PSU's identity.

Payment Services Act – Polish Payment Services Act of 19 August 2011.

XS2A (Access to Account) – access to payment accounts used to perform AIS, PIS, CAF and other services effected as part of the PolishAPI.

Premium Scope of the AIS, PIS and CAF services **–** services exceeding the requirements laid down in PSD2.

Compliance Scope of the AIS, PIS and CAF services **–** services required by PSD2.

2 Introduction

2.1 Context

The implementation by the European Union of the new directive on payment services in the internal market (PSD2) introduces a possibility to offer new products and services related not only to the payment service market but also the financial service market in the wider sense. Both the entities present on the market, such as banks, cooperative savings and credit unions (SKOK) or branches of foreign credit institutions, as well as new types of entities (third party providers - TPP) will be able to take advantage of the possibility to offer new services built on the basis of the PSD2 Directive, the implementing acts (including the regulatory technical standards - RTS) and national acts of law. The new categories of services are:

a) **Account Information Service (AIS)** – as defined in Art. 67 of PSD2
b) **Payment Initiation Service (PIS)** – as defined in Art. 66 of PSD2
c) **Confirmation of the Availability of Funds (CAF)** – as defined in Art. 65 of PSD2

Allowing the performance of the above-mentioned services by entities authorised to do so required the preparation by account servicing payment service providers (ASPSP) of dedicated interfaces allowing access to payment accounts (the XS2A interface) by authorised third party providers (TPP), based on an open API.

Banks and other entities cooperating with the Polish Bank Association took a decision on the creation of a common and universal API standard drawing on the existing achievements of the Polish banking and payment sectors, the best practices and experiences, including those resulting from foreign API standards, as well as the existing interfaces of the interbanking infrastructure. Banks and other ASPSP will be able to implement the standard, depending on the business decisions they take independently. During the work of the business, IT, security and legal task forces, assumptions were formulated and then the standard description was created as presented herein below.

The basis assumed for this standard version was the Delegated Regulation with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication (RTS), as published in the Official Journal of the European Union on 13 March 2018 (https://eur-lex.europa.eu/legal-content/PL/TXT/?uri=uriserv:OJ.L_.2018.069.01.0023.01.POL&toc=OJ:L:2018:069:TOC).

The following entities took part in the preparation of this standard (in an alphabetical order):
1) Allegro Group
2) Biuro Informacji Kredytowej S.A.
3) Billbird S.A.
4) Blue Media S.A.
5) Diners Club Polska
6) Krajowa Izba Rozliczeniowa S.A.
7) Kontomierz.pl Sp. z o.o.
8) National Savings and Credit Union
9) Polish Association of Cooperative Banks
10) PayU S.A.
11) Polish Chamber of Information Technology and Telecommunications (PIIT)
12) Polish Insurance Association (PIU)
13) Polski Standard Płatności Sp. z o.o.
14) Polish Organisation of Non-banking Payment Institutions (PONIP)
15) Skycash Poland S.A.
16) F. Stefczyk Cooperative Savings and Credit Union

17) Polish Bank Association together with its associated bank members[1]

The specification draft was subject to public consultation (between 17-31 January 2018), in result of which 21 Polish and foreign entities submitted approx. 300 comments and observations, partially allowed for in this document.

2.2 Document Structure

The document consists of two fundamental parts and of annexes:

a) Part concerning the business characteristics of the PolishAPI Standard (Chapters 2 – 4)
b) Part concerning the technological solutions adopted in the PolishAPI Standard (Chapters 0 – 13)
c) Annexes, the list of which is given in Chapter 14

2.3 Mission of the PolishAPI Standard

The main objective of this document is to define interfaces for services described in PSD2 and related acts of law as regards the interactions between ASPSPs and TPPs during the performance of the AIS, PIS and CAF services. The requirement of open APIs also provides a chance that ASPSPs and TPPs will obtain an opportunity under a single standard to offer not only law-required services but also additional services the scope of which exceeds the framework defined by the legislator. Therefore, the following scopes of services can be identified within the PolishAPI standard:

a) **Compliance Scope** of the AIS, PIS and CAF services - services required by PSD2,
b) **Premium Scope** of the AIS, PIS and CAF services - services exceeding the requirements laid down in PSD2, outside the scope of this document.

Each ASPSP and TPP may use the PolishAPI standard as an open standard. The application of the standard is not mandatory. Each of the entities operating on the market on the basis of the PSD2 Directive may use any solution compliant with PSD2 and the related acts of law.

The interactions between the TPPs and PSUs and between ASPSPs and PSUs, as well as the matters related to the processes of making an entry in the national register of TPPs, and of granting of authorisations for the operation of TPPs in the scope related to PSD2-related services by public administration authorities are outside the scope of this document.

A part of the problems remaining within the standard specification scope will be systematically added over time as the project and agreement work (including public consultation) will advance. The above reservation concerns, without limitation, the problems related to specific functionalities of business and corporate accounts (e.g. a multi-signature).

[1] Alior Bank S.A., Bank BGŻ BNP Paribas S.A., Bank Handlowy w Warszawie S.A., Bank Millennium S.A., Bank Pekao S.A., Bank Pocztowy S.A., Bank Polskiej Spółdzielczości S.A., Bank Zachodni WBK S.A., Credit Agricole Bank Polska S.A., Deutsche Bank Polska S.A., DNB Bank Polska S.A., Eurobank S.A., Getin Noble Bank S.A., Idea Bank S.A., ING Bank Śląski S.A., mBank S.A., Nest Bank S.A., PKO Bank Polski S.A., Raiffeisen Bank Polska S.A., SGB-Bank S.A.

2.4 Main Assumptions

2.4.1 Actors in the PolishAPI Standard-defined Processes

The standard defined only three categories of actors that can take part in processes defined by the PolishAPI standard:

a) **Payment Service User (PSU)** – User of the payment account the given payment transaction refers to
b) **Account Servicing Payment Service Provider (ASPSP)** – Provides maintaining the payment account and making the XS2A interface available for TPPs
c) **Third Party Provider (TPP)** – Entity using the XS2A interface on the basis of and in accordance with the consents granted by the PSUs. The ASPSP may also act as a TPP and use the interfaces made available by other ASPSPs

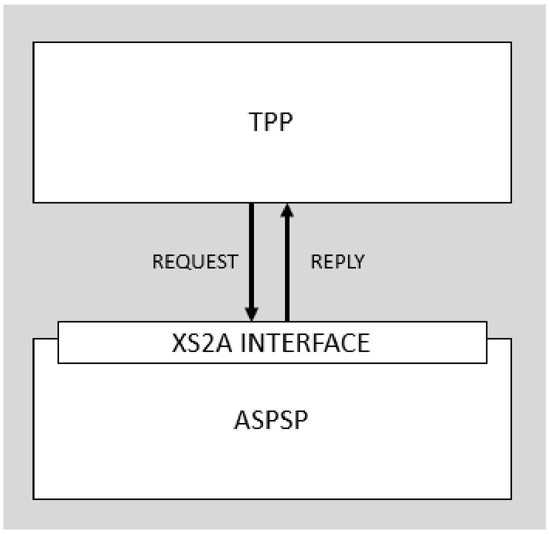


Figure 1: General diagram of PolishAPI Standard communication

The standard defined three roles which the actors taking part in the PolishAPI standard-defined processes can play. The categorisation below does not restrict the entities acting as TPPs to apply for an entry in the national register in more than a single role but aims at defining the roles of particular actors in the description of communication under the PolishAPI standard.

a) **Account Information Service Provider (AISP)** – TPPs using the XS2A interface to access information about the PSU's payment account.
b) **Payment Initiation Service Provider (PISP)** – TPPs using the XS2A interface to initiate the a payment transaction debited to the PSU's account.
c) **Payment Instrument Issuer Service Provider (PIISP)** – TPPs using the XS2A interface to confirm the availability at the PSU's payment account of an amount necessary to effect the payment transaction performed on the basis of an instrument issued by the PIISP.

The actors may play the following roles:

Role \ Actor	PSU	ASPSP	TPP
AISP	NO	YES	YES
PISP	NO	YES	YES
PIISP	NO	YES	YES

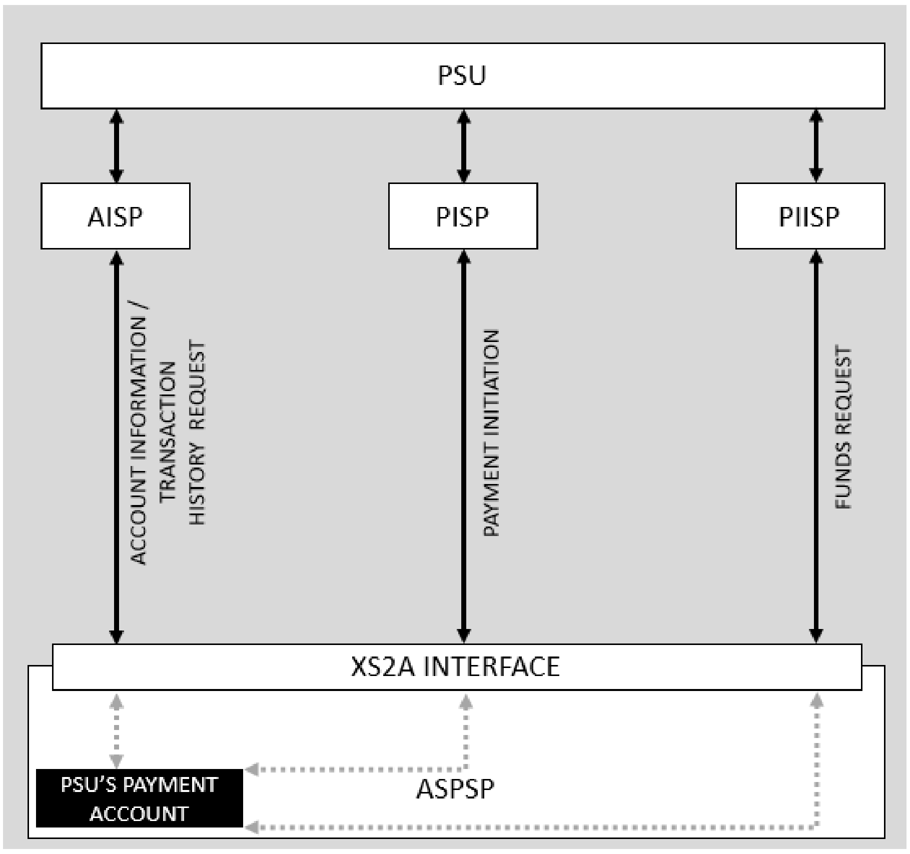


Figure 2: General diagram of dependencies between actors in the PolishAPI Standard

2.4.2 Requirements concerning Actors in the PolishAPI Standard-defined Processes

a) The ASPSP must implement an XS2A interface compliant with the PolishAPI standard. The ASPSP may also implement other XS2A interface standards, which however will not be covered by the scope of this document
b) The interfaces implemented by ASPSPs must be compliant with PSD2, the Payment Services Act and related acts, in particular the RTSs
c) The TPP must be registered in at least one register of the European Union Member State in the role it intends to play during the PolishAPI standard-based communication
d) The TPP and ASPSP must have a valid certificate used for mutual identification in the XS2A interface obtained from a qualified provider of trust services and meeting the regulatory requirements concerning the electronic identification and trust services. The certificate should additionally meet the requirements defined in the RTSs and in the ETSI technical specification (TS 119 495).
e) PSU may be present in the context of an account for individual clients and in the context of an account for corporate (business) clients. The context of an account for an individual client is

the default one. For calls in the context of an account for a corporate client, there must be the ‘isCompanyContext’ tag sent with the value of ‘*true*’ in the body of the request sent as per the technical specification. Additional parameters allowing the narrowing down of the business scope of information returned by the XS2A interface are the following:

- psuCompanyIdentifierType – type of PSU’s identifier (the available range of identifiers may be different for each ASPSP and will be defined by it in a detailed XS2A interface specification; the PolishAPI specification defines a complete list of identifier types available: N - NIP, P - PESEL, R - REGON, 1 – ID card number, 2 – Passport number, 3 - Other),
- psuCompanyIdentifierValue – value of PSU’s identifier.

The parameters indicated are used to indicate a more detailed context of the XS2A interface method calling, i.e. the account holder’s identifier - both an individual and a corporate one. The parameters may be used on case of PSU, who is at the same time a proxy to accounts of many clients with the given ASPSP.

2.4.3 PSU Authentication Mechanisms

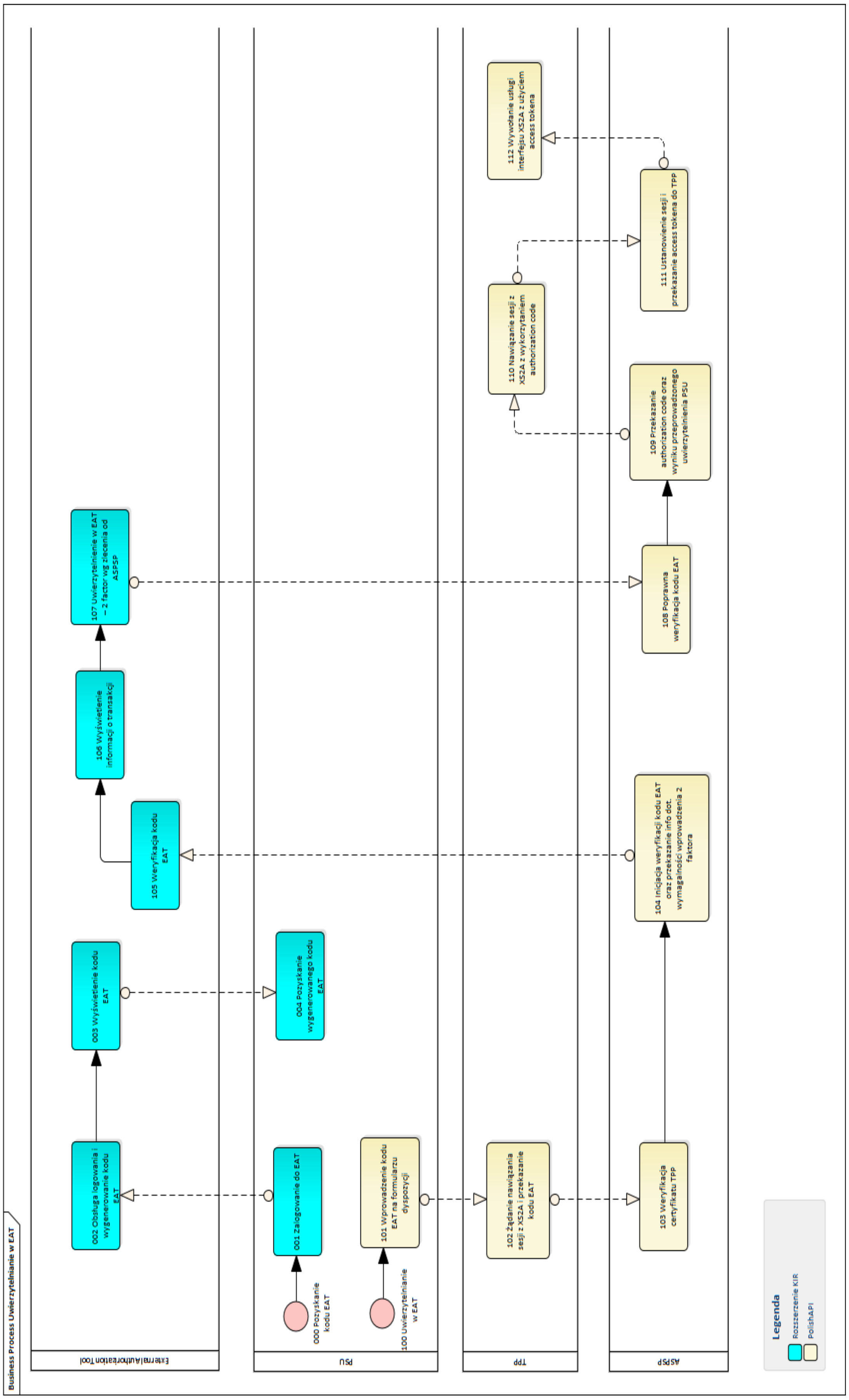
The PolishAPI Standard allows the PSU authentication mechanisms as listed below. The ASPSP may freely select the authentication method. The selection made should be compliant with the regulations in force.

2.4.3.1 Authentication Mechanism on the ASPSP’s Side

The PolishAPI Standard allows the use of a mechanism of ASPSP-side authentication, which assumes a redirection to the ASPSP’s website during the execution of the AIS, PIS and CAF services. This means that the PSU’s authentication and authorisation data are given exclusively at the ASPSP’s website. The PSU is authenticated in the ASPSP’s interface.

2.4.3.2 Authentication Mechanism in an External Authorisation Tool (Decoupled)

The PolishAPI Standard allows the use of an authentication mechanism using an external authorization tool during the performance of the AIS and PIS services. The mechanism of authentication in an external authorisation tool has been presented at a high level in the diagram below. Details concerning its use have been described in chapter 7.3.



Business Process Uwierzytelnianie w EAT
External Authorization Tool
PSU
TPP
ASPSP
000 Pozyskanie kodu EAT
100 Uwierzytelnianie w EAT
001 Zalogowanie do EAT
002 Obsługa logowania i wygenerowanie kodu EAT
003 Wyświetlenie kodu EAT
004 Pozyskanie wygenerowanego kodu EAT
101 Wprowadzenie kodu EAT na formularzu dyspozycji
102 Żądanie nawiązania sesji z XS2A i przekazanie kodu EAT
103 Weryfikacja certyfikatu TPP
104 Inicjacja weryfikacji kodu EAT oraz przekazanie info dot. wymagalności wprowadzenia 2 faktora
105 Weryfikacja kodu EAT
106 Wyświetlenie informacji o transakcji
107 Uwierzytelnienie w EAT – 2 factor wg zlecenia od ASPSP
108 Poprawna weryfikacja kodu EAT
109 Przekazanie authorization code oraz wyniku przeprowadzonego uwierzytelnienia PSU
110 Nawiązanie sesji z XS2A z wykorzystaniem authorization code
111 Ustanowienie sesji i przekazanie access tokena do TPP
112 Wywołanie usługi interfejsu XS2A z użyciem access tokena
Legenda
Rozszerzenie KIR
PolishAPI

Figure 3: Authentication in an external authorization tool

The following assumptions have been made:

- ASPSP cooperates with the provider of an external authorization tool (hereinafter referred to as EAT).
- PSU holds an account with EAT and has taken steps necessary to use the code generator function.
- ASPSP prepares a message containing basic information about the transaction displayed in EAT before confirmation.

2.4.3.2.1 Code acquisition from EAT:

- 001 / In order to obtain an EAT code, PSU logs into a dedicated tool compliant with PSD2 and with ASPSP's safety requirements.
- 002 / EAT supports PSU's logging in and generates an EAT code.
- 003 / EAT displays the code to PSU.
- 004 / PSU acquires the EAT code generated.

2.4.3.2.2 PSU's authentication using EAT:

- 101 / PSU inserts the EAT code in the instruction form at TPP's.
- 102 / TPP forwards the request to start a session with XS2A and to send the EAT code to ASPSP.
- 103 / ASPSP verifies TPP, there is, inter alia, a verification of TPP's certificate.
- 104 / ASPSP initiates the EAT code verification and provides information concerning the use of a 2nd factor by EAT and basic information about the transaction.
- 105 / EAT verifies the code.
- 106 / EAT displays to the user the information about the transaction in process (agreed details) – optionally, in this step the user determines the source account (PIS) or an account/accounts covered by the consent (AIS), if this has not been defined by the TPP in the API call.
- 107 / EAT performs authentication – the 2nd factor is used as per ASPSP's request.
- 108 / EAT sends information to ASPSP about a correctly identified EAT code.
- 109 / ASPSP provides the *authorization code* and the result of PSU's authentication to TPP.
- 110 / TPP starts a session with XS2A using the *authorization code*.
- 111 / ASPSP establishes a session and provides an *access token* to TPP.
- 112 / TPP recalls the XS2A interface service using the *access token*.

2.4.3.3 Other Authentication Mechanisms

The standard may contain a description of other mechanisms of authentication which meet the regulatory requirements and requirements agreed during the work of the project group. They will be published in subsequent versions of this document.

2.4.4 Management of PSU's Consents for the Performance of Services by a TPP

Pursuant to PSD2, the TPP may perform services for a PSU only upon his/her consent and within the scope covered by such consent. The PolishAPI standard defines the framework of consent grant and revocation by PSUs.

2.4.4.1 Process of Granting Consent by PSU to Effect the PIS Service

It is assumed that the payment initiation process (with the current date, future date, recurring payments and multiple payments, as described in Chapter 3.1.1) performed is each time related with the consent expressed for this purpose by the PSU in the TPP's interface. The processes of consent granting, payment initiation and payment status retrieval in obligatory variants assuming a TPP-side manual insertion of the account number and the ASPSP-side account selection as well as the payment cancellation have been presented in the diagrams and in the descriptions in Chapter 4.

2.4.4.2 Process of Granting Consent by PSU to Effect the AIS Service

In this Chapter, the term 'consent' refers exclusively to the provision of the AIS service and means the grant of consent for the service without indicating specific accounts (in case of an option with the ASPSP-side account indication or with a retrieval of a list of accounts) or with an indication of the same (in case of an option with a manual account number insertion). This process is always linked with the strong customer authentication (SCA).
Determination of access parameters (in case of an option with the ASPSP-side account indication or with a retrieval of a list of accounts) means each operation on specific accounts within the limits of the consent to effect the AIS services, including:

- indication of a specific account
- change of parameters for a specific account (e.g. date of access)
- withdrawal of indication of a specific account or
- withdrawal of consent

These operations do not require the strong customer authentication (SCA).

The standard allows three processes of granting a consent for the AIS service (in options allowing the authentication on the ASPSP's side and in an external authorisation tool):
- with a manual insertion of the account (accounts) number
- with the ASPSP-side account (accounts) number selection (only in the option with the ASPSP-side authentication)
- with the account list retrieval. This process is an optional process and its implementation depends on the ASPSP's decision.

The processes of consent granting and account information retrieval in the above-mentioned variants have been presented in the diagrams and descriptions in Chapter 4.

2.4.4.3 Process of Granting Consent by PSU to Effect the CAF Service

The process of the PSU's granting a consent for the ASPSP to effect the CAF service will be developed in the next version of this document. For the purposes of the current version, it is assumed that the request within the CAF service is made exclusively in the situation when the consent has been made previously. The fund availability request process has been presented at the diagram and in the description in Chapter 4.

2.4.5 Application of the Strong Customer Authentication (SCA) Mechanism

ASPSPs use any given strong PSU authentication system (SCA) they selected and the PolishAPI standard does not define and does not recommend any way in which this procedure may be conducted. Furthermore, the decision to release a given transaction from the SCA procedure remains in the exclusive competence of the ASPSP.

2.4.6 Provision of Services within the Compliance Scope

Each ASPSP is obliged to make available the services from the Compliance Scope pursuant to PSD2 and the related acts of law. ASPSP makes the accounts available in accordance with the definition given in

Chapter 3.2.1 and takes independent decisions as to the scope of payment account data available online within the framework of this service. The performance of services within the Compliance Scope will not require a contractual relation between the ASPSP and the TPP.

2.4.7 Provision of Services within the Premium Scope

Each ASPSP takes the decisions on making available the services within the Premium Scope and, in case of a decision to start offering them, determines the extent of such services independently. The performance of services within the Premium Scope will not require a contractual relation between the ASPSP and the TPP.

2.5 Development of the PolishAPI Standard

Currently, the PolishAPI standard defines the Compliance Scope of the AIS, PIS and CAF services. A permanent development of the standard in response to regulatory, technological and business changes on the Polish and European market is assumed. The changes will be published as subsequent versions of the PolishAPI standard specification.

3 Business Definition of the Compliance Scope Services

3.1 Business Definition of the Compliance Scope for the PIS Service

The Payment transaction initiation service within the Compliance Scope consists in making available by the ASPSP of a possibility to initiate a payment from the payment account by the PSU via a TPP who acts as a PISP after obtaining prior consent from the PSU as appropriate.

3.1.1 Types of Transactions within the Compliance Scope

As part of the PIS service within the Compliance Scope, the ASPSP will make available to the PSU, via the TPP (PISP), an initiation of payments that meet the following cumulative conditions:

a) The payment is a bank transfer
b) The payment is a single transfer, a recurring transfer (a series of transfers) or a multiple payment (transfer batch), whereby a batch of transfers may be made up exclusively of transfers of the same type from a single account number (e.g. exclusively domestic transfers or exclusively EEA transfers)
c) The payment is a transfer with a current date or a future date
d) If it is a domestic transfer, it is settled using one of the following systems (depending on which of the systems is supported by the ASPSP):
    a. Elixir,
    b. Express Elixir,
    c. SORBNET2,
    d. Blue Cash.
e) If the payment is a foreign transfer, it is settled in one of the systems listed below:
    a. SWIFT
    b. SEPA
    c. TARGET
f) It is available in the online interface of the given ASPSP
g) The PSU will complete all the data required to order a transfer (the ASPSP will not provide support in the form of dictionaries, dropdown lists or other creators) or in case of the process described in item 1.4.4.1.2 all the data save the number of the account from which the payment will be initiated

A multiple transfer (transfer batch) may be made in the following two ways:

a) the PSU defines n transfers at the TPP's interface side, then the strong authentication procedure is effected, during which all the payments defined are confirmed at the same time,
b) The PSU uploads a structured file where any given structure supported by the ASPSP will be placed. A transfer of such a file is related to the strong authentication procedure (a business description and the API method for this process variant will be added in the subsequent version of the specification).

The data given by the TPP in the transfer order should not be modified by the PSU in the ASPSP's domain. Each ASPSP is obliged to make available the services from the Compliance Scope pursuant to PSD2 and the related acts of law. The ASPSP takes an independent decision about the scope of online services provided and the data concerning the payment accounts available under the service. also on the basis of the availability of particular services in the online banking of the given ASPSP. The performance of services within the Compliance Scope will not require a contractual relation between the ASPSP and the TPP.

3.1.2 Transaction cancellation

The following may be cancelled:

a) single payments with a future date with the ‘scheduled’ status,
b) recurring payments with the 'scheduled’ status,
c) single payments with a future date defined as part of a multiple payment (batch of transfers), with the ‘scheduled’ status.

Provided the ASPSP offers such a functionality, it is also possible to cancel a multiple payment (batch of transfers) as a whole, subject to a reservation that if at the moment of cancellation the batch comprises transfers that have already been done, such cancellation does not have any impact on the same and the cancellation concerns only payments with a future date.

3.1.3 Information about the Transaction Status

As part of the message exchange in the PIS service within the Compliance Scope, the ASPSP will immediately advise the TPP about the order acceptance or rejection. Additionally, the TPP will be able to retrieve information about the payment status using the getPayment method with an option to enquire about the status of many payments (getMultiplePayments), provided the ASPSP offers such a functionality. The ASPSP will have an optional possibility to transfer to the TPP (asynchronous) information about the payment status using the /v1.0/accounts/v1.0/paymentCallBack method.

The following statuses are defined:

a) Submitted
b) Scheduled
c) Cancelled
d) Pending
e) Rejected
f) Done

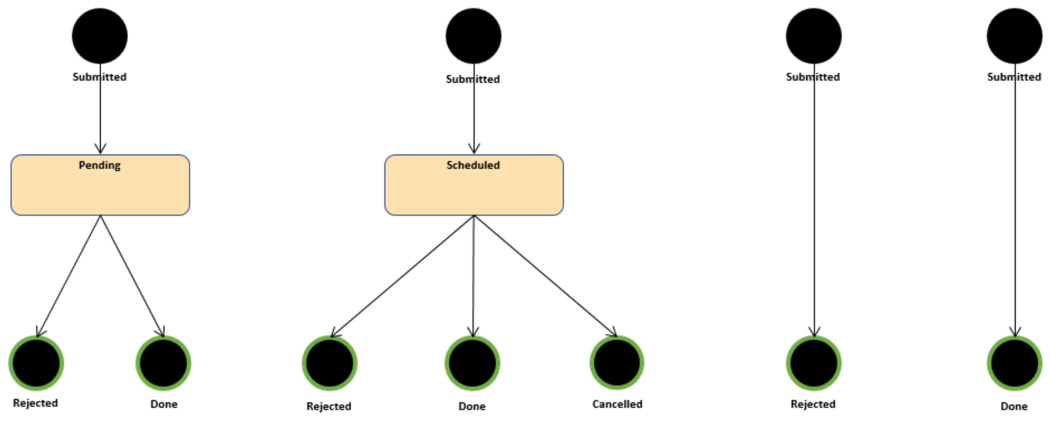


Figure 4: Diagram of payment statuses

Multiple payments (batches of transfers) have the following statuses:

a) inProgress – contain at least one transaction with a future date;
b) partiallyDone – contain at least one transaction with a Done status;
c) cancelled;
d) done – all transactions of the bundle have the Done status

3.1.4 Definition of a Payment Account

This service is provided only for payment accounts to which the given PSU has an on-line access. The account must meet all of the following cumulative conditions:

a) It is an account held for one or more users which is used to effect payment transactions (as per the definition laid down in the PSA).
b) The PSU has an on-line access to the account.

3.1.5 List of Fields Required by the ASPSP in the Compliance Scope

In order to initiate the PIS service payment transaction within the Compliance Scope correctly, the ASPSP may request from the PSU, via the TPP (PISP), that the following fields be completed with transaction order data. Each ASPSP may expect the PSU to transfer another set of data via the TPP.

With reference to foreign transfers, the use of certain fields will be optional, depending on the functionalities supported by the given ASPSPs. The ASPSP will effect the payments on condition that the payment will be initiated as appropriate by the TPP, i.e. appropriate fields with appropriate content are submitted.

Mandatory fields defining the TPP:

a) TPP's name

3.1.5.1 National transfer

FIELD NAME	REQUIRED	COMMENTS
Address of the transfer payee	No	
Effective date of the transfer	No	For the future effective date of the transfer, the urgency mode refers to that date
Transfer amount	Yes	
Name of the transfer sender	No	Sender's name completed by the ASPSP in order to avoid a situation when the transfer order coming from the ASPSP contains data other than data of the holder of the account debited.
Name of the transfer payee	Yes	
Transfer sender's account number	Yes	Given by the TPP or selected by the PSU after redirection to the ASPSP.
Transfer payee's account number	Yes	
Transfer description field	Yes	
Urgency mode	Yes	ExpressD0, StandardD1
Transfer type (system)	Yes	In case of a domestic transfer: Elixir, ExpressElixir, Sorbnet, BlueCash, Internal
Currency	No	In case the field is empty, the ASPSP will make the transfer in the account currency.
Block	No	Bool type field, owing to which the client will be able to make an explicit wish to make a block (in case of, e.g. a payment order on a free day). A default behaviour in case the parameter is not provided is defined by ASPSP.
Transaction ID as assigned by the TPP	Yes	

Transfer execution mode	Yes	What mode the transfer will be made in. As per the possibilities described in the following dictionary: - Immediate - Future date - Periodically
Date of the first transfer	Conditionally	In case of a recurring transfer execution mode
Frequency	Conditionally	In case of a recurring transfer execution mode. Defines how often a recurring transfer is to be executed.
The latest possible transfer date	Conditionally	In case of a recurring transfer execution mode. Defines the latest possible date when a recurring transfer can be executed.
Execution on a bank holiday	Conditionally	In case of a recurring transfer execution mode. Defines the behaviour in case the transfer date is a bank holiday, possible values are: ‘before’ and ‘after’ the bank holiday.

3.1.5.2 Domestic transfers to tax authorities / customs authorities in Poland

FIELD NAME	REQUIRED	COMMENTS
Address of the transfer payee	Yes	
Data of the authorities		
Effective date of the transfer	No	For the future effective date of the transfer, the urgency mode refers to that date
Payer's ID	Yes	
Payer’s ID type	Yes	Dictionary: N - NIP, P - PESEL, R - REGON, 1 – ID card number, 2 – Passport number, 3 - Other
Liability ID	No	
Transfer amount	Yes	
Name of payer	No	Sender's name completed by the ASPSP in order to avoid a situation when the transfer order coming from the ASPSP contains data other than data of the holder of the account debited.
Period number	Yes	
Transfer sender’s account number	Yes	Given by the TPP or selected by the PSU after redirection to the ASPSP.
Transfer payee’s account number	Yes	
Form symbol	Yes	
Period type	Yes	
Urgency mode	Yes	ExpressD0, StandardD1
Transfer type (system)	Yes	Standard (Elixir), express (ExpressElixir)
Currency	Yes	
Block	No	Bool type field, owing to which the client will be able to make an explicit wish to make a block (in case of, e.g. a payment order on a free day).

		A default behaviour in case the parameter is not provided is defined by ASPSP.
Transaction ID as assigned by the TPP	Yes	
Transfer execution mode	Yes	What mode the transfer will be made in. As per the possibilities described in the following dictionary: - Immediate - Future date - Periodically
Date of the first transfer	Conditionally	In case of a recurring transfer execution mode
Frequency	Conditionally	In case of a recurring transfer execution mode. Defines how often a recurring transfer is to be executed.
The latest possible transfer date	Conditionally	In case of a recurring transfer execution mode. Defines the latest possible date when a recurring transfer can be executed.
Execution on a bank holiday	Conditionally	In case of a recurring transfer execution mode. Defines the behaviour in case the transfer date is a bank holiday, possible values are: 'before' and 'after' the bank holiday.

3.1.5.3 EEA foreign transfer

FIELD NAME	REQUIRED	COMMENTS
Address of the transfer payee	No	
Effective date of the transfer	No	For the future effective date of the transfer, the urgency mode refers to that date
Transfer amount	Yes	
Name of the transfer sender	No	Sender's name completed by the ASPSP in order to avoid a situation when the transfer order coming from the ASPSP contains data other than data of the holder of the account debited.
Name of the transfer payee	Yes	
Transfer sender's account number	Yes	Given by the TPP or selected by the PSU after redirection to the ASPSP.
Transfer payee's account number	Yes	
Transfer description field	Yes	
Urgency mode	Yes	Standard, express
Transfer type (system)	No	SEPA, Instant SEPA, Target
Currency	No	Constant value - EUR
Block	No	Bool type field, owing to which the client will be able to make an explicit wish to make a block (in case of, e.g. a payment order on a free day). A default behaviour in case the parameter is not provided is defined by ASPSP.
Transaction ID as assigned by the TPP	Yes	
Transfer execution mode	Yes	What mode the transfer will be made in. As per the possibilities described in the following dictionary:

		- Immediate - Future date - Periodically
Date of the first transfer	Conditionally	In case of a recurring transfer execution mode
Frequency	Conditionally	In case of a recurring transfer execution mode. Defines how often a recurring transfer is to be executed.
The latest possible transfer date	Conditionally	In case of a recurring transfer execution mode. Defines the latest possible date when a recurring transfer can be executed.
Execution on a bank holiday	Conditionally	In case of a recurring transfer execution mode. Defines the behaviour in case the transfer date is a bank holiday, possible values are: 'before' and 'after' the bank holiday.

3.1.5.4 Foreign transfer other than EEA

FIELD NAME	REQUIRED	COMMENTS
Effective date of the transfer	No	For the future effective date of the transfer, the urgency mode (of the transfer) refers to that date
Transfer sender's account number	Yes	Given by the TPP or selected by the PSU after redirection to the ASPSP.
Transfer payee's account number	Yes	
Name of the transfer sender	No	Sender's name completed by the ASPSP in order to avoid a situation when the transfer order coming from the ASPSP contains data other than data of the holder of the account debited.
Name of the transfer payee	Yes	
Address of the transfer payee	No	
Transfer description field	Yes	
Transfer amount	Yes	
Currency	Yes	
BIC/SWIFT of the payee's bank	No	Conditional fields – required depending on the final specification of the Bank implementing the PolishAPI standard
Country of the payee's bank	No	
Name of the payee's bank	No	
Address of the payee's bank	No	
Code of the payee's bank	No	
Cost clause	No	
Urgency mode	Yes	Standard, urgent, express
Transfer type (system)	No	SWIFT
Block	No	Bool type field, owing to which the client will be able to make an explicit wish to make a block (in case of, e.g. a payment order on a free day). A default behaviour in case the parameter is

		not provided is defined by ASPSP.
Transaction ID as assigned by the TPP	Yes	
Transfer execution mode	Yes	What mode the transfer will be made in. As per the possibilities described in the following dictionary: - Immediate - Future date - Periodically
Date of the first transfer	Conditionally	In case of a recurring transfer execution mode
Frequency	Conditionally	In case of a recurring transfer execution mode. Defines how often a recurring transfer is to be executed.
The latest possible transfer date	Conditionally	In case of a recurring transfer execution mode. Defines the latest possible date when a recurring transfer can be executed.
Execution on a bank holiday	Conditionally	In case of a recurring transfer execution mode. Defines the behaviour in case the transfer date is a bank holiday, possible values are: 'before' and 'after' the bank holiday.

3.1.5.5 Cancellation of an initiated payment

FIELD NAME	REQUIRED	COMMENTS
Payment identifier	Conditionally	Required for a single payment cancellation request
Identifier of a batch of transfers	Conditionally	Required for a batch of transfers cancellation request

3.1.6 Diagrams of requests under the PIS Service within the Compliance Scope

The diagrams have been presented in Use Case #1 in Chapter 4.

3.1.7 Authorisation of a payment transaction initiated by means of a PIS service

The ASPSP provides a possibility to authorise a payment transaction ordered by the PSU under a payment initiation service within the understanding of the Payment Services Act (PSA), irrespective of the authorisation method and its complexity. The authorisation method is selected by the ASPSP.

3.2 Business Definition of the Compliance Scope for the AIS Service

The account information service within the Compliance Scope consists in making available by the ASPSP of data concerning the transaction history and selected information about the payment account to which the PSU has an active on-line access. The access is granted to a TPP acting as an AISP after a prior acquisition of consent as appropriate from the PSU. Additionally, the ASPSP makes available its data filtering mechanisms in accordance with the criteria available on-line in the ASPSP system (i.e. via the electronic banking), e.g.:

a) The transaction booking date (as per the indicated specific booking date and within the specified range of dates)

b) The transaction amount
c) The payment account debits and credits

3.2.1 Definition of a Payment Account

This service is provided only for payment accounts to which the given PSU has an on-line access. The account must meet all of the following cumulative conditions:

c) It is an account held for one or more users which is used to effect payment transactions (as per the definition laid down in the PSA).
d) The PSU has an on-line access to the account.

3.2.2 Frequency of Requests within the Compliance Scope

As part of the AIS service within the Compliance Scope, the TPP (AISP) may request that the ASPSP sent a payment account history and selected information about the payment account:

a) Up to 4 times within a 24 hour time span from the first request in case when the data collection is not initiated at the PSU's request via the TPP (AISP), but by TPP (AISP) on the basis of consent provided earlier by the PSU;
b) In each instance when the request is initiated directly by PSU via the intermediation of the TPP (AISP).

If a request that have not been initiated at the PSU's request, contains result paging, it should be treated as a single request.

A higher frequency of requests in case when the data collection is not initiated at the PSU's request via the TPP (AISP) but by the TPP (AISP) on basis of consent expressed earlier by the PSU may be allowed with regard to the AIS service only in the Premium Scope and is subject to separate bilateral arrangements by and between the ASPSP and the TPP (AISP).

3.2.3 Scope of Information concerning the Payment Account History within the Compliance Scope

Within the Compliance Scope, the AIS service comprises the provision to the PSU, together with data filtering mechanisms (including transaction history date scopes), of all available on-line account history of transactions booked, pending and rejected at the given payment account and blocked funds, which are visible to the PSU in the APSPS's on-line channel. Whereby, a pending transaction means a transaction that is not booked, not modifiable and which influences the available funds (available balance); a scheduled operation means a payment ordered with a future date. Pursuant to the regulations, the provision of the account history is related to the SCA process always (irrespective of the exclusions from the SCA application obligation applied), when the client obtains an online account access for the first time and when the request concerns a history of 90+ days. The SCA may be abandoned if the request concerns a history of payment transactions effected within the last 90 days, on condition that no more than 90 days have lapsed since the access to a history of not more than 90 days was obtained and the SCA was applied.

3.2.4 List of Fields Required by the ASPSP in the Compliance Scope

In response to the request sent by the TPP (AISP), the ASPSP sends information from the following fields.

FIELD NAME	REQUIRED	COMMENT
Account number	Yes	Account number

Account currency	Yes	For each payment account
Given names and surname / PSU's name	Yes	Given name for a natural person and a business name for a legal person
PSU's address	No	Address of the account holder
Available funds	Yes	Funds available in the account currency - after the transaction
Transaction identifier	Yes	Unique identifier of the given transaction as assigned by the ASPSP
Amount in original currency	No	For each account history transaction
Book balance of the account	Yes	Current account balance
Account type code	Yes	A key clearly identifying the account type in the account type dictionary as defined by the ASPSP
Account type	Conditionally	A business description of the account related to the dictionary key, provided in the 'Account type code' field. E.g. account for the consumer / business account + product reference, e.g. account, credit card, savings account, etc. Value required conditionally, in case the 'Account type code' field is provided.
Account type	Yes	Information from the ASPSP specifying whether the account belongs to a natural person or an enterprise
Transaction date	Yes	For each account history transaction
Amount	Yes	For each account history transaction
Sender's account number	Conditionally	For each account history transaction. Depending on the transaction type - credit / debit.
Payee's account number	Conditionally	For each account history transaction. Depending on the transaction type - credit / debit.
Title	Yes	For each account history transaction
Transaction status code	No	For each account history transaction. Value of the key of the transaction status dictionary as defined by the ASPSP.
Transaction status	Conditionally	Business description of the transaction status. Required, if the dictionary value was provided in the 'Transaction status code' field
Transaction category	No	Credit/debit transaction. For each account history transaction
Currency of original transaction	No	For each account history transaction
Account type name (defined by the ASPSP)	No	Product's commercial name
Data of the tax office	No	Only for transfers to tax authorities / customs authorities in Poland
Book date	Conditionally	Field mandatory for all booked transactions
Exchange rate date	No	For each account history transaction
TPP's Transaction ID	No	Unique ID of the given transaction as assigned by the TPP
Payer's ID with the tax authorities	Conditionally	Only for transfers to tax authorities / customs authorities in Poland
Liability ID with the tax authorities	No	Only for transfers to tax authorities / customs authorities in Poland
Transaction exchange rate	No	For each account history transaction
Currency code before the conversion transaction	No	As per the ISO standard
Currency code after the conversion transaction	No	As per the ISO standard
Period number	Conditionally	Only for transfers to tax authorities / customs

		authorities in Poland
Payee's account virtual number	No	For each account history transaction
Year	Conditionally	Only for transfers to tax authorities / customs authorities in Poland
Form symbol	Conditionally	Only for transfers to tax authorities / customs authorities in Poland
Period type	Conditionally	Only for transfers to tax authorities / customs authorities in Poland
Payment type	No	Only for transfers to the Social Insurance Institution (ZUS)
Unique ID of the payment instrument by which the transaction was effected	No	E.g. payment card number (masked, as per the data presentation in the ASPSP's online interface)
Data of the owner of the payment instrument by which the transaction was effected	No	Data of the payment card holder
Type of operation	Yes	For each account history transaction
Funds available at the account after the transaction	Conditionally	Field mandatory for each transaction at the account history
Type of the payer's ID with the tax authorities	Conditionally	Only for transfers to tax authorities / customs authorities in Poland
Name of the incoming transfer payee	No	For each incoming transfer transaction at the account history
Address of the incoming transfer payee	No	For each incoming transfer transaction at the account history
Name of the outgoing transfer payee	Conditionally	For each outgoing transfer transaction at the account history. Depending on the transaction type - credit / debit.
Address of the outgoing transfer payee	No	For each outgoing transfer transaction at the account history
Address of the payee's bank	Conditionally	For foreign transfers only
Code of the payee's bank	Conditionally	For foreign transfers only
Name of the payee's bank	Conditionally	For foreign transfers only
BIC/SWIFT of the payee's bank	Conditionally	For foreign transfers only
Code of the country of the payee's bank	Conditionally	For foreign transfers only
Name of the incoming transfer sender	Yes	For each incoming transfer transaction at the account history
Address of the incoming transfer sender	No	For each incoming transfer transaction at the account history
Name of the outgoing transfer sender	Yes	For each outgoing transfer transaction at the account history
Address of the outgoing transfer sender	No	For each outgoing transfer transaction at the account history
Account name as defined by the client	No	Provided the ASPSP makes available such a service.
Name of the transaction initiator	Conditionally	In case of transactions originated by people other than the account holder (given name and surname)
Address of the transaction initiator	No	In case of transactions originated by people other than the account holder
TPP's name	No	In case of transactions initiated as part of the PIS service
MCC	Conditionally	Merchant Category Code, a Code for each transaction / operation made using the card
Reason for rejection	No	In case of rejected transactions
Rejection date	No	In case of rejected transactions

Hold end date	No	In case of account holds
VAT No	Conditionally	Payer's basic identifier with the Social Insurance Institution (ZUS), i.e. NIP.
Payer’s additional identification number with the Social Insurance Institution (ZUS)	Conditionally	Value of the payer’s additional identifier with the Social Insurance Institution (ZUS) (the value appropriate to the type of payer's additional identifier selected in the ‘Type of payer's additional identifier’ field)
Type of payer’s additional identifier	No	Dictionary value defining the type of the payer’s additional identifier with the Social Insurance Institution (ZUS).
Declaration number	No	Value of declaration number for transfers to the Social Insurance Institution (ZUS) compliant with the form of this type of transfers
Declaration period	No	Value of declaration period for transfers to the Social Insurance Institution (ZUS) compliant with the form of this type of transfers
Liability ID with the Social Insurance Institution (ZUS)	No	Value of ID of the liability to be transferred to the Social Insurance Institution (ZUS) compliant with the form of this type of transfers

The fields described in the table above become mandatory for ASPSPs in relation to the scope of information about payment accounts and transactions the given ASPSP makes available in its online interface, save exceptions stipulated in the law (e.g. with regard to particularly protected data concerning payments or personal data). To the scope of data concerning the account and transactions, each ASPSP may add additional fields, taking advantage for this purpose of the auxData type Map field within the AccountInfo, TransactionInfo, HoldInfo, TransactionPendingInfo and TransactionRejectedInfo structures.

The list of fields made available when the ASPSP allows the use of the account list retrieval within the process of granting consent for the AIS or PIS services.

FIELD NAME	REQUIRED	COMMENT
Account number	Yes	Account number in a masked form, only the 2 first and last 4 digits of the account number visible without masking, according to the ASPSP’s decision
Account type name (defined by the Bank)	Yes	Product's commercial name
Account type	Yes	E.g. account for the consumer / business account + product reference, e.g. account, credit card, savings account, etc.

3.2.5 Diagrams of Requests under the AIS Service within the Compliance Scope

The diagrams have been presented in Use Case #2 in Chapter 4.

3.3 Business Definition of the Compliance Scope for the CAF Service

The service of confirmation of funds at the payer’s payment account in an amount sufficient to effect the payment transaction within the Compliance Scope consists in sending a request by the TPP acting as a PIISP to the ASPSP for a confirmation whether or not the PSU’s payment account has funds in the amount as determined in the request on the basis of consent granted earlier by the PSU. In response, the ASPSP sends a message in the form of ‘YES’ or ‘NO’.

3.3.1 List of Fields Required by the ASPSP in the Compliance Scope

In order to support a request concerning a conformation of funds at the payer's payment account in an amount sufficient to effect a CAF payment transaction within the Compliance Scope correctly, the ASPSP may request from the PSU, via the TPP (PIISP), that the following fields be completed with transaction order data. Details concerning the fields are defined in Chapter 5.7 Canonical Data Model.

FIELD NAME	REQUIRED	COMMENTS
Identifier of account the request concerns	Yes	Account previously connected with the payment instrument on the basis of consent granted by the PSU.
Amount	Yes	
Currency	Yes	Currency of transaction

3.3.2 Diagrams of Requests under the CAF Service within the Compliance Scope

The diagram was presented in Use Case #3 in Chapter 4.

4 Sample Use Cases

The current PolishAPI standard version described the manner of performance of XS2A interface-based transactions within the Compliance Scope as defined in Chapter 3 hereof and the TPP may participate in such transactions in one of the roles defined.

Examples illustrating the use of particular services were presented in this chapter. Their aim is only to illustrate the steps for particular services and should not be treated as an exhaustive list of admissible use cases.

4.1 Use Case #1: payment initiation by the PISP (PIS)

The use of a PIS service within the Compliance Scope as presented in this Use Case consists in the initiation by the TPP acting as a PISP of a payment transaction debited to the PSU's payment account held by the ASPSP on the basis of applicable provisions of the Payment Services Act. The ASPSP may reject the transaction if the TPP (PISP) has not been identified as an entity authorised to effect a PIS service.

4.1.1 Consent granting and payment initiation performance (single payment with a current or future date, recurring payments, multiple payments – transfer batch) – ASPSP-side authentication

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list and grants a consent to TPP to provide the PIS service, including a consent for the initiation of a transfer or a batch of transfers and for a query about the current status of a transfer or a batch of transfers, after they have been initiated
- 004 / PSU completes the transfer or transfers form meeting the requirements described in Chapter 3.1.1 and containing at least the information indicated in Chapter 3.1.4 of this specification: 'List of Fields Required by the ASPSP in the Compliance Scope' – depending on the option and with or without the account number
- 005 / TPP initiates the PIS process (use of the method /authorize, including the provision of scope and scope_details), then there is a redirection to the ASPSP's domain in order to authenticate the PSU
- 006 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 007 / ASPSP sends an authentication request to the PSU
- 008 / Authentication (SCA, if required)
- 009 and 009A / ASPSP displays to the PSU the transaction details and the account list (in the ASPSP-side account selection option), PSU indicates the account from which the payment will be initiated
- 010 / ASPSP generates and sends to the PSU an additional authorization element (e.g. OTP) – provided that it is required in accordance with the regulations in force

- 011 / PSU authorises the transaction using the method applied in relations with the ASPSP (the PSU has an option to refuse authorisation, which results in the fact that the payment transaction is not effected). After a successful authorization of a transfer or a batch of transfers by the PSU, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token and a refresh token to the TPP (use of the method /token and, after the XS2A session establishment, one of the following methods: /domestic, /tax, /EEA, /nonEEA, /bundle)
- 012 / ASPSP performs the request and then a redirection is made to the TPP's domain

the payment initiation process is terminated

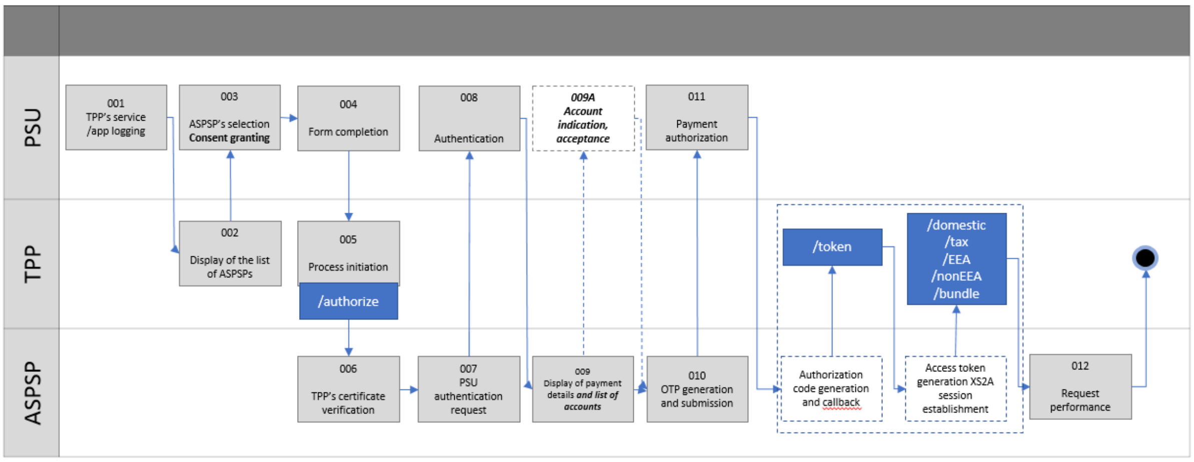

PSU
TPP
ASPSP
001 TPP's service /app logging
003 ASPSP's selection Consent granting
004 Form completion
008 Authentication
009A Account indication, acceptance
011 Payment authorization
002 Display of the list of ASPSPs
005 Process initiation
/authorize
/token
/domestic /tax /EEA /nonEEA /bundle
006 TPP's certificate verification
007 PSU authentication request
009 Display of payment details and list of accounts
010 OTP generation and submission
Authorization code generation and callback
Access token generation XS2A session establishment
012 Request performance

Figure 5: PIS – ASPSP-side authentication

4.1.2 Consent granting and payment initiation performance (single payment with a current or future date, recurring payments, multiple payments – transfer batch) – Authentication in an external authorization tool

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list and grants a consent to TPP to provide the PIS service, including a consent for the initiation of a transfer or a batch of transfers and for a query about the current status of a transfer or a batch of transfers, after they have been initiated
- 004 / PSU completes the transfer or transfers form meeting the requirements described in Chapter 3.1.1 and containing at least the information indicated in Chapter 3.1.4 of this specification: 'List of Fields Required by the ASPSP in the Compliance Scope' – together with an account number
- 005 / TPP initiates the PIS process (use of the method /authorizeExt, including the provision of scope and scope_details)
- 006 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)

- 007 / ASPSP initiates the process of PSU's authentication, including provides to the EAT an instruction concerning the use of the 2nd authorisation element – if this is required as per the regulations in force
- 008 / Authentication (SCA, if required)
- 009 / The external authorization tool displays the payment details and the PSU accepts the transaction
- 010 / PSU authorises the transaction (PSU has an option to refuse authorisation, which results in the fact that the payment transaction is not effected). After a successful authorization of a transfer or a batch of transfers by the PSU, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token and a refresh token to the TPP (use of the method /token and, after the XS2A session establishment, one of the following methods: /domestic, /tax, /EEA, /nonEEA, /bundle)
- 011 / ASPSP performs the request and then a redirection is made to the TPP's domain

the payment initiation process is terminated

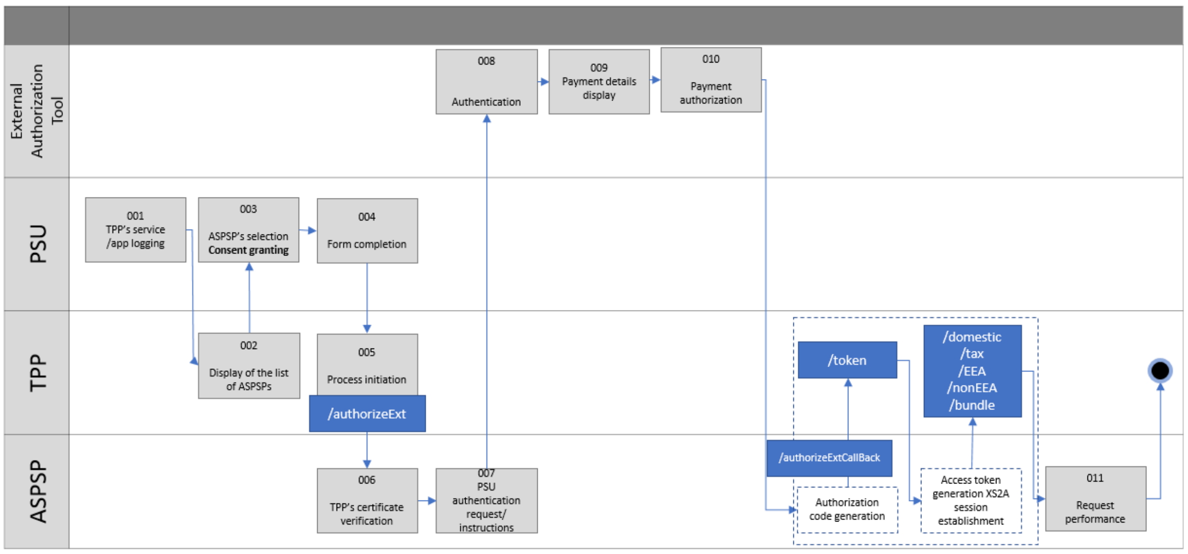

External Authorization Tool
PSU
TPP
ASPSP
008 Authentication
009 Payment details display
010 Payment authorization
001 TPP's service /app logging
003 ASPSP's selection Consent granting
004 Form completion
002 Display of the list of ASPSPs
005 Process initiation
/authorizeExt
/token
/domestic /tax /EEA /nonEEA /bundle
/authorizeExtCallBack
006 TPP's certificate verification
007 PSU authentication request/ instructions
Authorization code generation
Access token generation XS2A session establishment
011 Request performance

Figure 6: PIS – authentication in an external authorization tool

4.1.3 Payment status request (single payment with a current or future date, recurring payment, multiple payment – transfer batch)

- 001 / TPP sends a new access token issue request (new communication session establishment as per the description in 11.3), on the basis of the refresh token value obtained in step 011 (ASPSP-side authentication) or 010 (authentication in an external authorization tool), and a new scope of consents, which comprises a possibility to request the status of a transfer or a batch of transfers
- 002 / ASPSP verifies the TPP's request, in particular the refresh token value submitted and the data describing the consent requested, whereby a new XS2A interface communications session is established and new access token and refresh token values, which identify the session, are sent to the TPP

- 003 / TPP sends the PIS request concerning the retrieval of the status of a transfer or a batch of transfers, using the above-mentioned access token
- 004 / ASPSP performs the request

  the payment status request process is terminated

- 001 / ASPSP sends the payment status asynchronously

  the payment status provision process is terminated

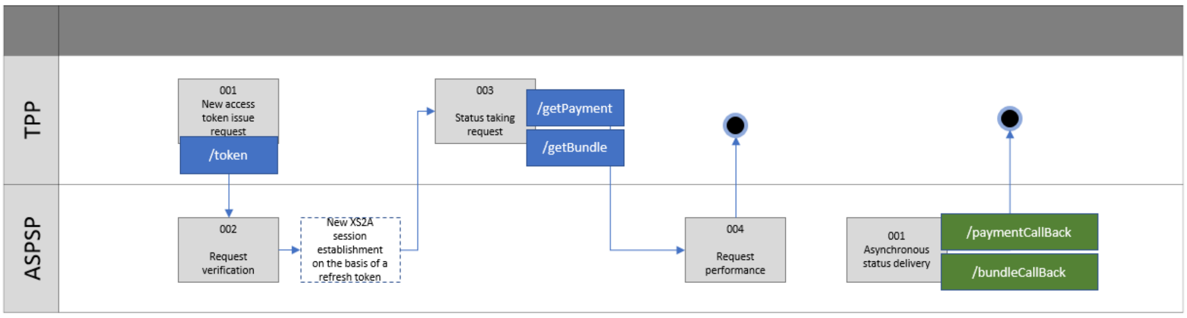

TPP
ASPSP
001 New access token issue request
/token
002 Request verification
New XS2A session establishment on the basis of a refresh token
003 Status taking request
/getPayment
/getBundle
004 Request performance
001 Asynchronous status delivery
/paymentCallBack
/bundleCallBack

Figure 7: PIS – status request

4.1.4 Payment cancellation (single payment with a future date, recurring payment with a future date, single payment as part of a multiple payment (with a future date) or a multiple payment – a batch of transfers) – ASPSP-side authentication

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list
- 004 / PSU selects a payment / a batch to be cancelled
- 005 / TPP initiates the cancellation process (use of the method /authorize, including the provision of scope and scope_details)
- 006 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 007 / ASPSP initiates the process of PSU's authentication
- 008 /   Authentication
- 009 / ASPSP displays details of the payment cancelled to the PSU
- 010 / ASPSP generates and delivers to the PSU an additional authorization element (e.g. OTP)
- 011 / PSU authorizes the payment cancellation as per the method used in relations with the ASPSP. After a successful authorization of a cancellation, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token to the TPP (use of the method /token and, after the XS2A session establishment, the method / cancelPayments

- 012 / ASPSP performs the request and then a redirection is made to the TPP's domain

  the payment /batch cancellation process is terminated

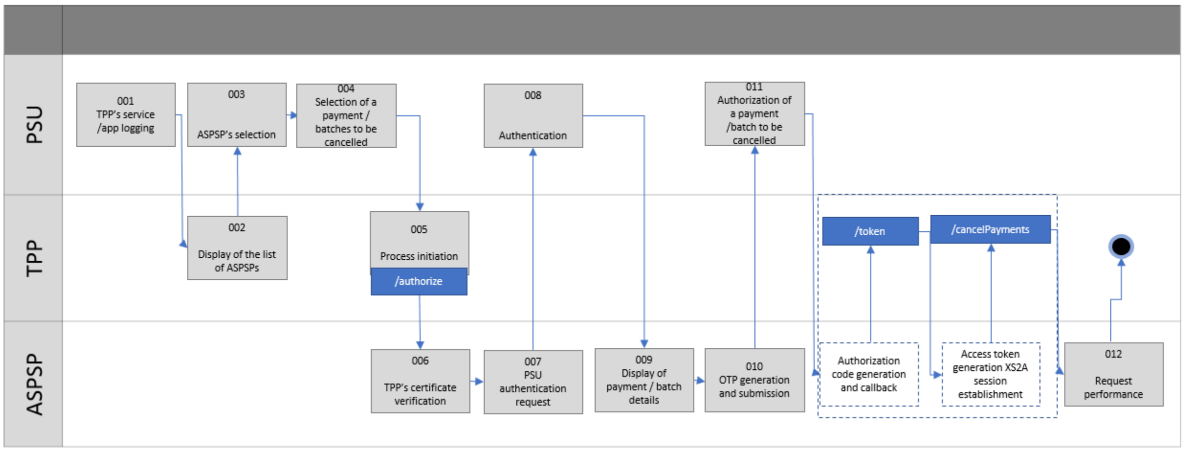

PSU
TPP
ASPSP
001 TPP's service /app logging
003 ASPSP's selection
004 Selection of a payment / batches to be cancelled
008 Authentication
011 Authorization of a payment /batch to be cancelled
002 Display of the list of ASPSPs
005 Process initiation
/authorize
/token
/cancelPayments
006 TPP's certificate verification
007 PSU authentication request
009 Display of payment / batch details
010 OTP generation and submission
Authorization code generation and callback
Access token generation XS2A session establishment
012 Request performance

Figure 8: PIS – payment cancellation – ASPSP-side authentication

4.1.5 Payment cancellation (single payment with a future date, recurring payment with a future date, single payment as part of a multiple payment (with a future date) or a multiple payment – a batch of transfers) – authentication in an external authorization tool

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list
- 004 / PSU selects a payment / a batch to be cancelled
- 005 / TPP initiates the cancellation process (use of the method /authorizeExt, including the provision of scope and scope_details)
- 006 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 007 / ASPSP initiates the process of PSU's authentication, including provides to the EAT an instruction concerning the use of the 2nd authorisation element
- 008 / Authentication
- 009 / EAT displays details of the payment cancelled to the PSU
- 010 / PSU authorizes the payment cancellation as per the method used in relations with the ASPSP. After a successful authorization of a cancellation, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token to the TPP (use of the method /token and, after the XS2A session establishment, the method / cancelPayments
- 011 / ASPSP performs the request

  the payment /batch cancellation process is terminated

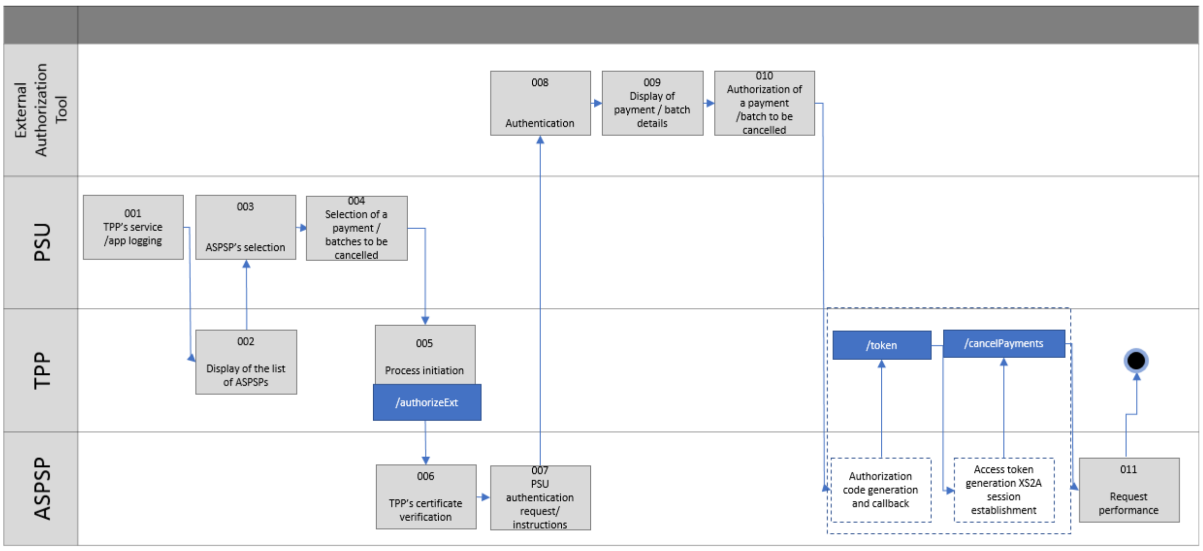

External Authorization Tool
PSU
TPP
ASPSP
008 Authentication
009 Display of payment / batch details
010 Authorization of a payment /batch to be cancelled
001 TPP's service /app logging
003 ASPSP's selection
004 Selection of a payment / batches to be cancelled
002 Display of the list of ASPSPs
005 Process initiation
/authorizeExt
/token
/cancelPayments
006 TPP's certificate verification
007 PSU authentication request/ instructions
Authorization code generation and callback
Access token generation XS2A session establishment
011 Request performance

Figure 9: PIS – payment cancellation – authentication in an external authorization tool

4.2 Use Case #2: payment account information display by the AISP (AIS)

The use of an AIS service within the Compliance Scope as presented in this Use Case consists in the acquisition by the TPP acting as an AISP of information about the PSU's payment account held by the ASPSP on the basis of applicable provisions of the Payment Services Act.

4.2.1 Consent granting and account information taking with a manual insertion of the account number (ASPSP-side authentication)

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list and grants a consent to the given TPP to provide the account information service concerning an account maintained by the given ASPSP
- 004 / PSU inserts the account number and defines the scope of access
- 005 / TPP initiates the PIS process (use of the method /authorize, including the provision of scope and scope_details), then there is a redirection to the ASPSP's domain in order to authenticate the PSU
- 006 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 007 / ASPSP sends an authentication request to the PSU
- 008 / SCA authentication. After a successful authentication by the PSU, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token and a refresh token to the TPP (use of the method /token and, after the XS2A session establishment, one of the following methods: /getAccount,

/getTransactionsDone, /getTransactionsPending, /getTransactionsRejected, /getTransactionsCancelled, /getTransactionsScheduled, /getHolds, /getTransactionDetail)

- 009 / ASPSP performs the request and then a redirection is made to the TPP’s domain

the account information taking process is terminated

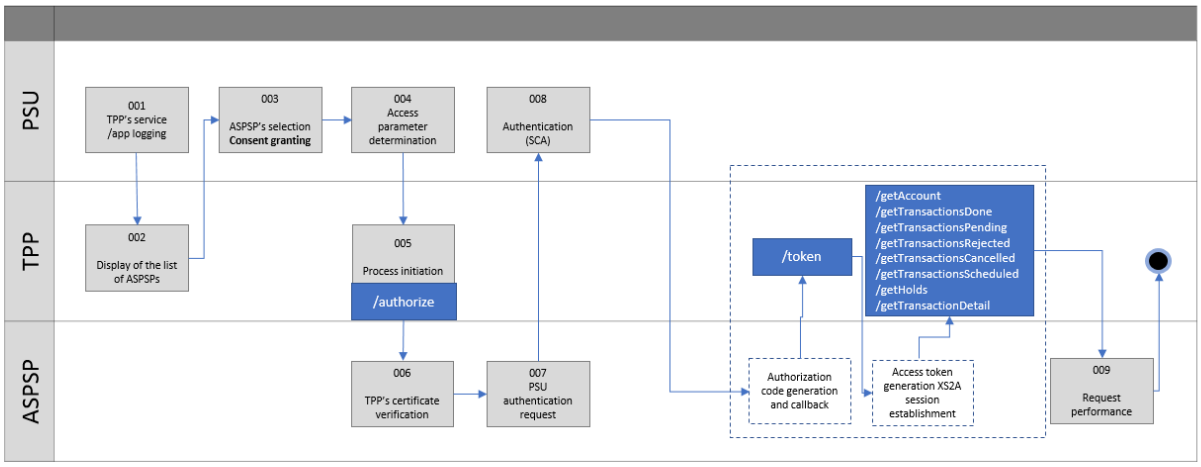

PSU
TPP
ASPSP
001 TPP's service /app logging
002 Display of the list of ASPSPs
003 ASPSP's selection Consent granting
004 Access parameter determination
005 Process initiation
/authorize
006 TPP's certificate verification
007 PSU authentication request
008 Authentication (SCA)
Authorization code generation and callback
/token
Access token generation XS2A session establishment
/getAccount
/getTransactionsDone
/getTransactionsPending
/getTransactionsRejected
/getTransactionsCancelled
/getTransactionsScheduled
/getHolds
/getTransactionDetail
009 Request performance

Figure 10: AIS – manual insertion of the account number – ASPSP-side authentication

4.2.2 Consent granting and account information taking with a manual insertion of the account number– authentication in an external authorization tool

- 001 / PSU initiates the process in the TPP’s interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list and grants a consent to the given TPP to provide the account information service concerning an account maintained by the given ASPSP
- 004 / PSU inserts the account number and defines the scope of access
- 005 / TPP initiates the PIS process (use of the method /authorizeExt, including the provision of scope and scope_details)
- 006 / ASPSP verifies the TPP’s identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 007 / ASPSP initiates the process of PSU’s authentication
- 008 / SCA authentication. After a successful authentication by the PSU, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token and a refresh token to the TPP (use of the method /token and, after the XS2A session establishment, one of the following methods: /getAccount, /getTransactionsDone, /getTransactionsPending, /getTransactionsRejected, /getTransactionsCancelled, /getTransactionsScheduled, /getHolds, /getTransactionDetail)
- 009 / ASPSP performs the request

the account information taking process is terminated

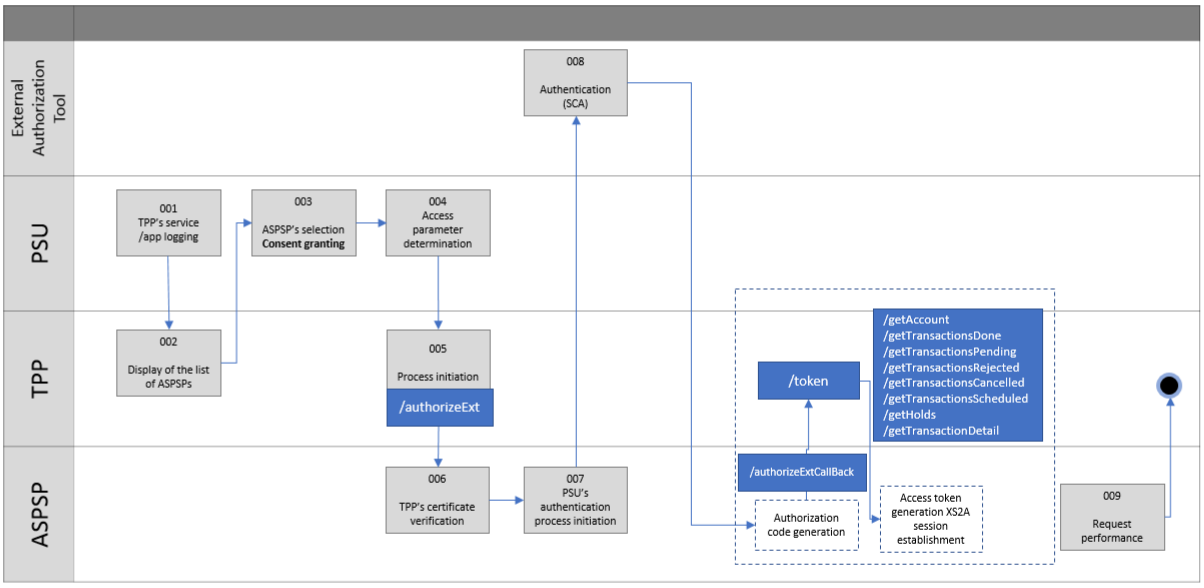

External Authorization Tool
PSU
TPP
ASPSP
008 Authentication (SCA)
001 TPP's service /app logging
003 ASPSP's selection Consent granting
004 Access parameter determination
002 Display of the list of ASPSPs
005 Process initiation
/authorizeExt
006 TPP's certificate verification
007 PSU's authentication process initiation
/token
/getAccount
/getTransactionsDone
/getTransactionsPending
/getTransactionsRejected
/getTransactionsCancelled
/getTransactionsScheduled
/getHolds
/getTransactionDetail
/authorizeExtCallBack
Authorization code generation
Access token generation XS2A session establishment
009 Request performance

Figure 11: AIS – manual insertion of the account number– authentication in an external authorization tool

4.2.3 Consent granting and account information taking with ASPSP-side account selection – ASPSP-side authentication

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list and grants a consent to the given TPP to provide the account information service concerning an account maintained by the given ASPSP
- 004 / TPP initiates the PIS process (use of the method /authorize, including the provision of scope and scope_details)
- 005 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 006 / ASPSP sends an authentication request to the PSU
- 007 / SCA authentication
- 008 / ASPSP displays a list of accounts
- 009 / PSU indicates an account (accounts), in the context of which it wants to obtain information. After a successful authentication and account indication by the PSU, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token and a refresh token to the TPP (use of the method /token and, after the XS2A session establishment, the method /getAccounts)
- 010 / ASPSP performs the request, taking into consideration the step 009 indications
- 011 / TPP displays a list of indicated accounts
- 012 / PSU determines the access parameters for the accounts indicated, TPP calls the method /token with the use of the method exchange_token, in consequence of which the ASPSP provides to the TPP a new access token and a new refresh token, and then one of the

following methods is called: : /getAccount, /getTransactionsDone, /getTransactionsPending, /getTransactionsRejected, /getTransactionsCancelled, /getTransactionsScheduled, /getHolds, /getTransactionDetail

- 013 / ASPSP performs the request

the account information taking process is terminated

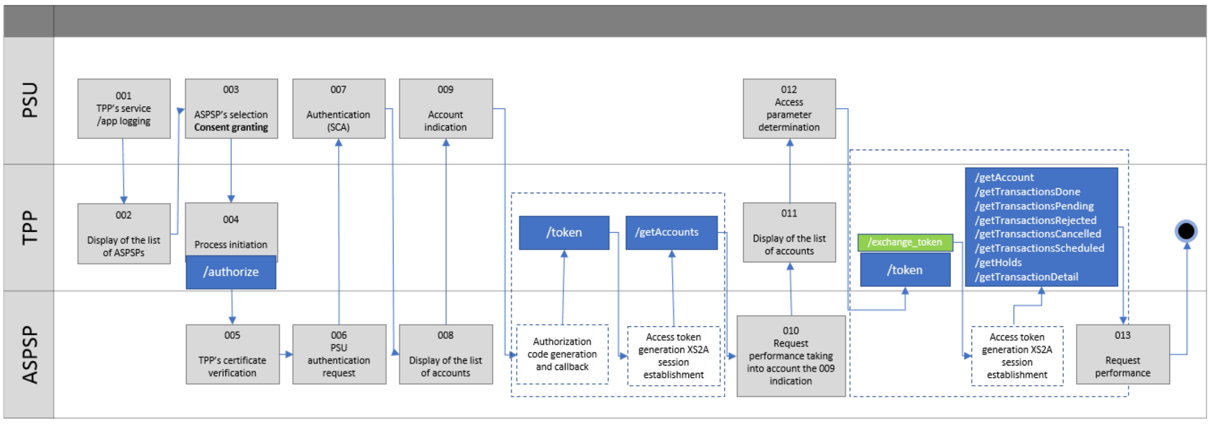

PSU
TPP
ASPSP
001 TPP's service /app logging
002 Display of the list of ASPSPs
003 ASPSP's selection Consent granting
004 Process initiation
/authorize
005 TPP's certificate verification
006 PSU authentication request
007 Authentication (SCA)
008 Display of the list of accounts
009 Account indication
/token
/getAccounts
Authorization code generation and callback
Access token generation XS2A session establishment
010 Request performance taking into account the 009 indication
011 Display of the list of accounts
012 Access parameter determination
/exchange_token
/token
/getAccount
/getTransactionsDone
/getTransactionsPending
/getTransactionsRejected
/getTransactionsCancelled
/getTransactionsScheduled
/getHolds
/getTransactionDetail
Access token generation XS2A session establishment
013 Request performance

Figure 12: PIS – ASPSP-side account selection – ASPSP-side authentication

4.2.4 Consent granting and account information taking with an account list retrieval – ASPSP-side authentication

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list and grants a consent to the given TPP to provide the account information service concerning an account maintained by the given ASPSP
- 004 / TPP initiates the PIS process (use of the method /authorize, including the provision of scope and scope_details)
- 005 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 006 / ASPSP sends an authentication request to the PSU
- 007 / SCA authentication. After a successful authentication and account indication by the PSU, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token and a refresh token to the TPP (use of the method /token and, after the XS2A session establishment, the method /getAccounts)
- 008 / ASPSP performs the request
- 009 / TPP displays a list of accounts
- 010 / PSU determines the access parameters for the accounts indicated, TPP calls the method /token with the use of the method exchange_token, in consequence of which the ASPSP provides to the TPP a new access token and a new refresh token, and then one of the following methods is called: : /getAccount, /getTransactionsDone, /getTransactionsPending,

/getTransactionsRejected, /getTransactionsCancelled, /getTransactionsScheduled, /getHolds, /getTransactionDetail

- 011 / ASPSP performs the request

the account information taking process is terminated

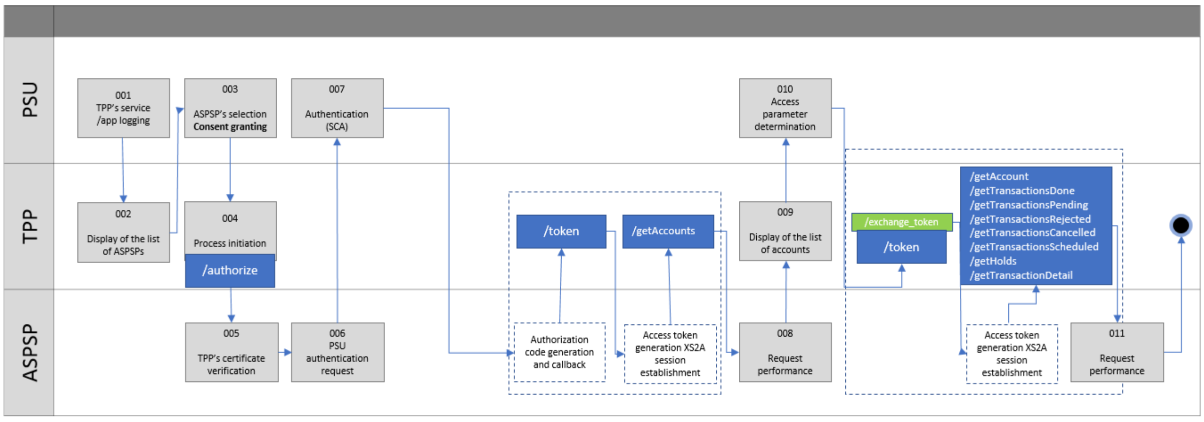

PSU
TPP
ASPSP
001 TPP's service /app logging
003 ASPSP's selection Consent granting
007 Authentication (SCA)
010 Access parameter determination
002 Display of the list of ASPSPs
004 Process initiation
/authorize
/token
/getAccounts
009 Display of the list of accounts
/exchange_token
/token
/getAccount
/getTransactionsDone
/getTransactionsPending
/getTransactionsRejected
/getTransactionsCancelled
/getTransactionsScheduled
/getHolds
/getTransactionDetail
005 TPP's certificate verification
006 PSU authentication request
Authorization code generation and callback
Access token generation XS2A session establishment
008 Request performance
Access token generation XS2A session establishment
011 Request performance

Figure 13: AIS – account list retrieval – ASPSP-side authentication

4.2.5 Consent granting and account information taking with an account list retrieval – authentication in an external authorization tool

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays the list of ASPSPs
- 003 / PSU selects an ASPSP from the list and grants a consent to the given TPP to provide the account information service concerning an account maintained by the given ASPSP
- 004 / TPP initiates the PIS process (use of the method /authorizeExt, including the provision of scope and scope_details)
- 005 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs)
- 006 / ASPSP initiates the process of PSU's authentication
- 007 / SCA authentication. After a successful authentication and account indication by the PSU, there is an establishment of the XS2A interface session between the ASPSP and TPP, in consequence of which the ASPSP provides an access token and a refresh token to the TPP (use of the method /token and, after the XS2A session establishment, the method /getAccounts)
- 008 / ASPSP performs the request
- 009 / TPP displays a list of accounts
- 010 / PSU determines the access parameters for the accounts indicated, TPP calls the method /token with the use of the method exchange_token, in consequence of which the ASPSP provides to the TPP a new access token and a new refresh token, and then one of the following methods is called: /getAccount, /getTransactionsDone, /getTransactionsPending, /getTransactionsRejected, /getTransactionsCancelled, /getTransactionsScheduled, /getHolds, /getTransactionDetail

- 011 / ASPSP performs the request

the account information taking process is terminated

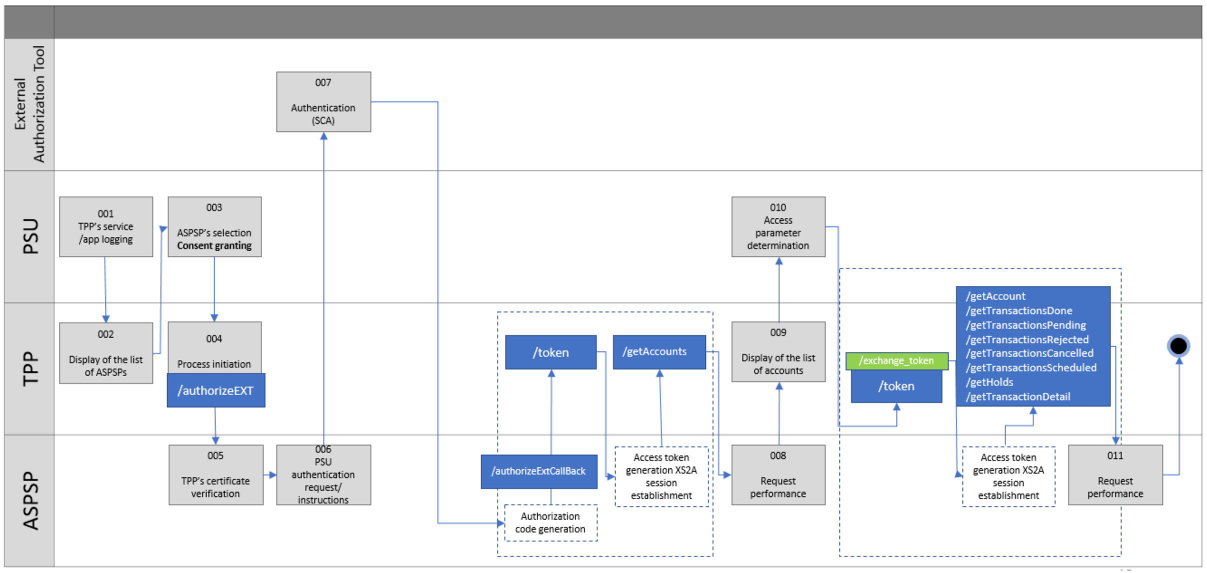

External Authorization Tool
PSU
TPP
ASPSP
007 Authentication (SCA)
001 TPP's service /app logging
003 ASPSP's selection Consent granting
010 Access parameter determination
002 Display of the list of ASPSPs
004 Process initiation
/authorizeEXT
/token
/getAccounts
009 Display of the list of accounts
/exchange_token
/token
/getAccount
/getTransactionsDone
/getTransactionsPending
/getTransactionsRejected
/getTransactionsCancelled
/getTransactionsScheduled
/getHolds
/getTransactionDetail
005 TPP's certificate verification
006 PSU authentication request/ instructions
/authorizeExtCallBack
Authorization code generation
Access token generation XS2A session establishment
008 Request performance
Access token generation XS2A session establishment
011 Request performance

Figure 14: AIS – account list retrieval – authentication in an external authorization tool

4.2.6 Account information retrieval without PSU's participation

- 001 / TPP sends the request to issue a new token based on a refresh token
- 002 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs). After a positive verification between the ASPSP and the TPP, an XS2A interface session is established, in consequence of which ASPSP sends to the TPP an access token based on a refresh token
- 003 / TPP calls one of the following methods: /getAccount, /getTransactionsDone, /getTransactionsPending, /getTransactionsRejected, /getTransactionsCancelled, /getTransactionsScheduled, /getHolds, /getTransactionDetail
- 004 / ASPSP performs the request

the account information taking process is terminated

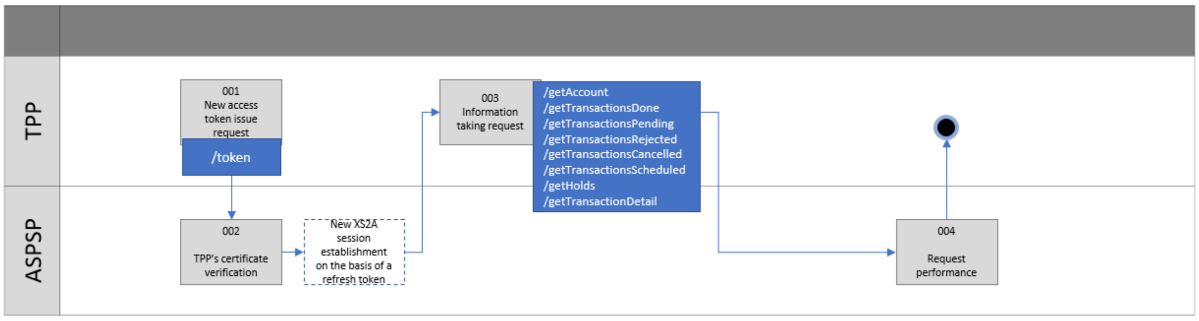

TPP
ASPSP
001 New access token issue request
/token
003 Information taking request
/getAccount
/getTransactionsDone
/getTransactionsPending
/getTransactionsRejected
/getTransactionsCancelled
/getTransactionsScheduled
/getHolds
/getTransactionDetail
002 TPP's certificate verification
New XS2A session establishment on the basis of a refresh token
004 Request performance

Figure 15: AIS – Account information retrieval without PSU's participation

4.2.7 Withdrawal of consent

- 001 / PSU initiates the process in the TPP's interface
- 002 / TPP displays a list of consents
- 003 / PSU selects a specific consent from the list of consents within the framework of which the changes will be made
- 004 / PSU withdraws the consent for the AIS service
- 005 / TPP sends a token revocation request to the ASPSP (use of the method /deleteConsent)

consent withdrawal process is terminated

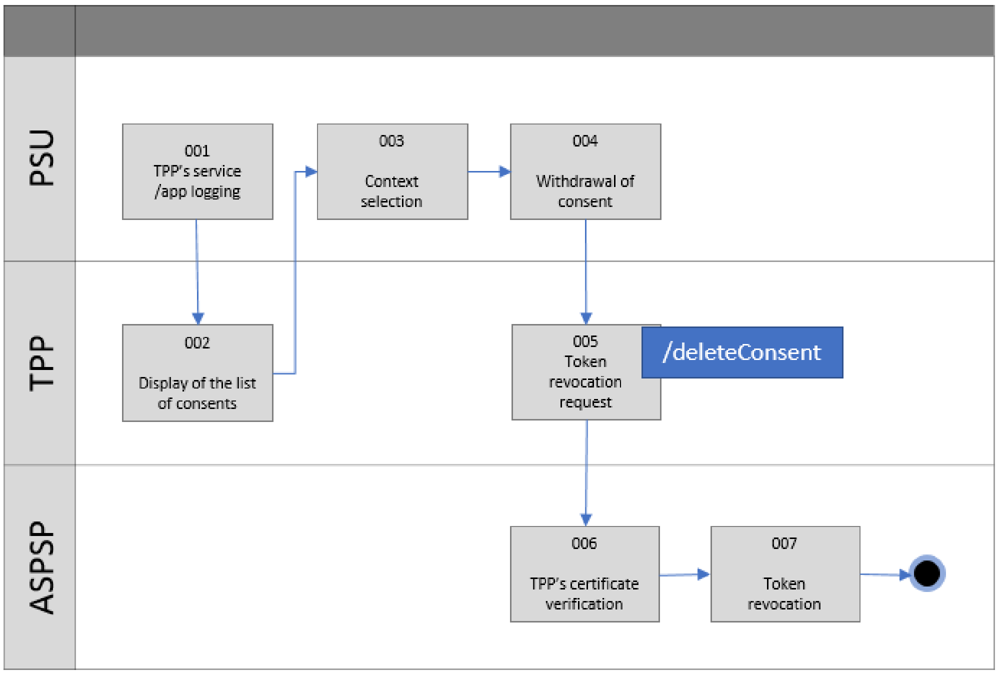

PSU
TPP
ASPSP
001 TPP's service /app logging
003 Context selection
004 Withdrawal of consent
002 Display of the list of consents
005 Token revocation request
/deleteConsent
006 TPP's certificate verification
007 Token revocation

Figure 16: AIS – consent withdrawal

4.3 Use Case #3: request for confirmation of funds by a PIISP (CAF)

The use of an CAF service within the Compliance Scope as presented in this Use Case consists in the initiation by the TPP acting as an PIISP of a request for availability of funds in the transaction amount at the PSU's payment account on the basis of applicable provisions of the Payment Services Act.

The PSU must previously indicate to the PIISP a payment account that will be verified in each case in terms of funds availability and grants his/her consent for the ASPSP holding the given payment account to answer such requests. The PSU initiates a business process requiring a verification whether or not the payment account previously indicated by the PSU has funds available in the amount equal at least to the requested amount. In order to effect the service, the PIISP establishes an XS2A session with ASPSP, sends a request and receives a 'YES' or 'NO' answer.

This process has been presented at a high level in the diagram below.

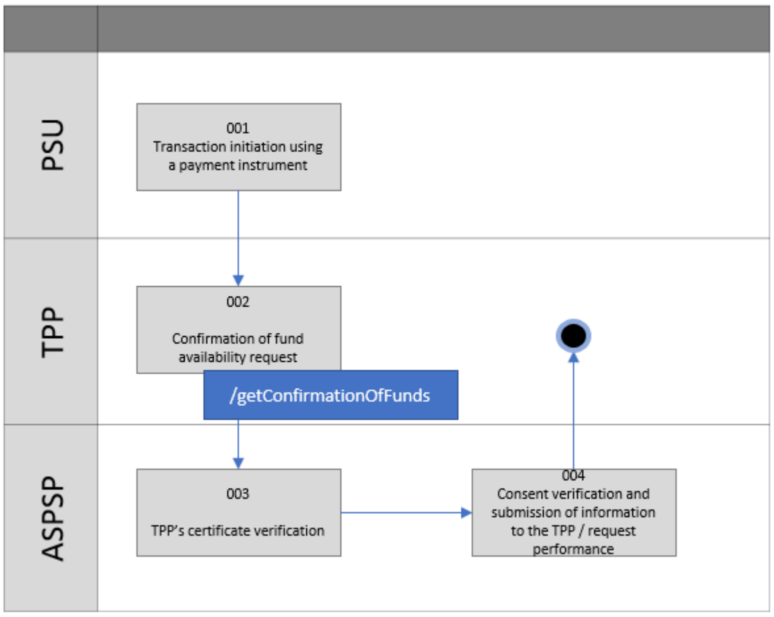

PSU
TPP
ASPSP
001
Transaction initiation using a payment instrument
002
Confirmation of fund availability request
/getConfirmationOfFunds
003
TPP's certificate verification
004
Consent verification and submission of information to the TPP / request performance

Figure 17: CAF – request for confirmation of funds

- 001/ Transaction initiation using a payment instrument
- 002 / TPP calls the method /getConfiramtionOfFunds
- 003 / ASPSP verifies the TPP's identify on the basis of a certificate (or also on the basis of the register of TPPs).
- 004 / ASPSP verifies the consent for the service on its side, after a positive verification, the request is performed

the confirmation of funds request process is terminated

5 Polish API Technical Specification

5.1 Technical Assumptions

The table below presents the technical assumptions made for the PolishAPI:

No.	ASSUMPTION	DESCRIPTION	GROUNDS
1	Direct TPP-ASPSP communication	In the basic variant of the PolishAPI, the TPP and the ASPSP communicate with each other directly.	The peer-to-peer architecture used increases the safety and efficiency as well as allows the avoidance of a single point of failure.
2	Role of the PSD2 HUB	In case the ASPSP uses the services of a PSD2 HUB, it is neutral for the TPP. The PSD2 HUB presents itself using the ASPSP's certificate, from the TPP's perspective, there is no difference whether it gets connected with the PSD2 HUB or directly with the ASPSP.	Efficient and Safe API and PolishAPI Standard Implementation.
3	The TPP-ASPSP communication is a server-server one	No direct communication of the client's device (e.g. a mobile app) with the ASPSP's PolishAPI servers is allowed. The TPP should be legally obliged to secure the access keys (so-called access certificate). In particular, the access certificates may not be installed in mobile apps made available to the PSUs)	
4	Separation of the client's consent step from the operation performance step	The client's consent for the service performance will be separated from the performance of the operation itself. One of the effects will be the fact that the consent in itself will not entail any financial consequences.	Flexibility in the implementation of new services, including the Premium Services.
5	Scope of the PolishAPI	The scope of PolishAPI specifies the following: - way of granting consent for the performance by the TPP of an operation on behalf of the customer - scope of operations and rights - URL where the given service is available - standard scope of parameters per service - security mechanisms - communication principles - error handling The PolishAPI does not specify the following: - full scope of functionalities to be made available by the ASPSP as well as the information as to which ones of them will not be	The RTS make the scope of functionality and the scope of data dependent on the scope of functionality made available in the Internet banking, which is different for each ASPSP

		within the Compliance Service - full specification of fields per service for each ASPSP	

5.2 XS2A Session Establishment

The use by a TPP of business services (AIS, PIS, CAF), made available at the ASPSP's side, requires the so-called communications session to be started at the side of the technical solutions of the entities listed.

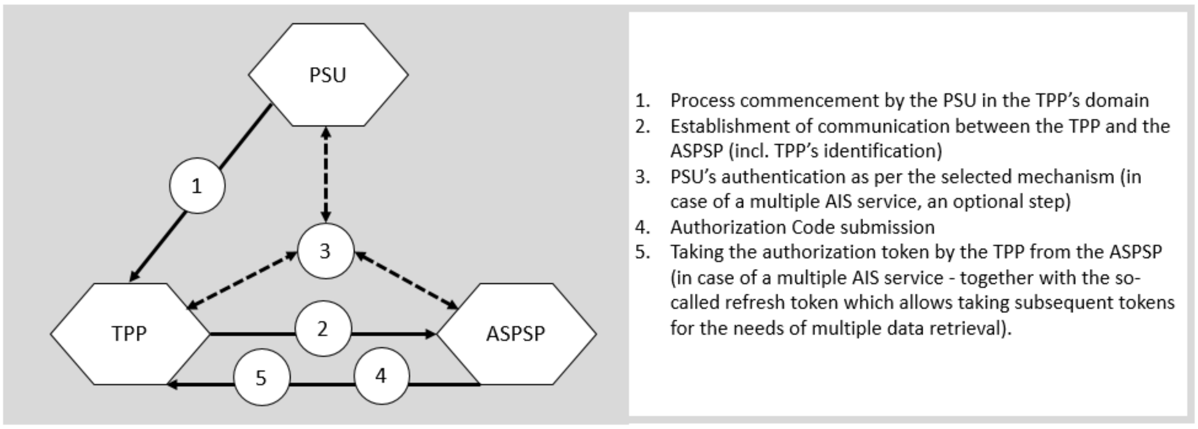
The process of starting a communications session with the XS2A interface comprises the requests and responses exchanged between the TPP and ASPSP using the technical services of that interface (AS – Authorization Service), in effect of which the communications session is started and the ASPSP's side and its technical representation, including such metadata as its validity date, is sent to the TPP.

The establishment of a communications session may take into consideration the necessity to ensure a strong authentication of the PSU. Considering the SCA method selected (*ASPSP-side* or *decoupled*), the communications session starting process may vary. Irrespective of the said differences as regards the SCA methods, the communications session establishment is based on the OAuth 2.0 standard assumptions in the following matters:

a) The required method of authorisation of access to the ASPSP resources made available via the XS2A business interface is the return by the ASPSP-side server, in response to each request sent by the TPP, of a one-time authorisation code – within the understanding of Art. 4 of the RTSs, which will be used by the TPP in the next step to obtain an access code as per the provisions of the OAuth 2.0 standard.
b) The *state* parameter sent by the TPP in the authorization request (item a) must be unique for each authorization process performed by the given TPP.
c) It is suggested that the one-time authentication code on the ASPSP's server side and the access token were the resource identifier in the database, in which the indicated resource data will be used to identify the PSU for whom the access token is generated or the defined business operation is effected.
The use of the so-called *stateless token* (e.g. JWT Token - RFC 7519) should be resorted to only in case when the disclosure of the ASPSP's customer data (including the ID) is compliant with the security policy
d) Together with the access token, the scope parameter (the same as in the request sent by the TPP) is transferred to the TPP.

The TPP's use of a valid communications session is a pre-condition for the reception of correct responses to the requests sent to the XSS2A interface business services.

The diagram of the XS2A communications session establishment process flow is presented below.



1. Process commencement by the PSU in the TPP's domain
2. Establishment of communication between the TPP and the ASPSP (incl. TPP's identification)
3. PSU's authentication as per the selected mechanism (in case of a multiple AIS service, an optional step)
4. Authorization Code submission
5. Taking the authorization token by the TPP from the ASPSP (in case of a multiple AIS service - together with the so-called refresh token which allows taking subsequent tokens for the needs of multiple data retrieval).

Figure 18: Multilayer XS2A session establishment diagram

Each transaction under the XS2A interface business services takes place as part of a dedicated and separate communications session, whereby for the selected methods under the AIS and PIS services and assuming the fulfilment of the conditions defined in the business and technical parts of the PSD2 Directive, a multiple use of the same communications session when sending requests to the XS2A interface business services, without the need to perform the SCA procedure for the PSU on each occasion and while maintaining the validity of the communications session, after which it will be automatically cancelled by the ASPSP.

The XS2A interface technical service may offer an alternative and automatic (i.e. not requiring any interaction with the PSU) mechanism of starting a communications session, i.e. the refresh token. The mechanism allows a refreshment of the communications session previously cancelled by the ASPSP without the need to repeat the SCA procedure, based on a separate session identifier (*refresh token*) sent to the TPP in response to the request to start the original communications session.

5.3 Definition of Access Token

The access token is a technical representation of the communications session with a defined validity that was established by and between the TPP and the ASPSP in the context of a precisely defined PSU and for a precisely defined scope of the ASPSP's side services and resources to which the TPP obtained access. The access token is a series of characters the role of which is to confirm the access authorization to secured resources made available via the XS2A interface services. The access token may have various forms and ways of interpretation. The final properties of the access token depend on the ASPSP-side authorization systems which implement the Polish API standard.

Pursuant to the regulations described in the RTSs of the PSD2 Directive, depending on the XS2A interface business service (AIS, PIS), for which the communications session was established, the access token may be used one time or many times before it is cancelled by the ASPSP, which will entail a necessity to re-run the SCA procedure for the PSU, in case of an intention to use the service again.

5.4 Mutual Authentication of the TPP and the ASPSP

The mutual authentication of the TPP and the ASPSP takes place on the basis of the X.509v3 certificates issued by a trusted third party. A trusted third party may by, in particular, an institution performing the role of the Identity Hub. It may also be any other party offering a trust-based relationship based on public key infrastructure mechanisms.

All operations consisting in the flows specified and described in the standard are possible only in a situation of a correct authentication in a process that comprises a mutual authentication of the server and the client (mutual authentication). The TPP and the ASPSP may have the role of both a server and a client, but, in each case, it is required that the parties to the communication mutually authenticate each other.

A description of the public key infrastructure used for the needs of authentication of parties (TPP, ASPSP, PISP) is not a part of the Polish API standard. It should be described in separate documents (working standards), taking into account the structure of trust relation between the certification institutions and the interoperability of the Polish API with other solutions of this type in place in other countries.

5.5 Communication Protocol

HTTP /2 or HTTP 1.1, secured by TLS 1.2+ with a mutual authentication of the client and the server by means of the X.509v3 certificates will be used as the communication protocol. Due to the requirement to ensure non-repudiation (request and response signing), only the POST method will be used in the http communication.

5.6 Resource Name Diagram

The PolishAPI services will be made available under addresses compliant with the following model:

https://{DNS domain}/{v{Resource version number 1}/{Resource name 1}}/.../v{Resource version number n}/{Resource name n}

Field description:

a) DNS domain/address – where the ASPSP makes the PolishAPI services available (information made available in the PSD2 register)
b) Resource version number – number of the version according to PolishAPI specification (digit before the dot separated by the '_' sign) and subsequent interface number within the given ASPSP (digit after the dot)
c) Resource name – number of the resource the request concerns; resources nesting routes, e.g. /v{version number of resource accounts}/accounts/v{number version of resource transactionsDone}/transactionsDone

5.7 Canonical Data Model

In order to unify the data types, a canonical data model was proposed as presented in the table below. A detailed model definition is given in Annex No. 1.

CLASS NAME	PURPOSE	API
AccountNumber	Account no	Primary
AccountBaseInfo	Class containing basic information about the account data	Primary
AccountForeign	Account number in the format for foreign transfers	Primary

AccountInfo	Class of information about the account	Basic / CallBack
AccountInfoRequest	Class of request concerning a single account	Primary
AccountResponse	Class of response to a request concerning the PSU's account	Primary
AccountsRequest	Class of request concerning accounts	Primary
AccountsRequest	Class of callback with a list of accounts	CallBack
AccountsResponse	Class of response to a request concerning many PSU's accounts	Primary
AddPaymentResponse	Class of response to the payment initiation request	Primary
Address	Class containing data of a postal address	Basic / CallBack
AuthorizationDataRequest	Class with feedback with authorization code compliant with the OAuth 2.0 standard for the authorization code method	CallBack
AuthorizeRequest	Class containing data required to for the TPP's authorization	Primary
AuthorizeResponse	Class of response to the TPP request for PSU's authorization for the performance of the XS2A interface service	Primary
BankAccountInfo	Class containing bank's data	Basic / CallBack
Bank	Class containing bank's data used in AIS requests	Basic / CallBack
CallBackResponse	Basic class for responses to callback	CallBack
BundleRequest	Class of request about the status of a batch of transfers	Primary
BundleResponse	Class of response to the request about the status of a batch of transfers	Primary
BundleStatusInfoRequest	Class of request with feedback information about the status of a batch of transfers	CallBack
CancelPaymentsRequest	Class of a request cancelling the payments or a whole batch of transfers initiated	Primary
CancelPaymentsResponse	Class of responses to a request cancelling the payments or a whole batch of transfers initiated	Primary
ConfirmationOfFundsRequest	Class of request concerning the available funds at the account	Primary
ConfirmationOfFundsResponse	Class of response to a request concerning the available funds at the account	Primary
CurrencyRate	Class containing conversion rates	Primary
DeleteConsentRequest	Class containing data allowing the identification of consents to be deleted at the ASPSP's side	Primary
DictionaryItem	Class containing dictionary item data	Basic / CallBack
EatCodeRequest	Class of request to obtain an authorization code compliant with OAuth 2.0 on the basis of a one-time code generated in EAT	Primary

Error	Class of information containing data about the error returned	Basic / CallBack
GetPaymentResponse	Class of response to the payment request	Primary
Map	Class of map <string, string>	Basic / CallBack
NameAddress	Class containing the data of the name and address in the form of four data lines	Basic / CallBack
PageInfo	Class containing data allowing the use of the paging mechanism	Primary
PaymentDomesticRequest	Class of request concerning the standard domestic transfer initiation	Primary
PaymentDomesticRequestBundled	Class of request concerning an initiation of many standard domestic transfers in the form of a batch	Primary
PaymentEEARequest	Class of request concerning the SEPA foreign transfer initiation	Primary
PaymentEEARequestBundled	Class of request concerning an initiation of many foreign SEPA transfers in the form of a batch	Primary
PaymentInfo	Class of information about the payment	Primary
PaymentNonEEARequest	Class of request concerning the initiation of a foreign transfer other than SEPA	Primary
PaymentNonEEARequestBundled	Class of request concerning an initiation of many foreign transfers other than SEPA in the form of a batch	Primary
PaymentRequest	Class of request concerning the payment status	Primary
PaymentsBundleRequest	Class of request concerning an initiation of many transfers in the form of a batch	Primary
PaymentsBundleResponse	Class of response to a request concerning an initiation of many transfers in the form of a batch	Primary
PaymentStatus	Dictionary of payment statuses	Basic / CallBack
PaymentStatusInfoRequest	Class of a callback with information about he payment status	CallBack
PaymentTaxRequest	Class of request concerning the tax transfer initiation	Primary
PaymentTaxRequestBundled	Class of request concerning an initiation of many tax transfers in the form of a batch	Primary
PaymentTokenEntry	Class constituting a structure of data about the payment initiated, as required to retrieve its current status	Primary
PaymentsRequest	Class of request concerning multiple payment status	Primary
PaymentsResponse	Class of response to a request concerning multiple payments	Primary
Payor	Class of information about the payer to the Social Insurance Institution (ZUS) and Tax Office	Primary

PrivilegeAisAspspIn	Class defining a list of attributes of the AIS service privilege constituting the subject matter of the PSU's consent request	Primary
PrivilegeAisAspspInSimple	Class defining a list of attributes of the AIS service privilege constituting the subject matter of the PSU's consent request (abbreviated version)	Primary
PrivilegeAisAspspOut	Class defining a list of attributes of the AIS service privilege for which a consent was granted by the PSU	Primary
PrivilegeAisAspspOutSimple	Class defining a list of attributes of the AIS service privilege for which a consent was granted by the PSU (abbreviated version)	Primary
PrivilegeBundle	Class defining a list of attributes of the privilege to request the status of a batch of transfers	Primary
PrivilegeBundleTransfers	Class defining a list of attributes of the privilege to initiate a batch of transfers	Primary
PrivilegeCancelPayment	Class defining a list of attributes of the privilege to cancel a transfer initiated	Primary
PrivilegeDomesticTransfer	Class defining a list of attributes of the privilege to initiate an ordinary transfer	Primary
PrivilegeForeignTransferEEA	Class defining a list of attributes of the privilege to initiate a foreign EEA transfer	Primary
PrivilegeForeignTransferNonEEA	Class defining a list of attributes of the privilege to initiate a foreign non-EEA transfer	Primary
PrivilegePayment	Class defining a list of attributes of the privilege to request the status of a payment	Primary
PrivilegeTaxTransfer	Class defining a list of attributes of the privilege to initiate a tax transfer	Primary
RecipientPIS	Class containing recipient's data used in PIS requests	Primary
RecipientPISTax	Class containing recipient's data used in PIS requests for tax operations	Primary
RecurringTransferFrequency	Class containing parameters defining the frequency of recurring payments	Primary
RecurringTransferParameters	Class containing parameters defining a recurring payment	Primary
RecipientPISForeign	Class containing recipient's data used in PIS requests for foreign operations	Primary
RequestHeader	Class containing information about the PSU	Primary
RequestHeader	Class containing metadata of the request to the callback interface	CallBack
RequestHeaderAIS	Class containing information about the PSU for the requests to the AIS service of the XS2A interface	Primary
RequestHeaderAISCallback	Class containing information about the PSU for the requests to the AIS service of the XS2A interface enabling the response to be sent in	Primary

	the form of a request to the callback interface	
RequestHeaderCallback	Class containing information about the PSU for the requests enabling the response to be sent in the form of a request to the callback interface	Primary
RequestHeaderWithoutToken	Class containing information about the PSU for the requests not requiring an access token	Primary
RequestHeaderWithoutTokenAS	Class containing information about the PSU for the requests not requiring an access token in the authorization service (AS)	Primary
RequestHeaderWithoutTokenCallbackAS	Class containing information about the PSU for the requests that do not require an access token and enabling the response to be sent in the form of a request to the callback interface in the authorization service	Primary
ResponseHeader	Class containing response metadata	Primary
ResponseHeader	Class containing response metadata	CallBack
ScopeDetailsInput	Class defining the scope, limits, parameters and validity of consents the TPP requests	Primary
ScopeDetailsInputPrivilegeList	Class containing a full list of privileges constituting the subject matter of the PSU's consent request	Primary
ScopeDetailsOutput	Class defining the scope, limits, parameters and validity of consents granted by the PSU	Primary
ScopeDetailsOutputPrivilegeList	Class containing a full list of privileges for which a consent was granted by the PSU	Primary
SenderPISDomestic	Class containing sender's data used in PIS requests concerning domestic and tax transfers	Primary
SenderPISForeign	Class containing sender's data used in PIS requests concerning foreign transfers	Primary
SenderRecipient	Class containing sender's/recipient's data used in AIS requests	Basic / CallBack
SocialSecurityPayor	Class contain information about the payer of contributions to the Social Insurance Institution (ZUS)	Primary
TokenRequest	Class containing data required to obtain an access token	Primary
TokenResponse	Class of responses containing, without limitation, the access token	Primary
TransactionCancelledInfo	Class containing data about cancelled transactions	Basic / CallBack
TransactionCancelledInfoRequest	Class of callback with a list of transactions cancelled	CallBack
TransactionDetailRequest	Class of request concerning a single transaction	Primary

TransactionDetailResponse	Class of response to a single transaction request	Primary
TransactionsDoneInfoResponse	Class of response containing a list of transactions done	Primary
TransactionDoneInfoRequest	Class of callback containing a list of transactions done	CallBack
HoldInfo	Class containing data about holds at the account	Basic / CallBack
HoldInfoResponse	Class of response containing a list of holds at the account	Primary
HoldInfoRequest	Class of callback containing a list of holds at the account	CallBack
HoldRequest	Class of request concerning holds at the account	Primary
TransactionInfo	Class describing the payment transaction booked	Basic / CallBack
ItemInfoBase	Base class describing a payment transaction or a hold at the account	Basic / CallBack
TransactionInfoCard	Class representing information about the card within the framework of a transaction	Primary
TransactionInfoRequest	Class of a request concerning transactions	Primary
ItemInfoRequestBase	Base class for requests concerning transactions or holds at the account	Primary
TransactionInfoTax	Class of information given for a transfer to a tax office / customs authorities	Primary
TransactionInfoZUS	Class of information given for a transfer to the Social Insurance Institution (ZUS)	Primary
TransactionPendingInfo	Class describing the pending payment transaction	Basic / CallBack
TransactionPendingInfoResponse	Class of response containing a list of pending transactions	Primary
TransactionPendingInfoRequest	Class of callback containing a list of transactions pending	CallBack
TransactionRejectedInfo	Class describing a rejected payment transaction	Basic / CallBack
TransactionRejectedInfoResponse	Class of response containing a list of rejected transactions	Primary
TransactionsCancelledInfoResponse	Class of response containing a list of transactions with a cancelled status	Primary
TransactionScheduledInfo	Class containing data about a scheduled transaction	Basic / CallBack
TransactionScheduledInfoRequest	Class of callback with a list of scheduled transactions	CallBack
TransactionRejectedInfoRequest	Class of callback containing a list of transactions rejected	CallBack
TransactionsScheduledInfoResponse	Class of response containing a list of transactions with a scheduled status	Primary
TransferData	Class containing transfer data	Primary
TransferDataBase	Class containing general transfer data	Primary
TransferDataBaseTax	Class containing data of a tax transfer	Primary

TransferDataCurrencyRequired	Class containing transfer data with the required information about the currency	Primary
TransferDataCurrencyRequiredTax	Class containing tax transfer data with the required information about the currency	Primary

5.8 Operations

Due to the requirement to ensure non-repudiation in the http communication, only the POST method will be used as it allows the JWS Signature format signature. Within the operation, the context of a specific user is determined on the basis of an access token. This principle applies both to the requests sent by the TPP to the ASPSP's XS2A interface , as well as requests sent from the ASPSP to the XS2A callback interface provided by the TPP.

5.9 Sorting

The records returned are sorted chronologically (on a reversed basis) as per the transaction date.

5.10 Filtering

Filtering in the AIS service takes place after setting the appropriate properties in the TransactionInfoRequest class object:

a) itemIdFrom – transactions or holds from the given ID 'chronologically'
b) transactionDateFrom – initial transaction date of the data range requested
c) transactionDateTo – final transaction date of the data range requested
d) bookingDateFrom – initial booking date of the data range requested
e) bookingDateTo – final booking date of the data range requested
f) transactionCategory – CREDIT or DEBIT
g) minAmount – minimum operation amount within the data range requested
h) maxAmount – maximum operation amount within the data range requested

5.11 Paging

Results of requests containing many records (more than 100) should be paged. Next pages will be retrieved by setting the pageId attribute in the data structures responsible for sending the request for the account list retrieval and transaction list retrieval. The pageId attribute should be a natural number value which defines the first ordinal number of the account or transaction at our side. In response to the request to retrieve accounts or transactions, a PageInfo structure will be returned and it will contain optional parameters called nextPage and previousPage. These parameters, if returned, will contain the ordinal numbers of the accounts or transactions that commence, as applicable, the next and the previous page. In order to retrieve one of the mentioned pages, it is necessary to provide in the next request, in the pageId parameter, one of the values obtained in the previous request, in the above-mentioned attributes nextPage or previousPage. The number of records per page is defined by means of the perPage attribute in the requests sent. It is suggested that the maximum settable value for the perPage parameter should be 100. The ordinal numbers of the transactions start from 1 and grow incrementally by 1.

5.12 Response Statuses

The technical statuses will be returned by the following http codes:

STATUS	DESCRIPTION
200 OK	The operation was successful
204 No Content	The operation was successful. The response does not contain additional information.
400 Bad Request	The request is syntactically incorrect
401 Unauthorized	Incorrectly authenticated user
403 Forbidden	Authorisation error (no rights to access the resource)
405 Method Not Allowed	Use of an inappropriate method – the method used in the request is not allowed for the resource indicated (Only POST is used)
406 Not Acceptable	Incorrect Accept heading in the request (the server does not support it)
415 Unsupported Media Type	If an incorrect content type was set in the request
422 Unprocessable Entity	Validation error
429 Too Many Requests	Request rejected due to the fact that the maximum number of requests to access the resource has been exceeded
500 Internal Server Error	There was an unknown internal error of the API server
503 Service Unavailable	The API server is temporarily unavailable

5.13 HTTP Header

The following HTTP headers will be used in the requests:

HEADER	TYPE	DESCRIPTION
Authorization	String	Authentication header (used when sending a token). The value of the Authorization header should comprise the 'type' + 'credentials', where, in case the 'type' token approach is applier, the 'type' should have the value of 'Bearer'.
Date	Date	Request timestamp in the RFC 5322 date and time format.
Accept	Content type	Should be set to application/json Otherwise the application should return 406 Not Acceptable HTTP.
Accept-Encoding	Gzip, deflate	The operation should support GZIP and DEFLATE coding, it may also return non-compressed data.
Accept-Language	'pl', 'en', etc.	Defined the preferred language in which the response is to be returned. The operation does not have to support this header
Accept-Charset	Charset type like 'UTF-8'	UTF-8
Content-Type	application/json	Should be set to application/json. Otherwise, the operation returns: 415 Unsupported Media Type HTTP status code
X-JWS-SIGNATURE	String	JWS Signature (Detached)

Response headers:

HEADER	REQUIRED	DESCRIPTION
Date	Yes	Timestamp on the basis of the GMT server time as per RFC 5322
Content-Type	Yes	application/json
Content-Encoding	Yes	GZIP or DEFLATE
Expires	No	Defines the caching policy for slowly varying objects e.g. Expires: Mon, 25 Jun 2012 21:31:12 GMT
Size	Yes	Response size in bytes
ETag	No	Resource version identifier
Last-Modified	No	Last resource modification date
X-JWS-SIGNATURE	Yes	JWS Signature (Detached)

5.14 Message format

The data exchange format will be JSON with the UTF-8 coding. All messages have a defined JSON schema draft #4. The parameter names will be saved camelCase.

5.15 Basic Data Formats

SIZE	JSON FORMAT	DESCRIPTION
Text	String	Text coded in UTF-8
Dates	String	Pursuant to ISO8601. Date and time will be represented in the form of YYYY-MM-DD to YYYY-MM-DDThh:mm:ss.ccczzzzzz with the mandatory specification of the time zone Designations: YYYY – year, MM – month, DD – day, hh – hour, mm – minute, ss – second, ccc – millisecond (optional) zzzzzz – e.g. +02:00 or Z to denote universal time For example: 2016-10-10T12:00:05.342+01:00
Amounts	String	Written as digits with a sign separating the integer part from the fractional part up to the second decimal place (the dot sign). In case of positive value, no additional signs are given. In case of negative value, the '-' sign is added before the number
Integer	Number	The integer numbers are represented without group separators
Real number	String	Real numbers are represented without group separators and with the '.' sign as a decimal separator
Country codes	String	In accordance with ISO 3166
Currencies	String	Currency symbols in accordance with ISO 4217
Account numbers	String	IBAN numbers in accordance with ISO 13616
Bank identifiers	String	Bank Identifier Codes (BIC) in accordance with ISO 9362
Logical value	Boolean	Flags and logical tags which may take one of two values: true or false

5.16 Unique Identifier of the request and an algorithm for its generation

Each request sent by the TPP to the ASPSP -side XS2A interface must contain a unique identifier (a parameter called requestId in the header structure sent within the body of each request). The identifier's uniqueness must be ensured for all the requests sent by all the TPPs to the selected ASPSP.

The requirement that a unique request identifier be sent results from the necessity to verify all the requests received by the ASPSP in order to identify and reject the same requests received more than once, e.g. in result of a TPP-side error or of recurring and intentional message sending by the TPP in case there is no answer from the ASPSP.

The PolishAPI standard defines the required request identifier format which ensures uniqueness that has been defined as above and makes it possible to carry out the ASPSP-side request verification as described on a random basis, i.e. taking into account a small subset of earlier request identifiers, which will significantly and positively influence the efficiency of such verification and will indirectly ensure a faster response from the XS2A interface.

The required request identifier format is UUID (Universally Unique Identifier), which is a standard described in the RFC 4122 document (https://tools.ietf.org/html/rfc4122). Additionally, it is required that the request identifier should be generated in variant No. 1 (see 4.1.1 RFC 4122) and in version No. 1 (see 4.1.3 RFC 4122), which will ensure that the identifier’s value includes a monotonic component based on the request sending time and information identifying the request sender (TPP).

6 Security of information

This chapter presents general security requirements vital from the perspective of standard creation and its designing on the basis of the IT solution ecosystem compliant with the PolishAPI. Detailed security requirements comprising additionally the problems of security of PolishAPI-based system implementation, operation and maintenance will be described in a separate document and its development will be preceded by a preparation of a detailed risk model. In consequence, they will be an answer to specific identified threats, places where the threats may potentially materialise as well as the assessment of the level of materiality and probability and impact of the cases when such threats should materialise on the safety and operational continuity of the PolishAPI ecosystem.

Particular PolishAPI-based IT system components should have a clearly defined separation between the data layer, the controller's layer and the presentation layer. The components should be separated from each other by a defined security measures such as network segmentation or the firewall rules.

6.1 TPP's Authentication

TPP entities must be properly authenticated before they are granted access to the XS2A interface so as to ensure a high level of protection both from an impersonation on the part of unauthorised users of lawful TPPs and from an unauthorised escalation of the authorisation level by TPPs having a legal access to the interface. The authentication takes place on the basis of public key certificates during a mutual authentication process via the TLS 1.2+ protocol.

Authentication errors must result on the denial of access to the XS2A interface.
The user and session authentication data as well as operation authentication tokens may not be transferred in the form of URI parameters.

6.2 TPP's Authorisation

The TPP's authorisation must be base on the RBAC model (*Role Based Access Control*), where the level and scope of access to particular API resources depends on the role of the PolishAPI user.

The use of particular methods must be authorised so that the rights depended on the user's role. In particular, the level and scope of authorisation should be different for TPPs depending on the scope of their rights.

6.3 PSU's Authorisation for Operations made by a TPP

Irrespective of the PSU's authentication mechanism applied within the AIS and PIS services, it is assumed that the process will end by the issue by the ASPSP of an access token as defined in Chapter 5.3 of the specification. The operations are always requested by the TPP via a valid access token.

6.4 Security in case of Mobile Apps

For security reasons in a model using the authentication mechanism on the ASPSP's side, the redirection to the ASPSP's site and back to the TPP's site will take place in the browser (browsers other than the system browse will not be allowed, the application of the WebView will not be allowed) and not in the mobile app itself. The TPP may register the appropriate URL in the device's operating system so that after the redirection back to the TPP the mobile app be automatically resumed.

6.5 Data Validation and Integrity Assurance

The data must be subject to validation procedures in the context of variable types, the scope and the model of limit values. In particular, the structured JSON data must be parsed in accordance with the formal validation procedures, using a white list-based approach. The validation must also be made with regard to the Content-type and Accept (application/json) headers for the compliance of the header value with the actual text of the HTTP message.

During the validation, the digital signature in the header (X-JWS-SIGNATURE) must be validated in the context of the data provided both in the requests and in the http protocol responses as listed in the ASPSP-TPP communication. It should be stressed that this rule applies also in the case of communication initiated by the ASPSP side, in case of a use of the XS2A callback interface provided by the TPP.

In case of Content-type and Accept text validation errors, http message 406 should be returned (Not Acceptable).

Input data validation errors must be registered in logs.

The validation errors must be signalled by the HTTP 400 message (Bad Request) and the data must be rejected.

Not validated or incorrectly validated data must be rejected.

6.6 Cryptography

The communication using the PolishAPI must ensure a cryptographic security at two levels:

a) At the level of transmission via (https/TLS). The TLS connection parameter renegotiation must be made in a secure way in accordance with RFC 5746
b) At the message level, in order to ensure the non-repudiation, it is necessary to apply the JSON Web Signature as per the RFC 7515 standard (https://tools.ietf.org/html/rfc7515). The signature should be included in each request in the X-JWS-SIGNATURE header

Each party to the communication (TPP, ASPSP) must have its own unique two pairs of keys (for transmission and for signature).

Separate certificates must be used to secure the transaction at the https level and at the JWS-SIGNATURE level. For https, the certificate must have an expanded key use (Client Authentication) for signature (Digital signature).

The certificates used to combine the transmission and the signature must be validated in terms of:

a) Validity (certificate validity date from and to)
b) No cancellation (crl/ocsp)
c) Path verification (https://tools.ietf.org/html/rfc4158)

Particularly sensitive information, including identification confirmations and authorization keys, may not be buffered or registered in logs.

Certificates should be issued taking into account the ETSI TS 119 495 specification.

6.6.1 Management of the JWS-SIGNATURE certificates

The PolishAPI standards requires that all requests and responses be signed in accordance with the JWS-SIGNATURE standard within the XS2A interface (ASPSP's side) and callback interface (TPP's side). This fact entails a necessity to manage the certificates, both in the context of signing the messages sent and their agreement and provision to the other side of the communication. This necessity is symmetrical, i.e. it concerns both the ASPSP and the TPP.

Considering the communication efficiency aspects in the XS2A and callback interfaces as well as the potential difficulties in the management of the encryption infrastructure related to the possibility of use of an unlimited number of certificates, the PolishAPI standard introduces the following requirement, which is an extension of the RFC 7515 standard in the context of the JWS-SIGNATURE header parameters:

- use of the 'kid' header parameter is required (extension of 4.1.4 of RFC 7515)

- use of the 'x5t#S256' header parameter is required (extension of 4.1.8 of RFC 7515)

The joint satisfaction of both above-mentioned requirements in the construction of each JWS-SIGNATURE allows the following:

a) unambiguous identification of the certificate at the reader's side, its finding in the internal encryption infrastructure and its use to read the signature content

b) skipping of the necessity to agree the certificate with regard to each message sent and received via the XS2A and callback interfaces

The introduction of the requirements described implies a necessity of a one-off prior or simultaneous (with regard to the message signed by JWS-SIGNATURE) agreement on the certificate between the communication parties. Considering the scarcity of this operation when compared to the number of messages signed using the certificate selected and, consequently, the low cost of its implementation, the PolishAPI standard does not impose any requirements in this regard but only determines the recommended implementations, i.e.:

a) the use of the JWS-SIGNATURE header parameter called 'x5u' (see 4.1.5 of RFC 7515); it allows the URL to be included in the resource constituting a public key of the X.509 certificate, in the same message in which JWS-SIGNATURE was inserted for the first time using the given certificate

b) procedure application based on the 'OAuth 2.0 Dynamic Client Registration' protocol (RFC 7591), allowing a prior (with regard to the actual communication using the XS2A or callback interfaces) agreement on the certificate between the parties

6.7 Protection against API Abuse

The API implementation should take into account the mechanisms of protection against excessive requests from the part of the users (both authorised and unauthorised ones), in particular those generated on purpose with the intention to render the resource unavailable (DoS/DDoS), by an application of mechanisms limiting the number of requests supported over a given time unit. The limit values should be determined after examination of the specific operational conditions. Limits of this kind should be parametrized. The count of the number of resource access requests should base on a key that unambiguously identifies the given TPP (the RequestHeader.tppID class) and the meters implemented per TPP on the server side. The limit excess must be signalled by HTTP message number 429 (Too Many Requests).

The security should be ensured on the basis of OWASP Guidelines - REST Security Cheat Sheet (https://www.owasp.org/index.php/REST_Security_Cheat_Sheet).

6.8 Audit Information Logging

It is recommended that the time sources for all the parties using the PolishAPI should be synchronized in order to ensure that the log entries have the correct time stamp.

The key business operation logging should ensure non-repudiation and integrity of entries by using the data from JWS Signature.

A log should contain necessary information that will allow a precise time analysis in case of an incident so that it would be possible to combine particular entries into a single transaction. The element combining particular entries may be, for example, an abbreviation from the authorisation token.

7 Technical Description of the Authentication and Authorisation Process

7.1 Scope and scope_details Parameters

- The scope parameter defines the following access scopes (corresponding to the consents granted by the PSU to the TPP with regard to the provision of services available via the XS2A interface): ais-accounts – the right to retrieve a list of the PSU's accounts;
- ais – the right to take information about one or more accounts indicated by the PSU;
- pis – the right to initiate a single payment or multiple payments in the form of a batch of transfers as well as to take information about the status of transactions and a batch of transfers initiated;

The detailed scope and conditions of services provided by the TPP on the basis of the above-mentioned rights were described in the form of a set of XS2A interface methods in the technical specification of the Polish API standard (Annex No. 1), separately for each of the AIS and PIS services.

The scope_details parameter defines the time ranges, limitations and details of the given authorisation:

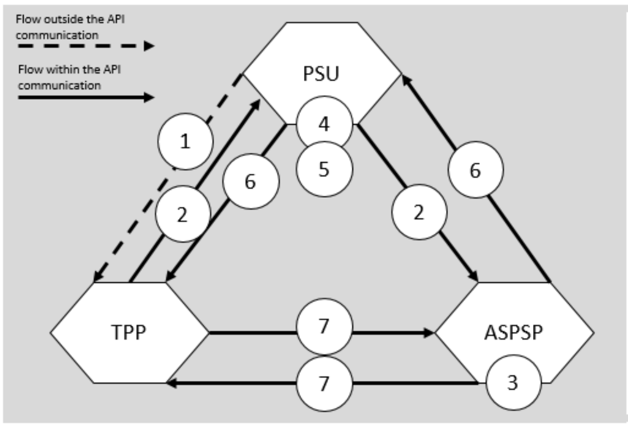
a) as to the scope of resources which are made available (e.g. a list of accounts)
b) time for which they are made available
c) limit of the number of uses
d) list of operations it concerns
e) selected operation parameters, e.g. length of back history, transfer parameters etc.

A specification of the scope_details parameter structure is given in Annex No. 1.

The above parameters are sent by the TPP as POST (due to the possible size of scope_details) in the JSON format - encoded and signed using the JSON Web Signature in accordance with RFC 7515.

7.2 Authentication Mechanism on the ASPSP's Side

The process of the PSU's authentication on the ASPSP's side was developed on the *authorization code* method as defined in the OAuth 2.0 standard. The high level business aspect of this mechanism was presented in the diagram below while a detailed procedure of the authentication process and of the process of obtaining authorization for the ASPSP's resources were described in Chapter 11.1.


Flow outside the API communication
Flow within the API communication
PSU
TPP
ASPSP
1
2
2
3
4
5
6
6
7
7

1. Process initiation by the PSU in the TPP's domain
2. PSU's redirection to the ASPSP's domain together with the provision in the redirection address of the scope of the consent requested by the user
3. ASPSP verifies the TPP's identity and verifies whether or not the given TPP may request the consent indicated (AIS, PIS, COF)
4. The PSU logs in the ASPSP's domain.
5. The PSU grants his/her consent in the requested or in a limited extent or, alternatively, rejects the request
6. PSU's redirection back to the TPP's domain together with a provision of an Authorisation Code
7. Collection of an authorisation code by the TPP from the ASPSP (in case of a multiple AIS service – together with the so-called refresh token allowing the collection of subsequent tokens for the need of multiple data collection)

Figure 19: Authentication Mechanism on the ASPSP's Side

Below are described the steps and changes with regard to the OAuth 2.0 standard implemented by the PolishAPI in relation with legal and security requirements.

7.2.1 Redirection from the TPP to the ASPSP

The redirection comprises the following parameters:

PARAMETER	REQUIRED	COMMENT
response_type	Required	'Code' value
client_id	Required	TPP's unique identifier
redirect_uri	required	
scope	Required	
scope_details	Required	
state	Required	A random value unique for the TPP – protection against the Cross-Site Request Forgery attack

7.2.2 PSU's authentication and authorisation

Performance on the ASPSP's side.

7.2.3 Reverse redirection of the PSU's browser to the TPP

When the PSU is granting an authorization for the TPP, the authorization server delivers this information to the TPP by sending a one-time authorization code, which means that it may be used by the TPP to obtain access to the ASPSP's resources (obtain an access token) exactly one time only. The code is sent within the request to redirect the PSU's browser to the redirect_uri address (using the Content-Type parameter with the value of 'application/x-www-form-urlencoded'). Additionally, the request may also contain the state parameter, which is required only if it was previously sent by the TPP in the authorization request.

A sample reverse redirection to the TPP after the PSU's authentication and the authorization of the TPP's access to the ASPSP's resources:

```
HTTP/1.1 302 Found

  Location: https://[redirect_uri]?code=[authorization_code]

       &state=[state]
```

where:

[redirect_uri] – TPP-side address sent in the authorization request to which the PSU's browser is redirected after the process of that PSU's authentication and the authorization of access to the ASPSP's resources has been completed

[authorization_code] – one-time authorization code confirming a correct authentication of the PSU and the PSU's grant of authorization for the TPP to access the ASPSP's resources

[state] – additional parameter allowing the adjustment of the authorization request with the redirection request after the completion of the PSU's authentication and after the grant by the PSU of authorization to the TPP to access the ASPSP's resources, used to prevent the *'cross-site request forgery'* type attacks.

7.2.4 Token collection on the basis of the Authorization Code

PARAMETER	REQUIRED	COMMENT
grant_type	required	Value of the 'authorization_code'
Code	required	In accordance with the value given in step 7.2.3
redirect_uri	required	Value in accordance with the value in step 7.2.1
client_id	required	TPP's unique identifier

The TPP's authentication takes place on the basis of a certificate used for the TLS connection

Data returned, also allowing for the *scope_details* field, containing details of consents granted by the PSU.

PARAMETER	REQUIRED	COMMENT
access_token	required	
token_type	required	
expires_in	required	
refresh_token	optional	
scope	optional	
scope_details	optional	

7.2.5 Consent Withdrawal

The consent withdrawal is made using the /v1.0/accounts/v1.0/deleteConsent method

7.2.6 Use of the scope_details structure

- The one-time consent is supported using the scopeUsageLimit parameter.

7.3 Authentication Mechanism in an External Authorisation Tool (Decoupled)

The basis assumption of the PSU's authentication method described is the use of EAT (*External Authorization Tool*). It is a tool the minimum functionality of which is the capacity to carry out a strong authentication of the PSU within the understanding of the technical requirements of the PSD2

Directive. Additionally, EAT may constitute software that is external in relation to the ASPSP's technical infrastructure, which ensures a safe exchange of the authorization information.

A session between the TPP and the ASPSP, allowing for the strong authentication of the PSU and based on the *Decoupled* method in order to allow the TPP to use the XS2A interface, must be established in accordance with the process as described below. The process described was developed on the basis of the assumptions of the OAuth 2.0 protocol, which means that it uses the terms defined therein (e.g. *'authorization code*', '*access token*'), but constitutes a separate way of gaining access to the XS2A interface in view of a lack of the use of redirections within the understanding of the http protocol, which are a mechanism this standard requires in the 'Authorization Code Grant' method. This approach was applied in order to ensure a coherence of the process of gaining access to the XS2A interface, irrespective of the PSU's authentication method selected, and its objective is to facilitate integration activities related to the use of the XS2A interface by the TPP.

The TPP initiates a process of establishment of a session with the XS2A interface on the ASPSP's side by calling the following XS2A interface method:

POST /[VER_A]/auth/[VER_B]/authorizeExt

The data sent in the request should be compliant with the XS2A interface technical specification as described in the Annex No. 1. It should be stressed that these parameters in an overwhelming majority are identical with the parameters of the request initiating a session with the XS2A interface using the ASPSP-side authentication mechanism as described in section 7.1.1. The most important parameters of that request were described in the table below.

PARAMETER	REQUIRED	COMMENT
response_type	Required	Constant value: code
eatCode	Required	One-time authorization code generated by the EAT tool
client_id	Required	TPP's unique identifier
callbackURL	Required	Address of the callback function in the TPP's interface to which the request containing a result of the PSU's authentication will be sent
apiKey		A key securing and adjusting the response to the request send in the form of a callback function The key value has two functions: It constitutes a value identifying the ASPSP, on the basis of which the TPP determines whether or not the party sending the callback request is the party to which the original request was sent it allows one to match the callback request and the request sent originally by the TPP. Necessary in case of many requests sent to the ASPSP, responses to which are sent in the form of requests to the TPP's callback interface The specific character of the provision of the apiKey attribute, both in the requests to the XS2A interface and to the callback interface, was described in the *swagger* format (version 2.0) in Annexes No. 1 and 2.
scope_details	Required	Parameter structure described in Annex No. 1

In result of the calling of this method and after a positive verification by the ASPSP's of the TPP (Mutual TLS Authentication, client_id verification) and after the confirmation of non-repudiation of the message received (JWS Signature), information on the confirmation of the process of the PSU's authentication will be returned.

Notes:

The one-time authorization code, which is required as an input parameter of the authorizeExt method, must be generated by the EAT tool at the request of the PSU who has been earlier authenticated by that tool.

The PSU must previously activate access to the EAT tool in accordance with procedure developed and required by each of the ASPSPs.

The EAT tool ensures a procedure of strong authentication of the PSU. Optionally, the EAT also ensures the determination by the user of a source account (PIS) or an account/accounts covered by the consent (AIS), if this was not defined by the TPP in the call. The result of the SCA procedure completed must be sent as a message to the appropriate ASPSP. The way of provision to the ASPSP of the PSU's strong authentication result, obtained in the EAT tool is not discussed in this PolishAPI specification.

The result of the PSU's strong authentication procedure must be then provided by the ASPSP to the TPP using the following TPP-side callback interface method:

[callBackURL]/[VER_A]/auth/[VER_B]/authorizeExtCallBack

The scope of the request data was described in detail in Annex No. 2. The most important parameters of this request are:

PARAMETER	REQUIRED	COMMENT
authorized	Required	Logic tag designating the result of the PSU's strong authentication by the EAT tool. - true – the PSU has been authenticated - false – the PSU has not been authenticated
code	Conditional	It is a value of the authorization code within the understanding of the OAuth 2.0 standard and the 'authorization code' method generated by the ASPSP only and exclusively in result of the PSU's authentication in the EAT tool.

On the basis of the authorization code obtained in the previous step, the TPP should initiate an XS2A interface session by using the following method of this interface, in which one of the parameters required is an authorization code and the feedback is, among other things, the so-called 'Access token' (within the understanding of the OAuth 2.0 standard): **/[VER_A]/auth/[VER_B]/token**

The way this method is called is compliant with sec. 7.2.4, which describes the way of session initiation in the ASPSP-side PSU's authentication method. A detailed technical specification of this method is given in Annex No. 1.

7.4 Access token taking on the basis of the refresh token

The TPP may take a new access token using the refresh token (provided it has been issued). This situation may only take place in case of the AIS and PIS services for which the access token is required, i.e. in the following situations:

a) The validity of the original access token expired and it is allowed to refresh it for an identical scope of consents
b) An initiation of a transfer or a batch of transfers was ordered using a selected PIS service method and it is necessary that the TPP obtained a new access token for another scope of consents, i.e. for the purposes related to the verification of the status of a transfer or a batch of transfers ordered, without a renewed SCA procedure.

Below is presented a TPP's request and a response from the ASPSP's server

PARAMETER	REQUIRED	COMMENT
grant_type	required	Value of 'refresh_token'
refresh_token	required	In accordance with the value provided by the ASPSP in step 7.2.4
scope	optional	The requested scope may not be larger than the one provided in step 7.2.4
scope_details	optional	The requested scope may not be larger than the one provided in step 7.2.4
is_user_session	optional	Defines whether or not the given session is related with an interaction with the PSU – true/false values. Expansion of the OAuth2 standard
user_ip	Required, if is_user_session=true	IP of the user's browser (information for fraud detection needs) Expansion of the OAuth2 standard
user_agent	Required, if is_user_session=true	Information concerning the version of the user's browser (information for fraud detection needs) Expansion of the OAuth2 standard

The response sent by the ASPSP is the same as in item 7.2.4

7.5 New access token taking on the basis of the exchange token

It is a method of establishment of a communications session with the XS2A interface the purpose of which is to provide an opportunity to exchange the access token without a necessity to re-run the SCA procedure in case of a change to the scope of consents pursuant to a scenario described in sec. 1.4.4.2.3 of the specification. This scenario assumes the access is obtained to a precisely defined subset of PSU's accounts as indicated by the PSU on the basis of a list of all its accounts with the given ASPSP, which was previously obtained by the TPP on the basis of another type of the PSU's consent and after the SCA procedure was carried out.

To effect this session establishment method, it is necessary to use a dedicated authorization method indicated in the 'grant_type' attribute of the method/token with the 'exchange_token' value, and the provision in the dedicated attribute of the same name (exchange_token) of the value of access token obtained during the earlier request for the consent to take a list of accounts associated with a valid XS2A interface communications session.

Below is presented a TPP's request and a response from the ASPSP's server

PARAMETER	REQUIRED	COMMENT
grant_type	required	Value of 'exchange_token'
exchange_token	required	Access token obtained when requesting a consent to take a list of accounts
scope	optional	The scope requested must be narrowed down to the list of accounts selected by the PSU and to authorizations concerning the scope of information requested, e.g. account details, transaction history or transaction details
scope_details	optional	The scope requested must be narrowed down to the list of accounts selected by the PSU and to

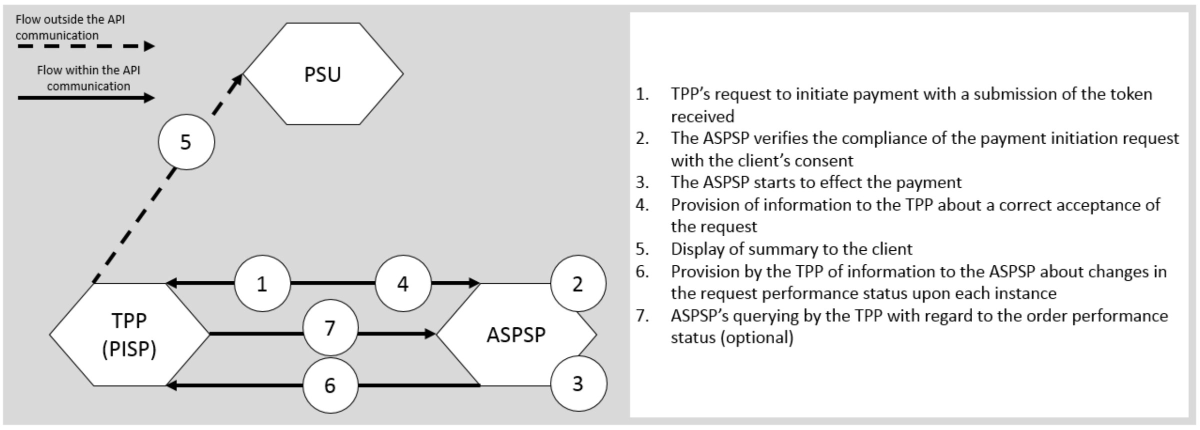
		authorizations concerning the scope of information requested, e.g. account details, transaction history or transaction details
is_user_session	optional	Defines whether or not the given session is related with an interaction with the PSU – true/false values. Expansion of the OAuth2 standard
user_ip	Required, if is_user_session=true	IP of the user's browser (information for fraud detection needs) Expansion of the OAuth2 standard
user_agent	Required, if is_user_session=true	Information concerning the version of the user's browser (information for fraud detection needs) Expansion of the OAuth2 standard

The response sent by the ASPSP is the same as in item 7.2.4

8 Technical description of the PIS Service

This chapter constitutes a summary of the API specification in the swagger format defined in Annex No. 1 and Annex No. 2.

8.1 Diagram of Activity in the PIS Service


Flow outside the API communication
Flow within the API communication
PSU
TPP (PISP)
ASPSP
1
2
3
4
5
6
7

1. TPP's request to initiate payment with a submission of the token received
2. The ASPSP verifies the compliance of the payment initiation request with the client's consent
3. The ASPSP starts to effect the payment
4. Provision of information to the TPP about a correct acceptance of the request
5. Display of summary to the client
6. Provision by the TPP of information to the ASPSP about changes in the request performance status upon each instance
7. ASPSP's querying by the TPP with regard to the order performance status (optional)

Figure 20: High-level diagram of activity in the PIS Service

8.2 XS2A Interface Request Structure

The table below contains basic information about all the PIS service methods of the XS2A interface, including the classes of objects of the cannon model of data provided in the request obtained in the responses.

INTERFACE METHOD	DESCRIPTION	KMD OBJECT CLASS
/payments/{version}/domestic	Initiates a domestic transfer	PaymentDomesticRequest/ AddPaymentResponse
/payments/{version}/EEA	Initiates a SEPA foreign transfer	PaymentEEARequest/ AddPaymentResponse
/payments/{version}/nonEEA	Initiates a non-SEPA foreign transfer	PaymentNonEEARequest / AddPaymentResponse
/payments/{version}/tax	Initiates a transfer to the tax office	PaymentTaxRequest / AddPaymentResponse
/payments/{version}/bundle	Initiates multiple transfers in the form of a batch	PaymentsBundleRequest / PaymentsBundleResponse
/payments/{version}/getPayment	Collects the transfer status	PaymentRequest/ GetPaymentResponse
/payments/{version}/getBundle	Retrieves the execution status of a batch of transfers	BundleRequest / BundleResponse
/payments/{version}/getMultiple Payments	Collects statuses of multiple payments. Calling does not require token reading.	PaymentsRequest/ PaymentResponse
/payments/{version}/cancelPaym ent	Cancels a transfer or a batch of transfers initiated	CancelPaymentsRequest/ CancelPaymentsResponse

8.3 Structure of call back interface requests - CallBack

The PIS service specification comprises also a definition of CallBack interface, owing to which the ASPSP has a possibility to notify the TPP, in an asynchronous way, about changes in the status of the payments and batches of payments initiated using the selected PIS service method of the XS2A interface. For this purpose, the following CallBack interface methods were defined: paymentCallBack, bundleCallBack. A detailed technical specification of the CallBack interface for the PIS service was defined in Annex No. 2, therefore the table below describes only basic elements of this interface.

INTERFACE METHOD	DESCRIPTION	KMD OBJECT CLASS
/payments/{version}/paymentCallBack	Provides the status of performance of a single payment	PaymentStatusInfoRequest/ CallBackResponse
/payments/{version}/bundleCallBack	Provides the execution status of a batch of payments	BundleStatusInfoRequestBundleStatusInfoRequest / CallBackResponse

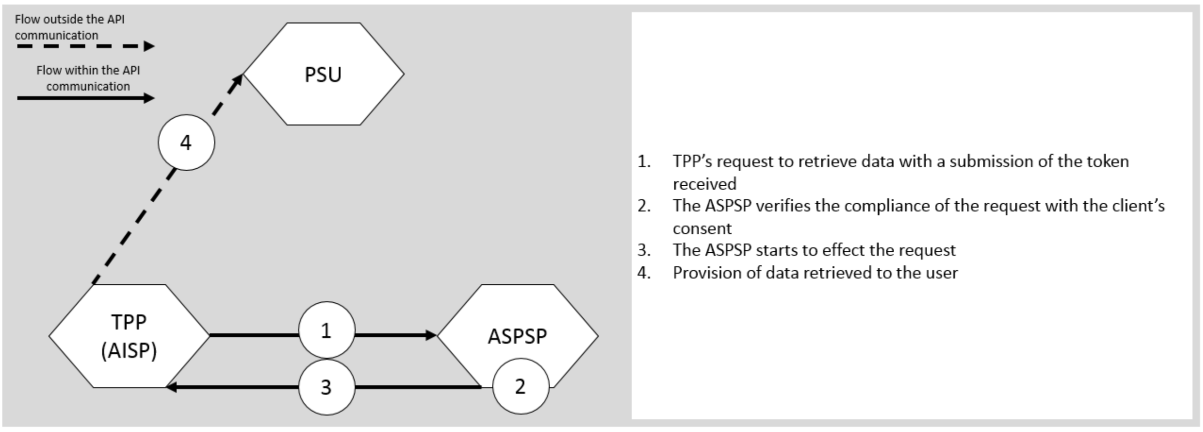
The method used to secure the API is the 'apiKey' type (https://swagger.io/docs/specification/2-0/authentication/) and, additionally, the fingerprint of the TPP's server certificate used to make the TLS connection of the CallBack - sent in the keyID parameter - is verified. In the PISs called, the TPP transfers the apiKey value and the callbackURL used in the CallBacks to the ASPSP.

In case of a failed call, the TPP may renew it and the number of repeated calls will be defined by the ASPSP in the implementation documentation.

9 Technical description of the AIS Service

This chapter constitutes a summary of the API specification in the swagger format defined in Annex No. 1 and Annex No. 2.

9.1 Diagram of Activity in the AIS Service


Flow outside the API communication
Flow within the API communication
PSU
4
TPP (AISP)
1
3
ASPSP
2

1. TPP's request to retrieve data with a submission of the token received
2. The ASPSP verifies the compliance of the request with the client's consent
3. The ASPSP starts to effect the request
4. Provision of data retrieved to the user

Figure 21: High-level diagram of activity in the AIS Service

9.2 XS2A Interface Request Structure

The table below contains basic information about all the AIS service methods of the XS2A interface, including the classes of objects of the cannon model of data provided in the request obtained in the responses.

INTERFACE METHOD	DESCRIPTION	KMD OBJECT CLASS
/accounts/{version}/deleteConsent	Deletes/invalidates the consent	DeleteConsentRequest/ string
/accounts/{version}/getAccounts	Collects all accounts of the PSU	AccountsRequest/ AccountsResponse
/accounts/{version}/getAccount	Collects a single payment account	AccountInfoRequest/ AccountInfo
/accounts/{version}/getTransactionsDone	Collects all transactions made at the account	TransactionInfoRequest/ TransactionDoneInfoResponse
/accounts/{version}/getTransactionsPending	Collects all pending transactions at the account	TransactionInfoRequest/ TransactionPendingInfoResponse
/accounts/{version}/getTransactionsRejected	Collects all rejected transactions at the account	TransactionInfoRequest/ TransactionRejectedInfoResponse
/accounts/{version}/getTransactionsCancelled	Retrieves cancelled transactions at the account	TransactionInfoRequest/ TransactionsCancelledInfoResponse
/accounts/{version}/getTransactionsScheduled	Retrieves scheduled transactions at the account	TransactionInfoRequest/ TransactionsScheduledInfoResponse
/accounts/{version}/getHolds	Collects all account holds	TransactionInfoRequest/ HoldInfoResponse
/accounts/{version}/getTransaction	Collects data of a single	TransactionDetailRequest/

Detail	transaction/hold	TransactionDetailResponse

9.3 Structure of call back interface requests - CallBack

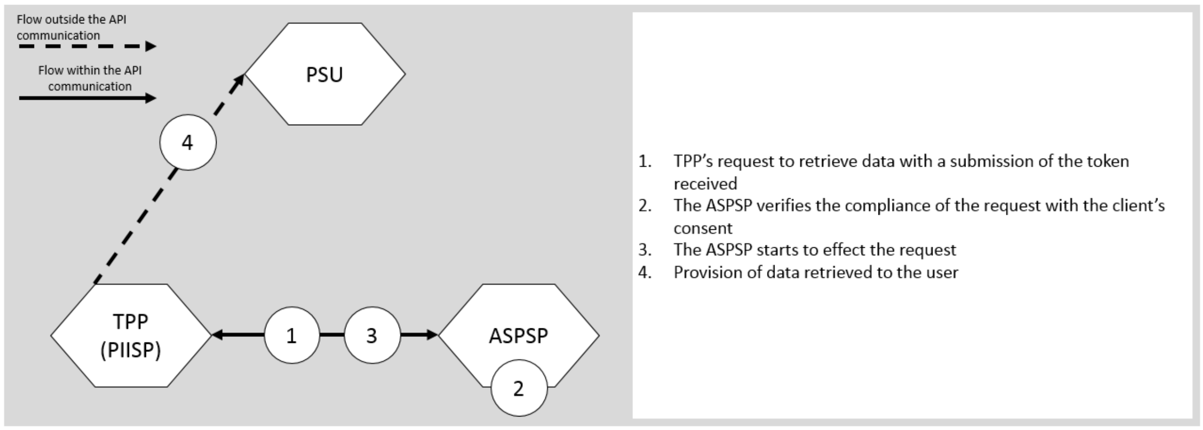
The AIS service specification comprises also a definition of CallBack interface, owing to which the ASPSP has a possibility to provide to the TPP, in an asynchronous way, the information about the account, transactions and holds, the provision of which was requested by the TPP by calling the appropriate methods of the XS2A interface. To this end, a number of the CallBack interface methods has been defined, a detailed technical specification of which was defined in Annex No. 2. The table below describes only the basic elements of the CallBack interface for the AIS service.

INTERFACE METHOD	DESCRIPTION	KMD OBJECT CLASS
/accounts/{version}/accountsCallBack	Provides information about details of the payment account selected	AccountsRequest / CallBackResponse
/accounts/{version}/transactionsDoneCallBack	Provides information about transactions done for the given payment account	TransactionDoneInfoRequest / CallBackResponse
/accounts/{version}/transactionsPendingCallBack	Provides information about pending transactions for the given payment account	TransactionPendingInfoRequest / CallBackResponse
/accounts/{version}/transactionsRejectedCallBack	Provides information about rejected transactions for the given payment account	TransactionRejectedInfoRequest / CallBackResponse
/accounts/{version}/transactionsCancelledCallBack	Provides information about cancelled transactions at the given payment account	TransactionCancelledInfoRequest / CallBackResponse
/accounts/{version}/transactionsScheduledCallBack	Provides information about scheduled transactions at the given payment account	TransactionScheduledInfoRequest / CallBackResponse
/accounts/{version}/transactionsHoldCallBack	Provides information about holds for the given payment account	HoldInfoRequest / CallBackResponse

10 Technical Description of the CAF Service

This chapter constitutes a summary of the API specification in the swagger format defined in Annex No. 1.

10.1 Diagram of Activity in the CAF Service


Flow outside the API communication
Flow within the API communication
PSU
4
TPP (PIISP)
1
3
ASPSP
2

1. TPP's request to retrieve data with a submission of the token received
2. The ASPSP verifies the compliance of the request with the client's consent
3. The ASPSP starts to effect the request
4. Provision of data retrieved to the user

Figure 22: High-level diagram of activity in the CAF Service

10.2 XS2A Interface Request Structure (including a description of fields and information if required)

INTERFACE METHOD	DESCRIPTION	KMD OBJECT CLASS
/confirmation/{version}/getConfirmationOfFunds	Confirmation of fund availability	confirmationOfFundsRequest/ confirmationOfFundsResponse

11 Use of the XS2A interface methods and authorization services – sequence diagrams

The sequence diagrams presented in the UML notation describe interactions occurring between the PSU, the TPP, ASPSP-side systems and external systems which reflect the full scope of XS2A interface use scenarios, which constitutes the subject matter of the PolishAPI specification. The diagrams present only basic sequence and intervention paths leading to the achievement of the goal intended. This means that particular interactions may end in failure leasing to error messages and codes returned by the XS2A interface methods or authorization service methods and which were not included in the diagrams for picture clarity. For the same reason, particular interactions contain only some parameters of requests and responses that are important for the correctness of the sequences presented (a full specification with all the parameters of requests and responses of the XS2A interface services and the authorization services was described in the technical specification of those interfaces).

The following abbreviations, acronyms and designations were used in the diagrams:

ASPSP Auth – a communications interface provided by the ASPSP, pursuant to the PolishAPI specification (AS - Authorization Service), the role of which is to provide methods to authorise the TPP’s access to the XS2A interface services and, in effect, establishment of sessions with that interface.

ASPSP XS2A – a communications interface provided by the ASPSP, the role of which is to ensure the performance of business services described in the PolishAPI specification (AIS - Account Information Service, PIS – Payment Initiation Service i CAF – Confirmation of the Availability of Funds).

EAT – *External Authorization Tool*, a system ensuring the SCA, i.e. a procedure of strong authentication of the PSU.

eatCode – a one-time code generated in the EAT tool at the PSU’s request used to authorise access to the XS2A as one of the SCA procedure factors.

sync / async – designation of the type of communication (synchronous, asynchronous), between the actors presented in the diagram.

tpp_redirect_url – a URL address to which the PSU’s browser should be redirected after the completion of the process of the PSU's authentication and the TPP’s access authorization to the ASPSP-side resources of that PSU, in case of the *Redirection* method of the PSU’s authentication.

auth_redirect_url – an address to which the PSU’s Internet browser should be redirected. In order to authenticate the PSU using the *Redirection method.*

authorization_code – a one-time authorisation code which constitutes a confirmation of the TPP’s authorization to access the PSU’s resources.

access_token – a token allowing access to the use of the XS2A interface services, described in more detail in sec. 5.3 Definition of Access Token.

callback_url – an address of the TPP-side callback interface indicating where the asynchronous responses should be sent.

apiKey – a type of token sent in the request in order to secure an asynchronous communication with the XS2A interface.

1.1 Establishment of an XS2A session with the ASPSP-side PSU's authentication

The diagram presents a communications sequence leading to the establishment of a session with the XS2A interface, allowing for the PSU's authentication using the *redirection* method as described in Chapter 7.1 Authentication Mechanism on the ASPSP's Side

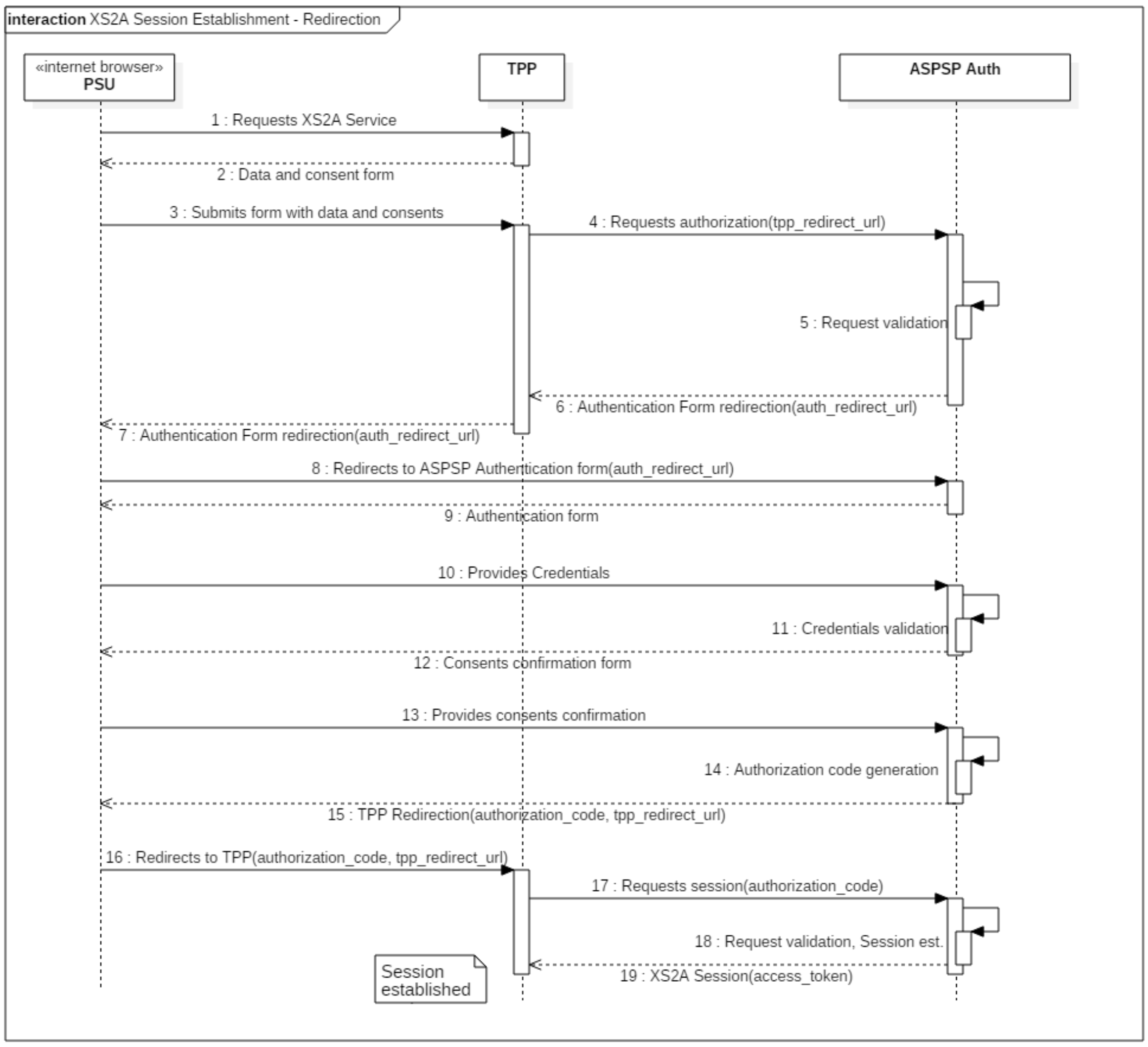

interaction XS2A Session Establishment - Redirection
«internet browser» PSU
TPP
ASPSP Auth
1 : Requests XS2A Service
2 : Data and consent form
3 : Submits form with data and consents
4 : Requests authorization(tpp_redirect_url)
5 : Request validation
6 : Authentication Form redirection(auth_redirect_url)
7 : Authentication Form redirection(auth_redirect_url)
8 : Redirects to ASPSP Authentication form(auth_redirect_url)
9 : Authentication form
10 : Provides Credentials
11 : Credentials validation
12 : Consents confirmation form
13 : Provides consents confirmation
14 : Authorization code generation
15 : TPP Redirection(authorization_code, tpp_redirect_url)
16 : Redirects to TPP(authorization_code, tpp_redirect_url)
17 : Requests session(authorization_code)
18 : Request validation, Session est.
19 : XS2A Session(access_token)
Session established

Figure 23: Establishment of an XS2A session – ASPSP-side authentication method

Description of interactions as per the sequence of their occurrence:

1: The PSU initiates the use of the selected XS2A interface service at the TPP's application side

2: The TPP presents a form with data required to identify the ASPSP, call an XS2A interface service and obtain access to that interface

3: The PSU inserts and confirms the data required in the TPP's form

4: The TPP requests authorisation of access to the XS2A interface by calling the following authorization service method:

/[VER_1]/auth/[VER_2]/authorize

One of the parameters of this method is an url address (tpp_redirect_url) redirecting to the TPP's interface after the completion of the procedure of the PSU's authentication and authorization of the TPP's access to the PSU's resources with the ASPSP.

5: The ASPSP validates the correctness of the authorization request received in terms of various aspects, including the correctness of signature, TPP's identity, compliance of the consents granted with the TPP's authorization

6: The ASPSP, in case of a positive outcome of the authorization request validation, returns a response containing an URL address to its own interface (auth_redirect_url) used for the PSU's authentication and authorization in the context of the request sent by the TPP

7: The TPP interprets the response from the ASPSP and returns a response to the PSU's browser in the form of a redirection to the interface of the ASPSP that obtained a response to the authorization request

8: The PSU's browser automatically redirects to the ASPSP's interface using the auth_redirect_url received

9: The ASPSP returns to the browser a page containing the PSU's authentication form

10: The PSU inserts authentication data to the form and the data, after confirmation by the PSU, are sent to the ASPSP

11: The ASPSP validates the correctness of the authentication data received as part of the SCA procedure

12: After the confirmation of the PSU's identity, the ASPSP returns to the browser a page containing a description of the scope of consents the TPP requested in order to perform the XS2A interface services, together with a form used to confirm the TPP's request, e.g. it presents a form with a list of PSU's account to be selected or with data of the transaction initiated.

13: The PSU accepts the TPP-requested consents by confirming the form presented, which is preceded by a potential selection of a subset of accounts (possible in case of selected XS2A interface services) and by provision of this information to the ASPSP

14: Having obtained the consent acceptances, the ASPSP generates and retains a one-time authorization code

15: The ASPSP returns to the browser a response in the form of redirection to the TPP's interface, i.e. to the url address of return to the TPP received in the authorization request (tpp_redirect_url), and sends the value of the one-time authorization code generated as the parameter of this response

16: The PSU's browser automatically redirects to the TPP's interface by means of the return url address received (tpp_redirect_url), together with the one-time authorization code

17: On the basis of the request received with the one-time authorization code, the TPP requests the ASPSP to start a session with the XS2A interface in the context of the authorization received from the PSU. To this end, the following authorization service method is called and one of the required elements of this method is a one-time authorization code (authorization_code):

/[VER_1]/auth/[VER_2]/token

18: The ASPSP validates the XS2A session establishment request received by verification of the authorization code received (authorization_code) and the data concerning the PSU's consents granted. After a positive verification, the ASPSP establishes a new session of the XS2A interface in result of which a unique access token (access_token) is generated.

19: The ASPSP returns a response to the session establishment request to the TPP, which contains, without limitation, the value of the access token generated, confirming thus the establishment of a session with the XS2A interface

1.2 XS2A session establishment with the PSU's authentication using an external authorization tool (*decoupled)*

The diagram presents a communications sequence leading to the establishment of a session with the XS2A interface, allowing for the PSU's authentication using the *decouple* method as described in Chapter 7.3 Authentication Mechanism in an External Authorisation Tool (Decoupled)

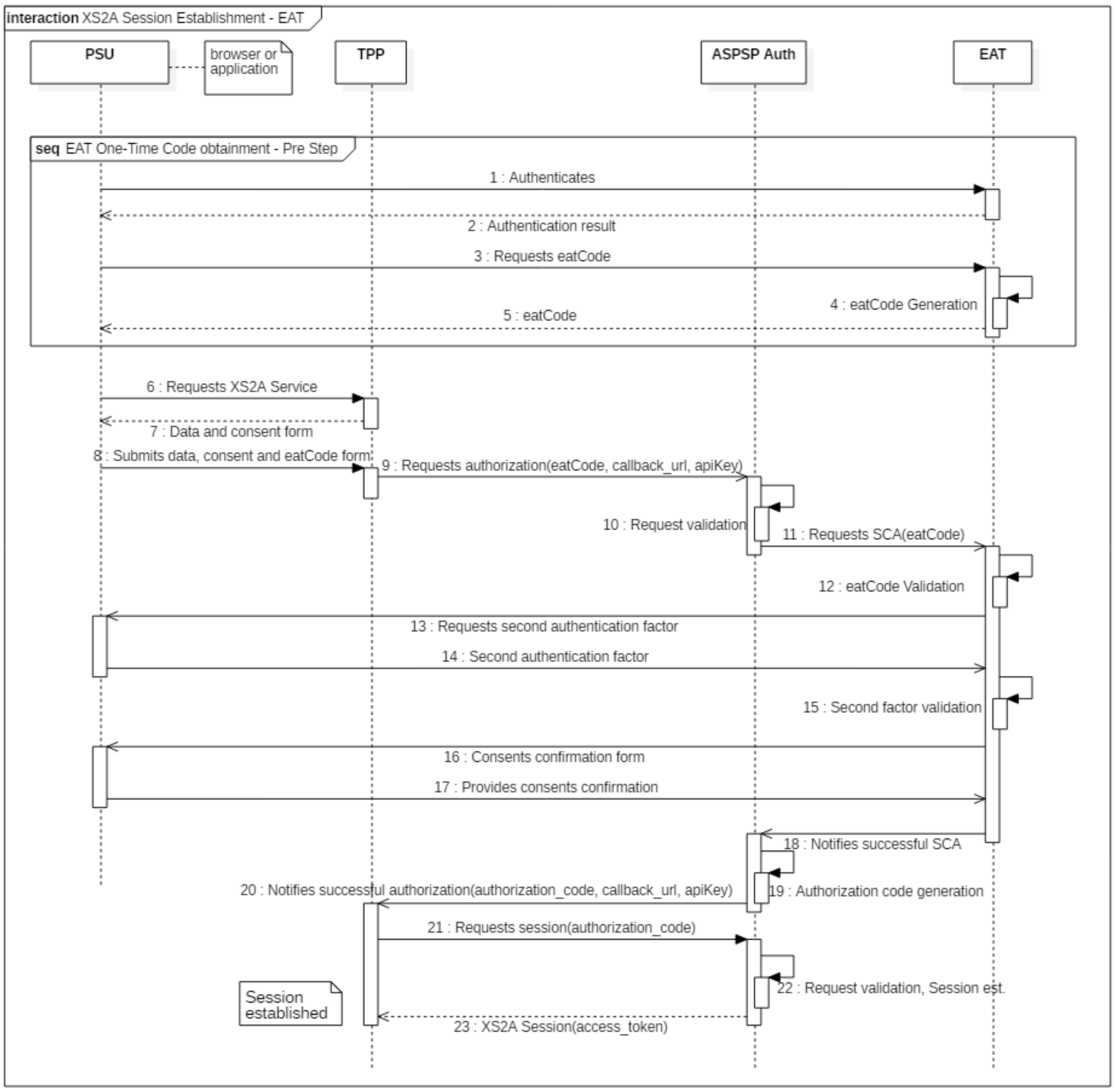

interaction XS2A Session Establishment - EAT
PSU
browser or application
TPP
ASPSP Auth
EAT
seq EAT One-Time Code obtainment - Pre Step
1 : Authenticates
2 : Authentication result
3 : Requests eatCode
4 : eatCode Generation
5 : eatCode
6 : Requests XS2A Service
7 : Data and consent form
8 : Submits data, consent and eatCode form
9 : Requests authorization(eatCode, callback_url, apiKey)
10 : Request validation
11 : Requests SCA(eatCode)
12 : eatCode Validation
13 : Requests second authentication factor
14 : Second authentication factor
15 : Second factor validation
16 : Consents confirmation form
17 : Provides consents confirmation
18 : Notifies successful SCA
19 : Authorization code generation
20 : Notifies successful authorization(authorization_code, callback_url, apiKey)
21 : Requests session(authorization_code)
22 : Request validation, Session est.
23 : XS2A Session(access_token)
Session established

Figure 24: Establishment of an XS2A session – authentication in an external authorization tool

Description of interactions as per the sequence of their occurrence:

1: Via a browser or an application, the PSU sends the data to be authenticated in the EAT tool

2: The EAT tool verifies the authentication data and grants access to its interface to the PSU

3: The PSU requests that a one-time code be issued (eatCode)

4: The EAT tool generates a one-time code (eatCode)

5: The EAT tool returns the one-time code to the PSU's browser or application

6: The PSU initiates the use of the selected XS2A interface service at the TPP's application side

7: The TPP presents a form with data required to identify the ASPSP, call an XS2A interface service and obtain access to that interface (including, but not limited to, an insertion of the eatCode value)

8: The PSU inserts and confirms the data required in the TPP’s form

9: The TPP requests authorisation of access to the XS2A interface by calling the following authorization service method:

/[VER_1]/auth/[VER_2]/authorizeExt

Due to the asynchronous character of the response to the request, among the parameters of the method, it is required to provide a url address (callback_url) of the XS2A callback interface and a security token (apiKey). Furthermore, in order to obtain an authorization, it is required to provide the one-time code received from the EAT tool (eatCode).

10: The ASPSP validates the correctness of the authorization request received in terms of various aspects, including the correctness of signature, TPP’s identity, compliance of the consents granted with the TPP’s authorization

11: The ASPSP sends a request to the EAT tool in order to carry out the SCA procedure in relation with the PSU, including a verification of the correctness of the one-time code (eatCode) received from the PSU and generated by EAT. The request also provides business data defining the scope of the PSU’s consent. Depending on the XS2A interface service, these may be, for example, a list of the PSU’s accounts, data of the initiated payment or numbers of accounts for the transaction history retrieval.

12: EAT verifies the correctness of the one-time code (eatCode) received from the ASPSP

13: In case, the one-time code is correct, the EAT tool requests that the PSU provided a second factor in order to complete the SCA procedure

14: The PSU executes a second factor in the EAT tool

15: The EAT tool verifies the correctness of the second factor provided by the PSU

16: After a successful termination of the strong authentication procedure, the EAT requests from the PSU a consent for the performance by the TPP of an XS2A interface service in the business scope as requested by that TPP, e.g. it presents a form with a list of PSU’s accounts to select or data of the initiated transaction.

17: The PSU accepts the TPP-requested consents by confirming the form presented, which is preceded by a potential selection of a subset of accounts (possible in case of selected XS2A interface services)

18: The EAT notifies the ASPSP about the result of the SCA procedure carried out

19: In case of a positive result of the strong authentication of the PSU and the TPP's authorization to access the PSU’s resources (including consents obtained from the PSU), the ASPSP generates and retains a one-time authorization code (authorization_code)

20: The ASPSP notifies the TPP about the result of the request to authorize access to the PSU’s resources by calling the following TPP-side callback interface method:

/[VER_1]/auth/[VER_2]/authorizeExtCallBack

In case the TPP has obtained authorization to access the PSU's resources, the request contains a one-time authorization code (authorization_code).

21: On the basis of the request received with the one-time authorization code, the TPP requests the ASPSP to start a session with the XS2A interface in the context of the authorization received from the PSU. To this end, the following authorization service method is called and one of the required elements of this method is a one-time authorization code (authorization_code):

/[VER_1]/auth/[VER_2]/token

22: The ASPSP validates the XS2A session establishment request received by verification of the authorization code received (authorization_code) and the data concerning the PSU's consents granted. After a positive verification, the ASPSP establishes a new session of the XS2A interface in result of which a unique access token (access_token) is generated.

23: The ASPSP returns a response to the session establishment request to the TPP, which contains, without limitation, the value of the access token generated, confirming thus the establishment of a session with the XS2A interface

1.3 Establishment of an XS2A session with the PSU's authentication using the *refresh token method*

The diagram presents a communications sequence leading to the establishment of a session with the XS2A interface, using the refresh token method.

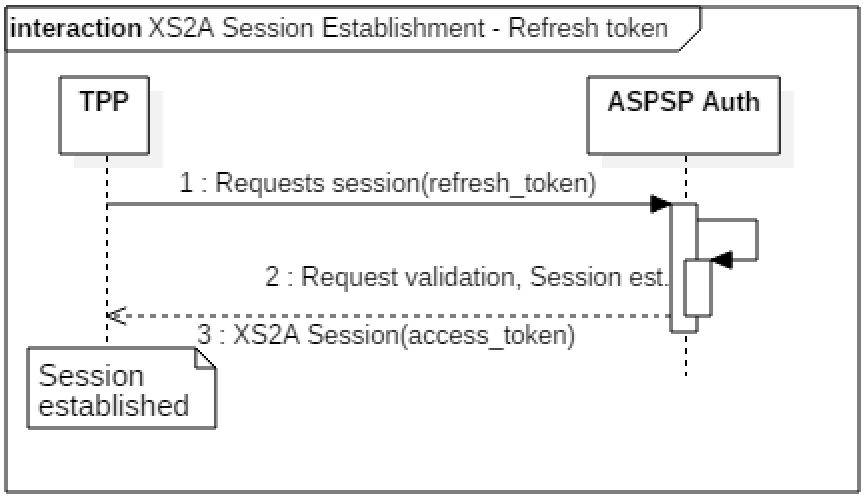

interaction XS2A Session Establishment - Refresh token
TPP
ASPSP Auth
1 : Requests session(refresh_token)
2 : Request validation, Session est.
3 : XS2A Session(access_token)
Session established

Figure 25: XS2A session establishment – refresh token

Description of interactions as per the sequence of their occurrence:

1: The TPP sends a request to the ASPSP to start a session with the XS2A interface in the context of a session established earlier which was cancelled or in the context of a change necessity (consent scope narrowing down). The session is related to an additional token (refresh_token), returned to the TPP during the original session establishment procedure. To this end, the TPP calls the following authorization service method (as described in 7.4), sending an additional token (refresh_token):

/[VER_1]/auth/[VER_2]/token

2: The ASPSP validates the XS2A session establishment request received by verification of the additional token received (refresh_token) and the data concerning the PSU's consents granted. After a positive verification, the ASPSP establishes a new XS2A interface session, in result of which a new unique access token (access_token) is generated.

3: The ASPSP returns a response to the session establishment request to the TPP, which contains, without limitation, the value of the access token generated, renewing thus the session with the XS2A interface.

1.4 Establishment of an XS2A session with the PSU's authentication using the *exchange token method*

The diagram presents a communications sequence leading to the establishment of a session with the XS2A interface, using the exchange token method.

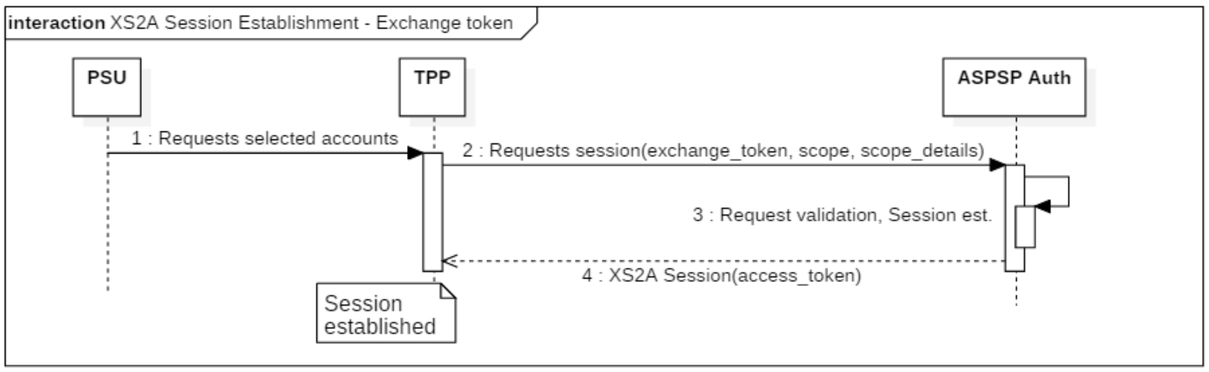

interaction XS2A Session Establishment - Exchange token
PSU
TPP
ASPSP Auth
1 : Requests selected accounts
2 : Requests session(exchange_token, scope, scope_details)
3 : Request validation, Session est.
4 : XS2A Session(access_token)
Session established

Figure 26: XS2A session establishment – exchange token

<u>Description of interactions as per the sequence of their occurrence:</u>

1: The PSU specifies the details of consents for the TPP by selecting a subset of accounts from the accounts previously retrieved by the TPP from the ASPSP, and by determining the scope of authorizations to the data related to those accounts, such as account details, account history and the time scope or transaction details.

2: The TPP sends a request to the ASPSP to start a session with the XS2A interface in the context of a previously established session that was established in order to retrieve a list of PSU's accounts and to which the access token (access_token) returned to the TPP during the original session establishment procedure with a strong authorization of the PSU is related. To this end, the TPP calls the following authorization service method, providing the said access token and using the exchange_token parameter:

/[VER_1]/auth/[VER_2]/token

The required parameters of that request are also the *scope* and *scope_details* parameters, which must contain a detailed scope of consents, including the numbers of accounts selected by the PSU.

3: The ASPSP validates the XS2A session establishment request received by verification of the access token received (provided in the exchange_token attribute) and the data concerning the PSU's consents granted. After a positive verification, the ASPSP establishes a new session of the XS2A interface in result of which a unique new access token (access_token) is generated in the context of the new scope of consents.

4: The ASPSP returns a response to the session establishment request to the TPP, which contains, without limitation, the value of the access token generated, confirming thus the establishment of a new session with the XS2A interface.

1.5 XS2A Interface Method Calling with the Use of a Session

The diagram presents a communication sequence allowing one to call the XS2A interface services for which a valid session of that interface is required. The table below contains a list of methods within the framework of the AIS and PIS services, for which the sequence presented is obligatory.

AIS
/[VER_1]/accounts/[VER_2]/ getAccounts
/[VER_1]/accounts/[VER_2]/ getAccount
/[VER_1]/accounts/[VER_2]/ getTransactionsDone
/[VER_1]/accounts/[VER_2]/ getTransactionsPending
/[VER_1]/accounts/[VER_2]/ getTransactionsRejected
/[VER_1]/accounts/[VER_2]/ getTransactionsCancelled
/[VER_1]/accounts/[VER_2]/ getTransactionsScheduled
/[VER_1]/accounts/[VER_2]/ getHolds
/[VER_1]/accounts/[VER_2]/ getTransactionDetail
PIS
/[VER_1]/payments/[VER_2]/ domestic
/[VER_1]/payments/[VER_2]/ EEA
/[VER_1]/payments/[VER_2]/ nonEEA
/[VER_1]/payments/[VER_2]/ tax
/[VER_1]/payments/[VER_2]/ bundle
/[VER_1]/payments/[VER_2]/ getPayment
/[VER_1]/payments/[VER_2]/ getBundle
/[VER_1]/payments/[VER_2]/ cancelPayment

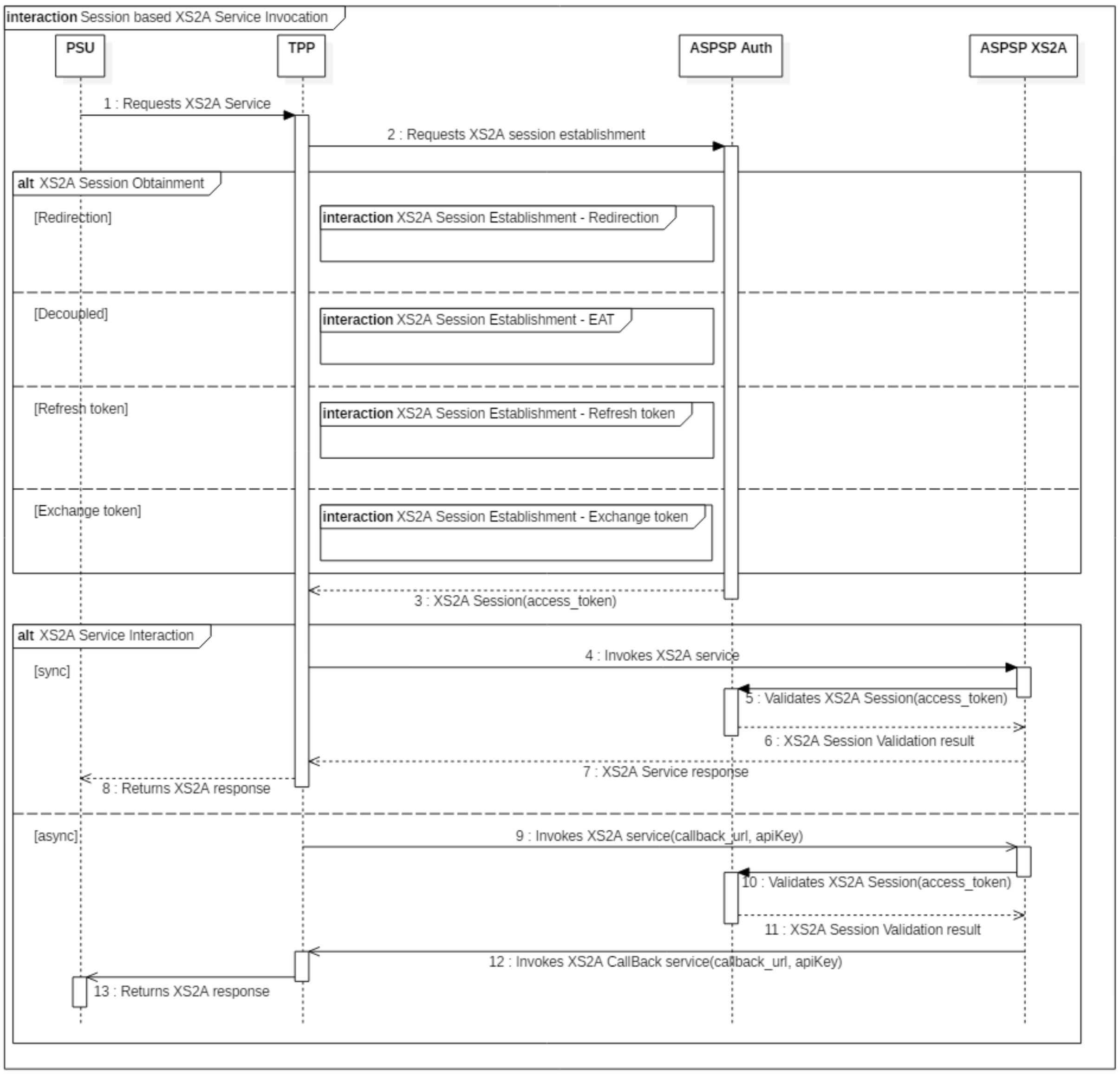

interaction Session based XS2A Service Invocation
PSU
TPP
ASPSP Auth
ASPSP XS2A
1 : Requests XS2A Service
2 : Requests XS2A session establishment
alt XS2A Session Obtainment
[Redirection]
interaction XS2A Session Establishment - Redirection
[Decoupled]
interaction XS2A Session Establishment - EAT
[Refresh token]
interaction XS2A Session Establishment - Refresh token
[Exchange token]
interaction XS2A Session Establishment - Exchange token
3 : XS2A Session(access_token)
alt XS2A Service Interaction
[sync]
4 : Invokes XS2A service
5 : Validates XS2A Session(access_token)
6 : XS2A Session Validation result
7 : XS2A Service response
8 : Returns XS2A response
[async]
9 : Invokes XS2A service(callback_url, apiKey)
10 : Validates XS2A Session(access_token)
11 : XS2A Session Validation result
12 : Invokes XS2A CallBack service(callback_url, apiKey)
13 : Returns XS2A response

Figure 27: XS2A interface method calling with the use of a session

Description of interactions as per the sequence of their occurrence:

1: The PSU initiates the use of the selected XS2A interface service at the TPP's application side

2: The TPP requests that a session with the XS2A interface be established. The session establishment procedure may be carried out on the basis of each one of the variants available, for which the sequence diagrams were described in the previous items of this chapter.

3: The ASPSP returns a response to the session establishment request to the TPP, which contains, without limitation, the value of the access token generated, confirming thus the establishment of a session with the XS2A interface

Variant 1 – synchronous services of the XS2A interface

4: The TPP sends a request to the XS2A interface in order to use a service of this interface selected by the PSU (one of the methods listed in the table above). In the request parameters, the input data required to perform the service and an access token (access_token) are provided in order to verify the obtained authorization to use the service.

5: The ASPSP validates the correctness and validity of the access token obtained (access_token) by means of an authorization service communication.

6: The ASPSP receives the access token validation result

7: In case of a positive result of the access token validation, the ASPSP returns the outcome of the XS2A service performance in the form of a response to the request sent by the TPP to the XS2A interface.

8: The TPP presents a result of the XS2A interface service performance to the PSU

Variant 2 – asynchronous services of the XS2A interface

9: The TPP sends a request to the XS2A interface in order to use a service of this interface selected by the PSU (one of the methods listed in the table above). The request parameters include input data - required to perform the service, an access token (access_token) - required to verify the obtained authorization to perform the service, , and values of the callback_url and apiKey parameters - required to send a response to the request in the form of a request to the TPP-side callback interface.

10: The ASPSP validates the correctness and validity of the access token obtained (access_token) by means of an authorization service communication.

11: The ASPSP receives the access token validation result

12: In case of a positive result of the access token validation, the ASPSP returns the outcome of the XS2A service performance by sending a request to the callback interface of the TPP-side XS2A interface (to the address indicated in callback_url).

13: The TPP presents a result of the XS2A interface service performance to the PSU

1.6 XS2A Interface Method Calling without the Use of a Session

The diagram presents a communication sequence allowing one to call the XS2A interface services for which a valid session of that interface is not required. The table below contains a list of methods within the framework of the AIS, PIS and CAF services, for which the sequence presented is obligatory.

AIS
/[VER_1]/accounts/[VER_2]/deleteConsent
PIS
/[VER_1]/payments/[VER_2]/getMultiplePayments
CAF
/[VER_1]/confirmation/[VER_2]/getConfirmationOfFunds

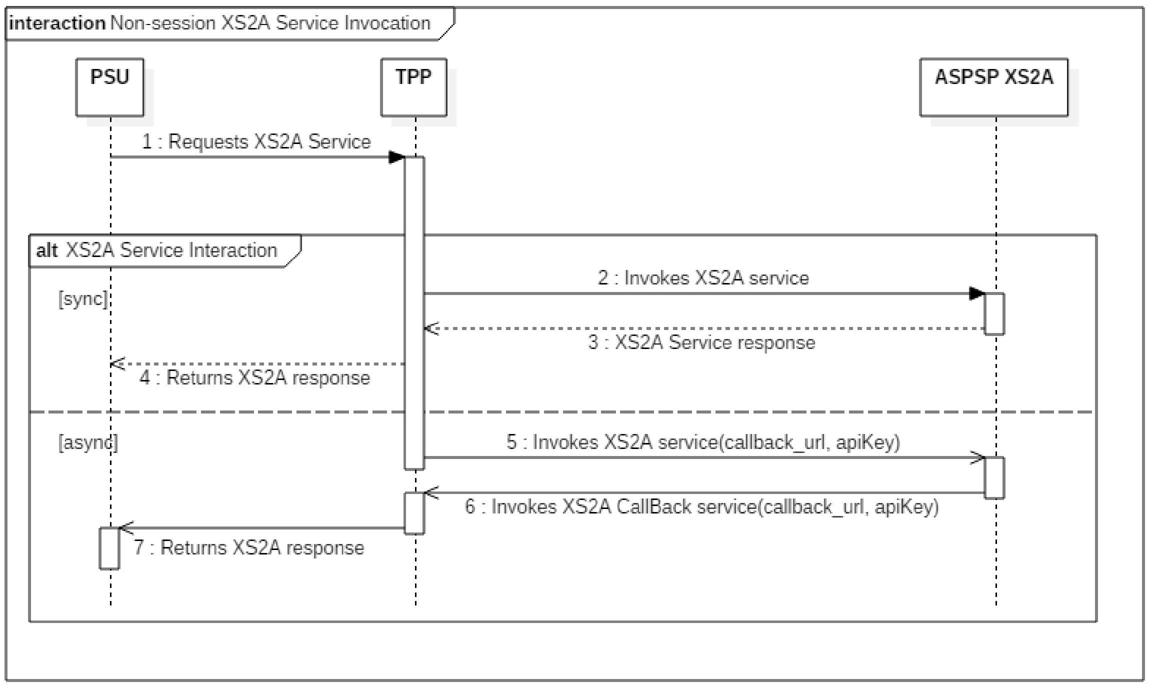

interaction Non-session XS2A Service Invocation
PSU
TPP
ASPSP XS2A
1 : Requests XS2A Service
alt XS2A Service Interaction
[sync]
2 : Invokes XS2A service
3 : XS2A Service response
4 : Returns XS2A response
[async]
5 : Invokes XS2A service(callback_url, apiKey)
6 : Invokes XS2A CallBack service(callback_url, apiKey)
7 : Returns XS2A response

Figure 28: XS2A interface method calling without the use of a session

Description of interactions as per the sequence of their occurrence:

1: The PSU initiates the use of the selected XS2A interface service at the TPP's application side. This service does not require any session at the XS2A interface’s side. The services of this type were listed in the table above.

Variant 1 – synchronous services of the XS2A interface

2: The TPP sends a request to the XS2A interface in order to use a service of this interface selected by the PSU. The request parameters contain input data required to perform the service.

3: The ASPSP returns the outcome of the XS2A service performance in the form of a response to the request sent by the TPP to the XS2A interface.

4: The TPP presents a result of the XS2A interface service performance to the PSU

Variant 2 – asynchronous services of the XS2A interface

5: The TPP sends a request to the XS2A interface in order to use a service of this interface selected by the PSU. The request parameters include input data - required to perform the service, and values of the callback_url and apiKey parameters - required to send a response to the request in the form of a request to the TPP-side callback interface.

6: The ASPSP returns the outcome of the XS2A service performance by sending a request to the callback interface of the TPP-side XS2A interface (to the address indicated in callback_url).

7: The TPP presents a result of the XS2A interface service performance to the PSU

12 Error codes

STAGE	ERROR	HTTP CODE	HOW SUPPORTED
Redirection of the client to the ASPSP's domain together with a provision in the redirection address of parameters of the initiated payment	Provision of incorrect parameters	400	Reverse redirection of the client to the TPP's domain and process abortion (pursuant to RFC6749 4.1.2.1)
The ASPSP verifies the TPP's identity in the Identity Hub and verifies whether or not the given TPP may request the consents indicated (AIS or PIS)	Incorrect verification of the TPP's identity	401	Display of a message to the user
	Incorrect verification of the TPP's licence (e.g. only AIS)	403	Reverse redirection of the client to the TPP's domain and process abortion (pursuant to RFC6749 4.1.2.1)
The client logs in the ASPSP's domain	Incorrect logging - 1 time	401	Waiting for a correct client logging
	Multiple incorrect logging	401	Waiting for a correct client logging
	No service activation by the TPP (opt-out)	403	Reverse redirection of the client to the TPP's domain and process abortion (pursuant to RFC6749 4.1.2.1)
	No funds	422	Reverse redirection of the client to the TPP's domain and process abortion (appropriate error code returned when requesting a payment service)
The client expresses the consent in the requested or limited scope or else rejects the request	Request rejection by the client	403	Reverse redirection of the client to the TPP's domain and process abortion (pursuant to RFC6749 4.1.2.1)
	Incorrect authorisation by the client	403	Reverse redirection of the client to the TPP's domain and process abortion (pursuant to RFC6749 4.1.2.1)
Authorisation token taking from the ASPSP by the TPP	Unknown TPP	401	Process abortion without the request being admitted
	Incorrect token request parameters	400	Process abortion without the request being admitted
	Communication with the ASPSP impossible	-	Process abortion without the request being admitted
The ASPSP verifies the compliance of the payment initiation request with the	No compliance with the consent granted	401	Process abortion without the request being admitted

client's consent	Limit of requests for the desired service has been exceeded	429	Process abortion without the request being admitted
The ASPSP starts to effect the payment	No funds	422	End of process (error code returned)
Provision of information to the TPP about a correct acceptance of the request	Communication with the TPP impossible	-	Message renewal x3 Failure information Possibility to repeat all messages
Provision by the TPP of information to the ASPSP about changes in the request performance status	Communication with the TPP impossible	-	Message renewal x3 Failure information Possibility to repeat all messages
The ASPSP verifies the compliance of the payment account data request with the client's consent	No compliance with the consent granted	403	End of process
ASPSP receives a request	Access to the service blocked by the ASPSP	403	End of process
ASPSP receives a request	Access to the service blocked by the PSU	403	End of process

12.1 Error codes for the HTTP 403 response code

CODE	COMMUNICATION
1	Incorrect verification of TPP licenses
2	No activation of TPP services
3	Rejection of the request by the client
4	Incorrect authorization by the client
5	Non-compliance with the consent given
6	Access to the service blocked by ASPSP
7	Access to the website blocked by the PSU

13 Standard Implementation Recommendations

13.1 Timeout Support

Due to the timeout type events which may occur during the http request processing, the ASPSP must ensure uniqueness verification at the server layer at the requestId level. Having identified a non-uniqueness of the request, the ASPSP returns the 400.1 error (Request repeated).

The recommended timeout value is 30 seconds.

13.2 TPP verification

The TPP authentication should be made based on the communications certificate (tls) and signature certificate (JSON Web Signature), with a simultaneous verification whether or not the certificates correspond to the TPP's ID (tppId) in the ASPSP's database. The tppId value is determined by the ASPSP during the TPP technical registration; the suggested value is TPP's EUNIP .

13.3 Authorization server

It is recommended that in its configuration of the given client_id, the ASPSP should have a list of redirect_uri which may be used. Thus, the ASPSP will not redirect the client to an incorrect URL address which may be submitted by an untrusted party.

13.4 Fraud Prevention

In order to prevent potential frauds, a dedicated RequestHeader Class was implemented which is provided in each request and contains the following information about the PSU: IP address and userAgent. The structure will be useful for the ASPSP during the implementation of security mechanisms.

Additionally, it is recommended that the entities participating in the project exchanged information about suspected unauthorised transactions/compromised IPs etc.

14 List of Annexes

Annex No. 1: PolishAPI-ver2.1.yaml

Annex No. 2: PolishAPI-CallBack-ver2.1.yaml