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# Digital euro pilot

## Frontend implementation specifications

### End user domain



**Disclaimer:** This document is indicative and may be subject to modifications. The design, features, and scope of a digital euro may also differ if issued in the future.



## Table of Contents

<b>1.</b>	<b>Introduction</b>	<b>5</b>
<b>2.</b>	<b>Structure of the document</b>	<b>5</b>
<b>3.</b>	<b>Pilot PSP app requirements</b>	<b>6</b>
3.1.	General requirements	6
3.1.1.	<i>Functional requirements</i>	7
3.1.1.1.	<i>Supported form factor</i>	7
3.1.1.2.	<i>Mobile Payment Solutions – NFC Functional Requirements</i>	7
3.1.1.2.1.	<i>NFC Communication Capabilities</i>	7
3.1.1.2.2.	<i>NFC Data Exchange</i>	7
3.1.1.2.3.	<i>Device Compatibility and NFC Availability</i>	7
3.1.1.3.	<i>End user activation</i>	8
3.1.1.4.	<i>User experience</i>	8
3.1.2.	<i>Non-functional requirements</i>	8
3.1.2.1.	<i>Download rules</i>	8
3.1.2.2.	<i>Supported operating systems</i>	8
3.1.2.3.	<i>Security</i>	8
3.1.2.4.	<i>Deployment</i>	8
3.1.2.5.	<i>Performance</i>	8
3.1.2.6.	<i>Compliance</i>	8
3.1.2.7.	<i>Availability</i>	9
3.1.2.8.	<i>Data integrity</i>	9
3.1.2.9.	<i>Disaster recovery</i>	9
3.1.2.10.	<i>Integration of Eurosystem NFC Payment SDK</i>	9
3.2.	<i>Access Management Requirements</i>	9
3.2.1.	<i>Individual end user</i>	9
3.2.1.1.	<i>Individual end user onboarding</i>	9
3.2.1.1.1.	<i>Overview of onboarding process</i>	10
3.2.1.1.2.	<i>New client registration</i>	10
3.2.1.1.3.	<i>End user onboarding</i>	11



EUROPEAN CENTRAL BANK

EUROSYSTEM

3.2.1.2.	<i>Individual end user offboarding</i>	12
3.2.1.2.1.	<i>Overview of offboarding process</i>	13
3.2.1.2.2.	<i>End user Offboarding through pilot PSP app</i>	13
3.2.1.3.	<i>Individual end user life cycle management</i>	14
3.2.1.3.1.	<i>Overview of end user life cycle processes</i>	14
3.2.1.3.2.	<i>Liquidity settings management</i>	15
3.2.1.3.3.	<i>Online notification settings management</i>	16
3.2.1.3.4.	<i>Alias management</i>	17
3.2.1.3.5.	<i>Linked account management</i>	17
3.2.1.3.6.	<i>End user data management</i>	18
3.2.1.3.7.	<i>Blocking beta digital euro account</i>	18
3.2.1.3.8.	<i>Unblocking beta digital euro account</i>	19
3.2.1.3.9.	<i>NFC service enrolment</i>	19
3.2.1.3.9.1.	<i>Overview of Enrolment service</i>	20
3.2.1.3.9.2.	<i>Full integration scheme overview</i>	20
3.2.1.3.9.3.	<i>User Enrolment Flow for Digital Euro NFC Payment (via HCE)</i>	21
3.2.1.3.10.	<i>Key replenishment management</i>	23
3.2.1.3.10.1.	<i>NFC CPACE Key replenishment Enabled by Active Internet Connection – Capability</i>	24
3.2.1.3.10.1.1.	<i>Overview of key replenishment management</i>	25
3.2.1.3.10.2.	<i>Overview of NFC termination by App service</i>	26
3.2.1.3.10.3.	<i>Full integration scheme overview</i>	26
3.2.1.3.10.4.	<i>User NFC termination Flow for Digital Euro NFC Payment (via HCE)</i>	28
3.2.1.3.11.	<i>Display end user profile management</i>	29
3.2.1.3.11.1.	<i>Overview of user profile display</i>	30
3.2.1.3.11.2.	<i>Full integration scheme overview</i>	30
3.2.1.3.11.3.	<i>User NFC Get Status by App Flow for beta digital euro NFC Payment (via HCE)</i>	31
3.2.2.	<i>Business end user</i>	31
3.2.2.1.	<i>Business end user onboarding</i>	31
3.2.2.1.1.	<i>Overview of onboarding process</i>	32
3.2.2.1.2.	<i>Business end user onboarding</i>	32
3.2.2.2.	<i>Business end user offboarding</i>	33

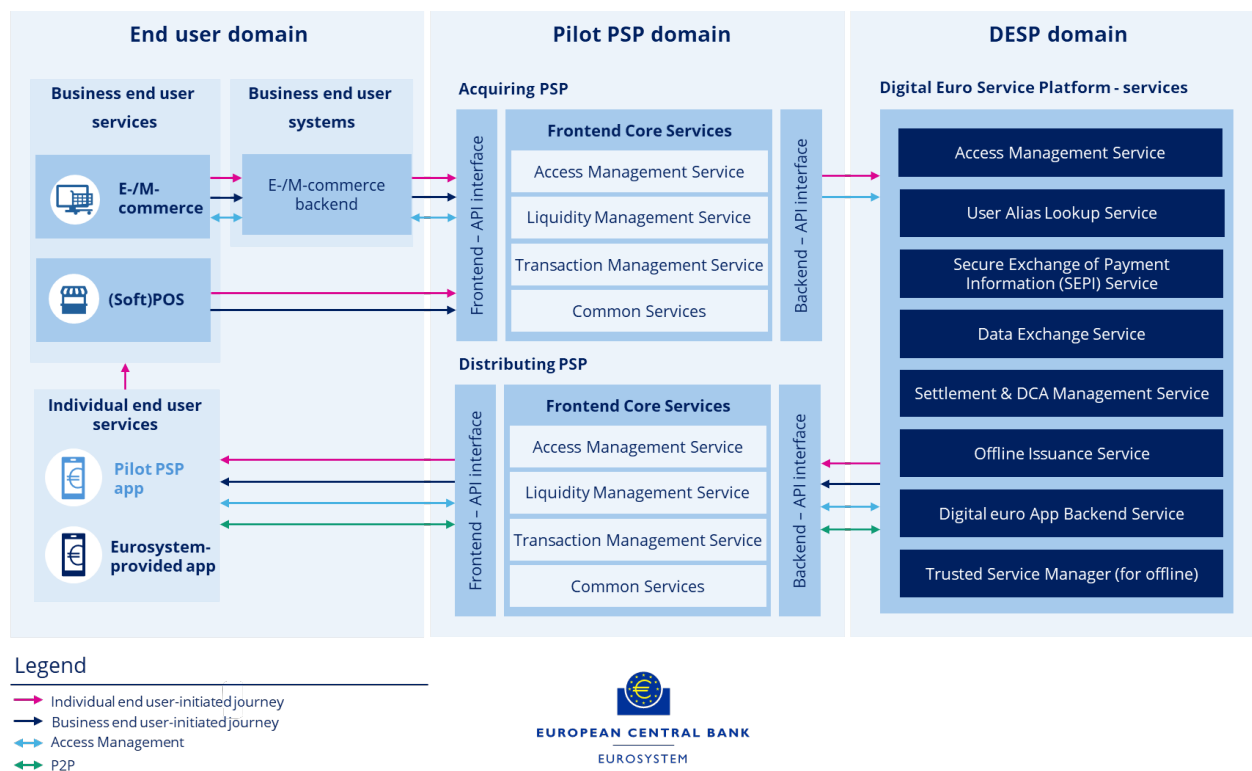


**EUROPEAN CENTRAL BANK**  
**EUROSYSTEM**

3.2.2.2.1.	<i>Overview of offboarding process</i>	33
3.2.2.2.2.	<i>Business end user offboarding through pilot PSP app</i>	33
3.3.	<b>Liquidity Management Requirements</b>	34
3.3.1.	<i>Global pre-requisite</i>	35
3.3.2.	<i>Manual funding online holdings</i>	35
3.3.3.	<i>Manual defunding online holdings</i>	36
3.4.	<b>Transaction management requirements</b>	37
3.4.1.	<i>Peer-to-Peer (P2P) transactions</i>	37
3.4.1.1.	<i>Overview of P2P transactions</i>	38
3.4.1.2.	<i>P2P transaction via alias</i>	38
3.4.1.2.1.	<i>Transaction via alias initiated by a payer</i>	38
3.4.1.3.	<i>P2P transaction with DEAN</i>	39
3.4.2.	<i>Transactions at (Soft)POS</i>	40
3.4.2.1.	<i>Scope of Applicability – Payment Terminal Types</i>	41
3.4.2.2.	<i>NFC Payment transactions</i>	41
3.4.2.2.1.1.	<i>Protocol for beta digital euro account payment</i>	41
3.4.2.2.1.2.	<i>Distributing PSP Onboarding Precondition</i>	41
3.4.2.2.1.3.	<i>NFC payment transaction</i>	42
3.4.2.2.1.3.1.	<i>Overview of NFC payment with a beta digital euro account</i>	42
3.4.2.2.1.3.2.	<i>Beta digital euro NFC transaction flow (via HCE)</i>	42
3.4.2.2.1.3.3.	<i>Prerequisites</i>	43
3.4.2.2.1.3.4.	<i>Transaction Process overview</i>	43
3.4.2.2.1.3.5.	<i>Business rules</i>	47
3.4.3.	<i>Balance enquiry and transactions history</i>	48
3.4.3.1.	<i>Global pre-requisite</i>	48
3.4.3.2.	<i>Balance enquiry (online holdings)</i>	49
3.4.3.3.	<i>Transactions history</i>	49

## 1. Introduction

The implementation specifications for the different domains and interactions between actors are presented in the diagram below. The current document is dedicated to the end user domain, and is aimed at describing what must be implemented in the end user devices to offer pilot payment services.



**Figure 1 Digital euro pilot - Functional architecture**

## 2. Structure of the document

The end user domain covers several types of end user devices:

- Pilot PSP application (app)
- Eurosystem-provided mobile application (app) **(out of scope of this document)**

Of note that the business end user device requirements and specifications are detailed in **Digital euro pilot – Frontend specifications – Acceptance instruments**.



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EUROSYSTEM

### 3. Pilot PSP app requirements

This chapter provides detailed implementation specifications for the pilot PSP app through which pilot PSPs may offer pilot payment services.

**Any functions that pilot PSPs offer through their proprietary applications are not necessarily modified.**

The document is organised as follows:

- General requirements that are not “process specific“, that frame the application and define its characteristics (functional or not).
- Process requirements that describe the specificities of the pilot payment services that the application must satisfy. Three processes are specified:
  - o **Access Management** related to the onboarding, offboarding of end users by pilot PSPs and the processing of end user data. The initiation of end user data is described by the onboarding process while maintenance of such data is described in user life cycle management process.
  - o **Liquidity Management** dedicated to the funding and defunding of beta digital euro accounts, from and to commercial bank money accounts.
  - o **Transaction Management** specifying the rules applicable when paying or receiving a beta digital euro payment via different information exchange methods and technologies (NFC, alias, DEAN).

The current document version considers only **online** digital euro payment transactions.

Offline transactions will be integrated later according to the offline solution, which is not finalised yet as well as the functions involving online and offline holdings.

#### 3.1. General requirements

This section provides general functional and non-functional requirements for mobile application implementation. General requirements are related to the characteristics of the application, applicable independently of the processes.



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### **3.1.1. Functional requirements**

#### **3.1.1.1. Supported form factor**

- The pilot PSP app shall be usable on smartphones and shall support different screen sizes and resolutions.
- The pilot PSP app shall offer functionalities based on the capabilities of the form factor.
  - The pilot PSP app shall support seamless integration with hardware and software features of the form factor, such as the device's camera, while also allowing operation with minimum required permissions (e.g., location, camera).

#### **3.1.1.2. Mobile Payment Solutions – NFC Functional Requirements**

##### **3.1.1.2.1. NFC Communication Capabilities**

The payer application must utilise the mobile device's integrated NFC module to support the following modes:

- Host Card Emulation Mode: Enables the device to function as a contactless payment card.
- Peer-to-Peer (P2P) Mode: Facilitates direct data exchange between NFC-enabled devices.
- Reader/Writer Mode (Active): Allows reading from or writing to NFC tags or compatible devices, where applicable.

##### **3.1.1.2.2. NFC Data Exchange**

The pilot PSP app must ensure secure NFC-based payment sessions by implementing:

- Encryption and tokenisation to protect sensitive transaction data.
- Support for end user-initiated and merchant-initiated payment sessions.
- Visual and/or haptic feedback to confirm successful data transmission.

##### **3.1.1.2.3. Device Compatibility and NFC Availability**

The pilot PSP app must:

- Detect NFC capability and prompt the end user to enable it if disabled.
- Handle gracefully any scenarios where NFC is unsupported or unavailable, providing appropriate guidance or fallback options.



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EUROSYSTEM

### **3.1.1.3. End user activation**

The pilot PSP app shall provide a functionality whereby the end user, after being onboarded by the pilot PSP shall be able to identify themselves and use the app service.

### **3.1.1.4. User experience**

The pilot PSP app shall comply with minimum UX requirements as defined in **Digital euro pilot – User journeys & Minimum UX requirements**.

## **3.1.2. Non-functional requirements**

### **3.1.2.1. Download rules**

An end user shall be able to download the up-to-date version of the pilot PSP app from the official applications stores of the Android and iOS platforms and install it.

### **3.1.2.2. Supported operating systems**

Pilot PSPs must ensure that mobile apps, web interfaces, and hardware are compatible with operating systems and browsers that remain within the official support lifecycle of their respective vendors. For security and compliance reasons, platforms that no longer receive vendor-issued security updates must not be supported. Compatibility must be limited to devices such as smartphones and tablets that receive ongoing security updates, support secure communication protocols, are not rooted or jailbroken, and include necessary hardware-level security features where applicable. This is to ensure data integrity, protection of sensitive information, and alignment with prevalent industry regulations and certifications.

### **3.1.2.3. Security**

[Placeholder for a future version of the document.](#)

### **3.1.2.4. Deployment**

[Placeholder for a future version of the document.](#)

### **3.1.2.5. Performance**

[Placeholder for a future version of the document.](#)

### **3.1.2.6. Compliance**

[Placeholder for a future version of the document.](#)



### **3.1.2.7. Availability**

Placeholder for a future version of the document.

### **3.1.2.8. Data integrity**

Placeholder for a future version of the document.

### **3.1.2.9. Disaster recovery**

Placeholder for a future version of the document.

### **3.1.2.10. Integration of Eurosystem NFC Payment SDK**

The pilot PSP application shall integrate the SDK provided by the Eurosystem, which offers the complete set of services required for NFC-based payment functionalities.

## **3.2. Access Management Requirements**

This section describes the requirements dedicated to registration and management of end users and accounts. It covers the following functions for individual and business end users.

- Onboarding of an end user
- Offboarding of an end user
- User life cycle management

### **3.2.1. Individual end user**

#### **3.2.1.1. Individual end user onboarding**

During the onboarding process, the new end user is created in the system along with the account and permissions necessary to use the pilot payment services. The end user provides all required information to facilitate the onboarding which may include multiple settings.

1. If the end user is known by the pilot PSP and has already a beta digital euro account, the pilot PSP app shall freeze the creation of a beta digital euro account process and inform the end user that a beta digital euro account already exists.
2. If the end user is not known by the pilot PSP, the pilot PSP app shall first trigger the registration of the end user as a new client. As soon as the end user is registered, the pilot PSP shall trigger a beta digital euro account existence check.



- If the end user already has a beta digital euro account, the pilot PSP shall inform the end user she/he has already a beta digital euro account.
- If the end user does not have a beta digital euro account, the onboarding process starts.

This section details the rules applicable to the creation of a new end user and the corresponding settings.

### 3.2.1.1.1. Overview of onboarding process

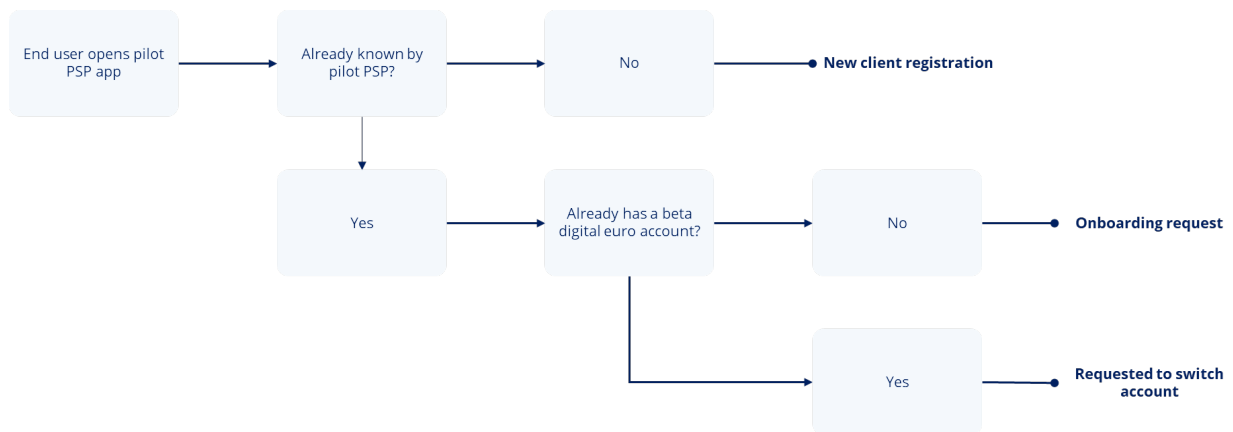


Figure 2 Overview of individual end user onboarding process

### 3.2.1.1.2. New client registration

The pilot PSP app must support the registration of an end user as a new client prior to initiating their onboarding as a beta digital euro end user.

Pre-requisites

1. The end user is not registered, and the pilot PSP provides a pilot PSP app, which supports the registration.

**E2E flow reference: AM1.1 Onboarding of an individual end user (first steps of the flow)**

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to enter the mandatory information required by the pilot PSP to be registered as a new customer.
2	Mandatory	- The pilot PSP app must send a new customer registration request to the distributing PSP Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 5.2 – Individual end user access management service</b> - <b>(section 5.2.1.1 - KYC registration)</b>



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#	Mandatory Optional Conditional	Business rules description
		- (section 5.2.1.2 - New customer registration)
3	Mandatory	- The final status must be displayed to the end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end user.

### 3.2.1.1.3. End user onboarding

The pilot PSP app must allow registration and onboarding of end users who want access to the pilot payment services and the ability to pay and be paid in beta digital euro.

#### Pre-requisites

1. Once the application is installed the end user is identified according to the pilot PSP mobile identification rules.
2. If the end user doesn't already have the pilot PSP app installed and the application registration procedure completed, the end user must download the pilot PSP app, open it and perform the pilot PSP app onboarding process.

#### E2E flow reference: AM1.1 & sAM26 Onboarding of an individual end user

It is not required to configure all parameters during the onboarding. The end user may choose to perform some settings at a later stage.

The parameters concerned are explicitly detailed in the section dedicated to end user life cycle management.

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to request a beta digital euro account through the pilot PSP app.
2	Mandatory	- The pilot PSP app must be able to send an onboarding request to the distributing PSP. Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 5.2 – Individual end user access management service)</b> - (section 5.2.1.3 - New individual end user registration request validation) - (section 5.2.1.4 - New individual end user registration)
2	Optional	- The end user must be able to register an alias at onboarding, to enter an alias type and the corresponding alias value. - The alias registration is not mandatory for onboarding. The end user must have the choice to skip this step (section 3.2.1.3.4).
3	Optional	- The end user must be able to link a commercial bank money account at onboarding and enter a digital euro payment account. - The link between a commercial bank money account and the beta digital euro account is not mandatory at onboarding. The end user must have the choice to skip this step (section 3.2.1.3.5 for linked account management).



#	Mandatory Optional Conditional	Business rules description
4	Optional	- The end user must be able to define liquidity settings at onboarding and the corresponding parameters. - The liquidity management setting is not mandatory at onboarding. The end user must have the choice to skip this step. Refer to <b>paragraph 3.2.1.3.2</b> .
5	Optional	- The end user must be able to configure notifications at onboarding and enter the corresponding parameters. - The notification setting is not mandatory at onboarding. The end user must have the choice to skip this step. Refer to <b>paragraph 3.2.1.3.3</b> .
6	Optional	- The end user must be able to request an enrolment to the NFC mobile payment service. - The notification setting is not mandatory at onboarding. The end user must have the choice to skip this step ( <b>section 3.2.1.3.9</b> ).
7	Optional	- The terms and conditions must be communicated to the end user. - The end user must be able to accept or reject the terms and conditions. - The onboarding cannot be successful if the end user does not accept the terms and conditions. - The pilot PSP can propose other communication channels to manage digital euro pilot terms and conditions.
8	Conditional	- If the onboarding is successful, the pilot PSP app must display the digital euro access number and provide the technical proof.
9	Mandatory	- The technical proof must be communicated to the end user for potential further emergency account switching. The existing procedures for providing information to the customer are reused.
10	Mandatory	- The final status must be displayed to the end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end user.

### 3.2.1.2. Individual end user offboarding

An individual end user wishing to close their beta digital euro account can submit a request via the pilot PSP app.

The distributing PSP servicing the beta digital euro account receives the request, checks whether the prerequisites are fulfilled, and verifies the account balance.

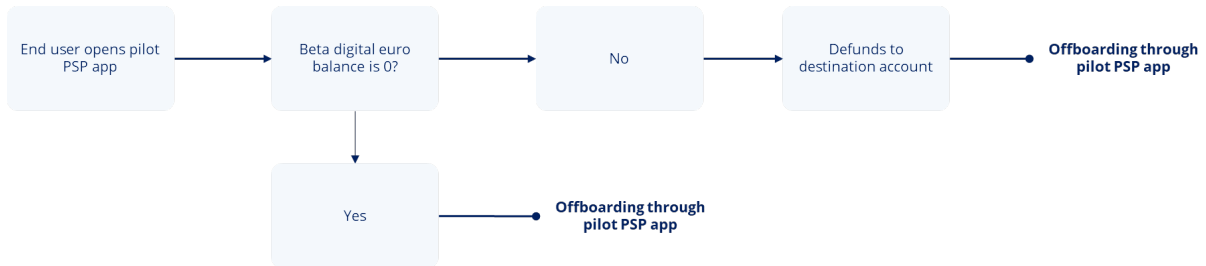
If the balance is zero, the offboarding process can begin.

If the balance is not zero, the end user has one option during the pilot:

- Transfer the balance to their commercial bank money account. Thereafter, the offboarding process continues.



### 3.2.1.2.1. Overview of offboarding process



**Figure 3 Overview of individual end user offboarding process**

### 3.2.1.2.2. End user Offboarding through pilot PSP app

- The offboarding process supports the end user who might decide to stop using beta digital euro at any point.
- The end user follows specific steps to perform the offboarding.
- This section details the rules applicable to terminate the pilot payment services, close the beta digital euro account and deactivate the beta digital euro end user.

#### Pre-requisites

1. The end user has activated the pilot payment services, is registered as a beta digital euro end user and has a beta digital euro account.
2. The end user has opened the pilot PSP app and is authenticated.

#### E2E flow reference: AM-3.1 offboarding of an individual end user

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to request an offboarding through the pilot PSP app.
2	Mandatory	- The offboarding request option is available only if the end user has already activated the pilot payment services and has a beta digital euro account.
3	Optional	- From a user experience perspective, the distributing PSP can decide to display beta digital euro account holdings. Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 5.4. – Balance and holding limits service)</b> .
4	Mandatory	- The end-user must defund the remaining funds to a destination account. By default, the destination account is the linked account.
5	Conditional	- If the end-user didn't link a commercial bank money account to the beta digital euro account, the end-user shall be able to enter the identifier of the destination account. - If the commercial bank money account identifier entered by the end user is invalid, the end user must be informed and be able to retry.



#	Mandatory Optional Conditional	Business rules description
		<ul style="list-style-type: none"> <li>The distributing PSP must verify the end user has full access to the destination account Refer to <b>Digital euro pilot – Frontend specifications – Common Services (section 1.5. – Linked account settings service)</b>.</li> </ul>
6	Mandatory	<ul style="list-style-type: none"> <li>The pilot PSP app must be able to send an offboarding request to the distributing PSP. Refer to <b>Digital euro pilot - Frontend specifications – Distributing PSP (section 5.2. – Individual user access management service)</b> <ul style="list-style-type: none"> <li><b>Individual end user offboarding request validation</b></li> </ul> </li> <li>If the request is not valid, the process must be discontinued.</li> </ul>
7	Mandatory	<ul style="list-style-type: none"> <li>The final status must be displayed to the end user in case of completion and rejection.</li> <li>In case of failure, the reason for the rejection must be provided to the end user.</li> </ul>

### 3.2.1.3. Individual end user life cycle management

End user life cycle management processes offer users the ability to add, update, delete beta digital euro settings that are used by other processes (liquidity management, transaction management) view their balance and transaction history and manage account switching.

#### 3.2.1.3.1. Overview of end user life cycle processes

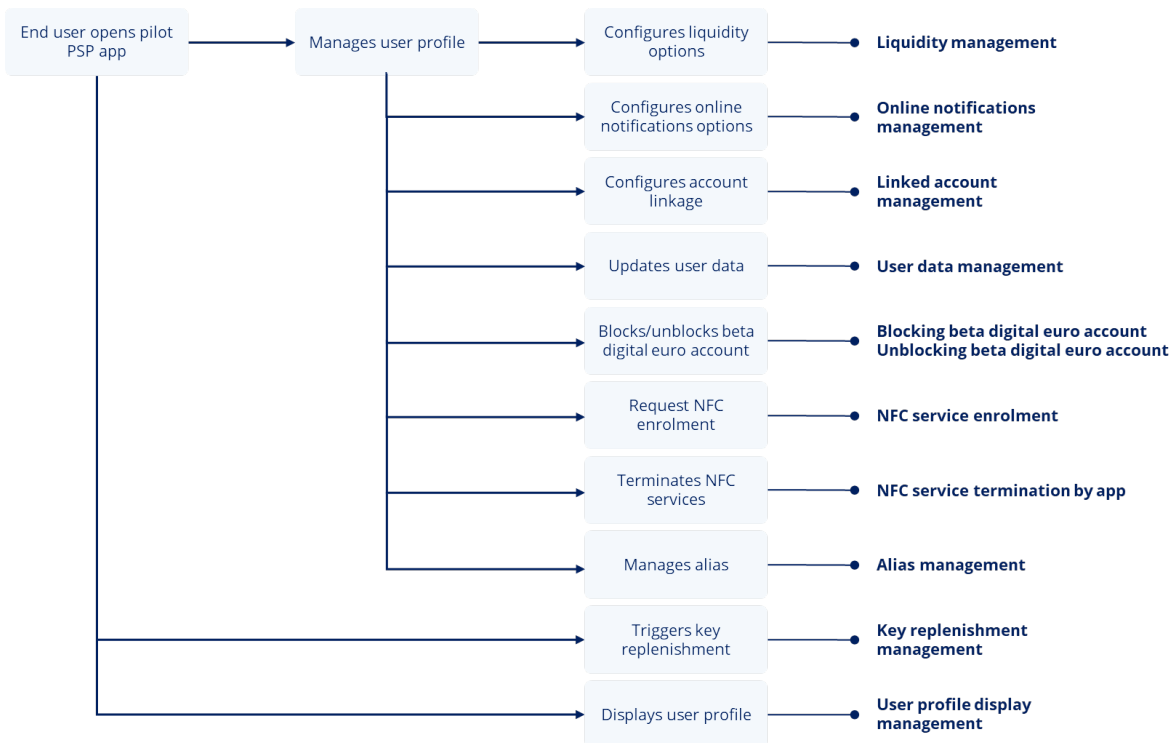


Figure 4 Overview of individual end user life cycle process



The end user might decide at any time to manage the beta digital euro settings: liquidity and notification options, alias, linked commercial bank money account, authentication method, NFC services.

This section details the rules applicable to end user profile management.

Pre-requisites

1. The end user is registered as a beta digital euro end user and has a DEAN.
2. The pilot PSP app is already connected to the distributing PSP through a Strong Customer Authentication process specific to that pilot PSP.

End user profile management

The end user profile covers several settings. The end user should be offered to select the profile settings to be configured.

**3.2.1.3.2. Liquidity settings management**

Pre-requisites

- The liquidity setting is allowed only if the end user has defined the linked commercial bank money account.

**E2E flow reference: AM-4.1.2 End user (individual) amendments (Liquidity management settings)**

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to perform an initial set-up, to update some existing settings or to remove all or a subset of the configuration parameters.
2	Conditional	- If liquidity parameters are already defined, they must be displayed to the end user. The Mobile App can request the existing settings to the PSP. Refer to <b>Digital euro pilot - Frontend specifications – Distributing PSP (section 5.8. – Liquidity settings service)</b> . - If liquidity parameters are not yet defined, it is possible to display “per default” settings. (at the discretion of pilot PSP).
3	Optional	- Cross consistency between the different options is defined and checked by the pilot PSP.
8	Optional	<b>Waterfall indicator</b> - The end user must be able to define if the automatic waterfall process must be performed.
9	Optional	<b>Reverse waterfall indicator</b> - The end user must be able to define if the automatic reverse waterfall process must be performed.
10	Mandatory	<b>Holding limits</b> - The holding limit is displayed to the end-user in accordance with the applicable legislation and with the rules defined by the PSP based on that legislation.



#	Mandatory Optional Conditional	Business rules description
11	Mandatory	- The pilot PSP app must ask the end user to confirm the settings before generating the liquidity settings request to the pilot PSP.
12	Conditional	- If the end-user doesn't confirm the settings, the process must be discontinued.
13	Conditional	- If the end-user confirms the settings The PSP App must be able to send a liquidity settings request to the distributing PSP. Refer to <b>Digital euro pilot - Frontend specifications – Distributing PSP (section 5.8. – Liquidity settings service)</b> .
14	Mandatory	- Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.
15	Mandatory	- The final status must be displayed to the user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end-user.

### 3.2.1.3.3. Online notification settings management

E2E flow reference: AM-4.1.3 End user (Individual) amendments (online notification preferences)

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to perform an initial set-up, to update some existing settings.
2	Conditional	- If notifications parameters are already defined, they must be displayed to the end user. - If notification parameters are not yet defined, it is possible to display "per default" settings (at the discretion of the pilot PSP).
3	Mandatory	- The end user must be able to enter the needed setting or keep the default options (if any) <ul style="list-style-type: none"> <li>- Type of notification</li> <li>- Preferred channel for notification</li> </ul> - The possible communication channels are defined by the pilot PSP.
4	Mandatory	- The following list of notification types is proposed: <ul style="list-style-type: none"> <li>- credit to beta digital euro account</li> <li>- debit from beta digital euro account</li> <li>- execution of a waterfall transaction</li> <li>- execution of a reverse waterfall transaction</li> <li>- Account balance threshold breach</li> </ul> - The end user can only select a channel already configured in the end user data.
5	Mandatory	- The pilot PSP app must ask the end user to confirm the settings before generating the notification settings request to the pilot PSP.
6	Conditional	- If the end user doesn't confirm the settings, the process must be discontinued.
7	Mandatory	- If the end user confirms the settings, the pilot PSP app must be able to send a notification settings request to the distributing PSP. Refer to <b>Digital euro pilot - Frontend specifications – Distributing PSP (section 5.9. – Notification settings service)</b> .
8	Mandatory	- Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.
9	Mandatory	- The final status must be displayed to the end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end user.

**3.2.1.3.4. Alias management****E2E flow reference: AM-4.1.9 End user (individual) amendments (alias registration)**

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to create, update or remove an alias and to select the corresponding option.
2	Conditional	- If an alias is already defined, they must be displayed to the end user. - The alias value must be formatted according to the alias type format.
3	Mandatory	- The possible alias types must comply with the types allowed by the scheme.
4	Mandatory	- If an alias is already defined, only an update or a removal must be possible.
5	Mandatory	- The alias value entered by the end user must be consistent with the format of the alias type.
6	Conditional	- Where a mobile telephone number is used as an alias, it shall be stored and sent in strict E.164 format (MSIDN) with leading + and no other characters. Flexible input features may be offered (allowing leading 00, spaces etc to be entered) provided the alias is normalised to strict E.164 format (MSIDN).
7	Mandatory	- The pilot PSP app must ask the end user to confirm the settings before generating the notification settings request to the pilot PSP.
8	Conditional	- If the end user doesn't confirm the settings, the process must be discontinued.
9	Conditional	- If the end user confirms the settings, the pilot PSP app must be able to send an alias registration request to the distributing PSP. <b>Refer to Digital euro pilot – Frontend specifications – Distributing PSP (section 5.1 – Alias registration service).</b>
10	Mandatory	- Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.
11	Mandatory	- The final status must be displayed to the end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end user.

**3.2.1.3.5. Linked account management****E2E flow reference: AM-4.1.1 End user (individual) amendments (account linkage)**

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to create, update or remove a linked account and to select the corresponding option.
2	Conditional	- If a commercial bank money account is already linked to the beta digital euro account, it must be displayed to the end user.
3	Mandatory	- The end user must be able to enter the identifier of the commercial bank money account to be linked to the beta digital euro account. - The end user must have full access to the commercial bank money account.
4	Conditional	- If the commercial bank money account identifier entered by the end user is invalid, the end user must be informed and be able to retry.



#	Mandatory Optional Conditional	Business rules description
5	Conditional	- If the end user wants to remove an existing link between a commercial bank money account and the beta digital euro account, the selection of the “removal” option must be enough.
6	Mandatory	- The pilot PSP app must ask the end user to confirm the settings.
7	Conditional	- If the end user doesn’t confirm the settings, the process must be discontinued.
8	Mandatory	- If the end user confirms the settings, the pilot PSP app must be able to send linked account settings request to the distributing PSP. Refer to <b>Digital euro pilot – Frontend specifications – Common Services (section 1.5. – Linked account settings service)</b> .
9	Mandatory	- Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.
10	Mandatory	- The final status must be displayed to the end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end user.

### 3.2.1.3.6. End user data management

#### E2E flow reference: AM-4.1.8 End user (individual) amendments (user data)

The end user data that can be modified are the same as those currently editable. The existing process is not modified.

### 3.2.1.3.7. Blocking beta digital euro account

Pre-requisites

- Blocking a beta digital euro account is allowed only if the account is not blocked.

#### E2E flow reference: AM-4.1.6 End user (individual) amendments (un-blocking beta digital euro account)

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to block their beta digital euro account.
2	Mandatory	- The end user must be requested to confirm the request to block the beta digital euro account.
3	Conditional	- If the end user doesn’t confirm the blocking request, the process must be discontinued.
4	Conditional	- If the end user confirms the blocking request, the pilot PSP app must be able to send a request to the distributing PSP to block the beta digital euro account. Refer to <b>Digital euro pilot – Frontend specifications – Common Services (section 1.4. – Beta digital euro account service)</b>
5	Mandatory	- Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.



#	Mandatory Optional Conditional	Business rules description
6	Mandatory	- The final status must be displayed to the end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end user.

### 3.2.1.3.8. Unblocking beta digital euro account

Pre-requisites

- Unblocking a beta digital euro account is allowed only if the account is blocked.

**E2E flow reference: AM-4.1.6 End user (individual) amendments (un-blocking beta digital euro account)**

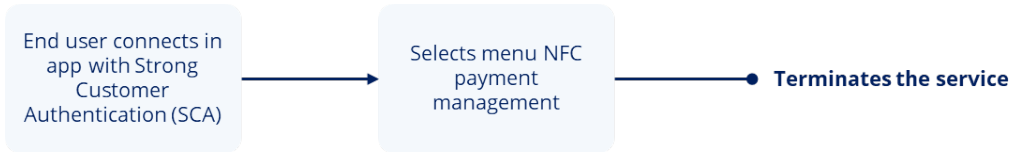
#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to unblock their beta digital euro account.
2	Mandatory	- The end user must be requested to confirm the request to unblock the beta digital euro account.
3	Conditional	- If the end user doesn't confirm the unblocking request, the process must be discontinued.
4	Conditional	- If the end user confirms the unblocking request, the pilot PSP app must be able to send a request to the distributing PSP to unblock the beta digital euro account. <b>Refer to Digital euro pilot – Frontend specifications – Common Services (section 1.4. – Beta digital euro account service).</b>
5	Mandatory	- Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.
6	Mandatory	- The final status must be displayed to the end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the end user.

### 3.2.1.3.9. NFC service enrolment

Since the end-to-end process flows related to NFC services are defined in a generic manner and do not account for the integration of the two Eurosystem components (the HCE SDK within the pilot PSP app and the HCE SDK backend in the pilot PSP distribution environment), flow diagrams have been introduced to improve visualisation and understanding.



3.2.1.3.9.1. *Overview of Enrolment service*

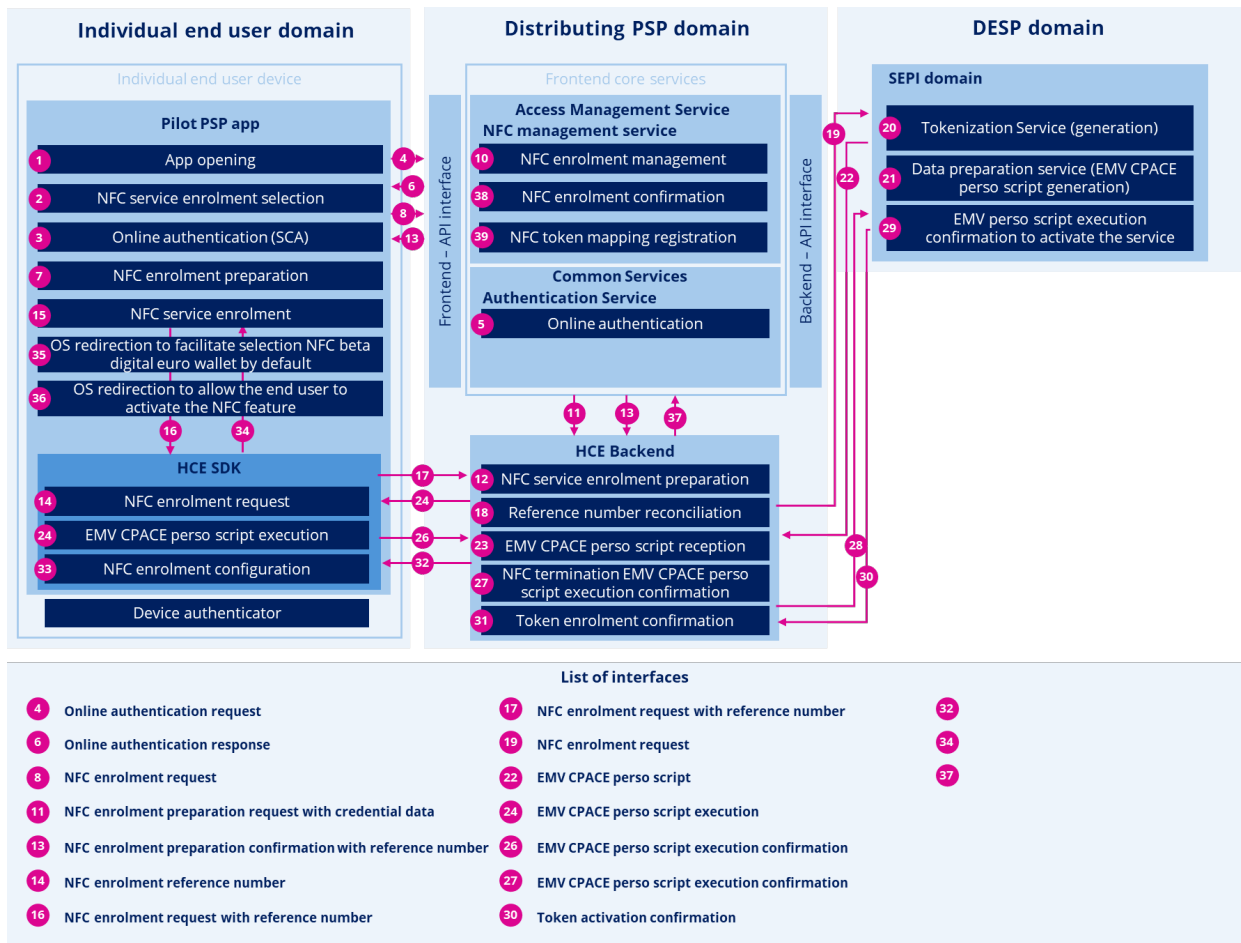


**Figure 5 Overview of NFC enrolment service**

3.2.1.3.9.2. *Full integration scheme overview*

This diagram provides a detailed view of the enrolment process for NFC mobile payments.

**Placeholder for E2E flow reference: Enrolment to NFC mobile payment with beta D€ account**



**Figure 6 NFC CPACE enrolment**



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This section covers the following topics:

- 1 – App opening
- 2 – NFC service enrolment selection
- 3 – Online authentication (SCA)
- 4 – Online authentication request
- 6 – Online authentication response
- 7 – NFC Service enrolment preparation
- 8 - NFC enrolment Request
- 14 – NFC enrolment with ref number
- 15 – NFC service enrolment
- 16 - NFC enrolment request with ref number
- 34 – NFC service enrolment confirmation
- 35 – OS redirection to allow the customer selecting the NCF Digital Euro Wallet by default
- 36 - OS redirection to allow the customer activating the NFC feature

#### 3.2.1.3.9.3. *User Enrolment Flow for Digital Euro NFC Payment (via HCE)*

##### Prerequisites

Before starting the enrolment process, the following conditions must already be met:

- The end user has already enrolled in a beta digital euro account, and the account is currently active.
- The end user has already accepted the Terms and Conditions related to the pilot payment services, either:
  - As part of the general terms of the beta digital euro account service, or
  - Through contractual agreement with their bank.
  - As part of the enrollment process, the individual end user logs into the pilot PSP app using Strong Customer Authentication (SCA).

## Enrollment Process overview

- **Initiation of Enrollment Request**

The client application (PSP app) sends a request to the distributing PSP to initiate enrollment in the NFC service.

- **Eligibility Verification**

The distributing PSP verifies the customer's eligibility for the NFC service (e.g., beta digital euro account status). A fraud check may be performed if required.

- NFC service enrollment service request by the Distributing PSP to the HCE Backend with provision of enrollment data

An NFC service enrollment request is sent to the HCE backend, including the last four digits of the DEAN (digital euro access number) and the PSP ID (Distributing PSP Identifier). These data are passed to the HCE SDK Backend, which initiates the NFC enrollment process. The HCE SDK backend then returns a reference for the NFC service enrollment initiation to the distributing PSP.

- **NFC service enrolment**

Once the distributing PSP receives the reference for the NFC service enrollment initiation from the HCE SDK backend, it forwards this reference to the PSP app. This enables the app to trigger the NFC service enrollment request via the HCE SDK.

The HCE SDK then orchestrates the enrollment process in coordination with the HCE SDK backend and SEPI. This process includes the personalisation of the HCE SDK.

Upon completion, the HCE SDK returns a confirmation of enrollment to the PSP app. The app can then finalise the process by configuring the default NFC wallet ("NFC Digital Euro") in the OS settings and activating NFC if it is not already enabled.

Finally, the HCE SDK backend confirms the successful NFC enrollment to the distributing PSP and provides the NFC token generated by SEPI.

- **Token Mapping**

The distributing PSP associates the EMV token with both the DEAN and the pilot PSP app ID. This linkage enables the distributing PSP to perform detokenisation during subsequent transactions.



#	Mandatory Optional Conditional	Business rules description
1	Mandatory	The distributing PSP must implement change management initiatives to support the successful adoption of NFC payments using a beta digital euro account. This requirement also applies to the enrollment process within the pilot PSP app implementation.
2	Mandatory	Enrolling in the "NFC Payment with a beta digital euro account" service is not mandatory to open a beta digital euro account.
3	Mandatory	An end user can enroll and unenroll from the NFC payment service at any time using the "Termination" operation, without limitation on the number of times
4	Mandatory	Enrollment in the beta digital euro menu of the pilot PSP app is only available to end users who have opted to hold their beta digital euro account with their bank.
5	Mandatory	The NFC enrolment menu should only be displayed by the pilot PSP app if the end user has already opened a beta digital euro account with that pilot PSP.
6	Mandatory	The pilot PSP app enables customers to enroll in the NFC service through a dedicated Digital Euro NFC service enrollment menu, accessible when they open the app.
7	Mandatory	Explicit consent to enroll must be collected (e.g., via a checkbox or electronic signature).
8	Mandatory	Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.
9	Mandatory	The pilot PSP app requests the NFC enrollment service from the distributing PSP, which manages the initiation of the process with the HCE SDK backend. The backend returns an NFC enrollment reference, which is forwarded by the distributing PSP to the pilot PSP app. The pilot PSP app requests the NFC enrollment service preparation. Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 5.10. - NFC service management)</b> .
10	Mandatory	The pilot PSP app uses an HCE SDK API to request the NFC enrollment service. The pilot PSP app sends the NFC enrollment request to the HCE SDK as specified in ECB. ( <a href="#">Placeholder for HCE SDK and HCE SDK backend ECB implementation guidelines</a> )
11	Conditional	If enrollment fails, the pilot PSP app must display a clear message indicating the reason for the rejection, based either on the core reason returned by the SDK or the response from the distributing PSP's server.
12	Mandatory	The service discovery phase is mandatory and must be completed before the end user can proceed with enrollment in the service via the pilot PSP app.
13	Mandatory	The pilot PSP app enables the end user to set it as the default NFC payment method for the beta digital euro by redirecting them to the device's operating system NFC settings menu.
14	Conditional	If NFC is not enabled, the pilot PSP app prompts the end user to activate it by redirecting them in the device's operating system NFC settings menu.

### 3.2.1.3.10. Key replenishment management

The key replenishment process may be carried out using different methods, depending on whether the individual end-user has an active internet connection. This paragraph provides a detailed presentation of both options.

- NFC CPACE key replenishment enabled by active internet connection
- NFC CPACE key replenishment alert when internet is unavailable

### 3.2.1.3.10.1. NFC CPACE Key replenishment Enabled by Active Internet Connection – Capability

This feature is provided for illustrative purposes only and does not require any specific integration with either the pilot PSP app or the distributing PSP. It is therefore included solely to help understand the key replenishment concept, which is limited to the following entities: HCE SDK, HCE backend and SEPI.

The end-to-end process flows related to NFC services are not yet defined. Flow diagrams are introduced to enhance visualisation and understanding.

This diagram provides a detailed view of the key replenishment process for NFC mobile payments using a beta digital euro account.

#### Placeholder for E2E flow reference: Key replenishment for NFC mobile payment

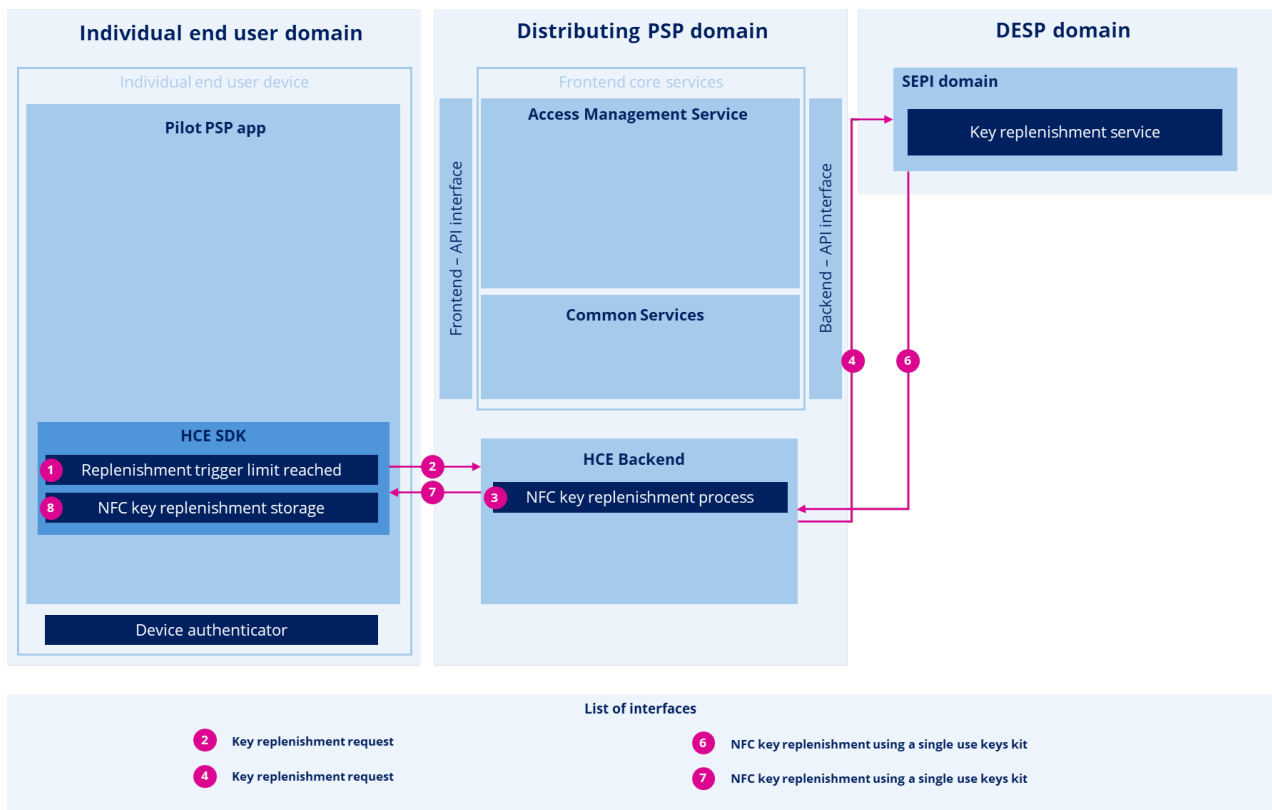


Figure 7 NFC CPACE key replenishment enabled by active internet connection



3.2.1.3.10.1.1. Overview of key replenishment management

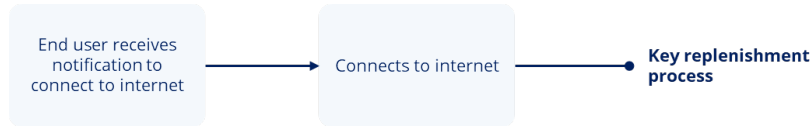


Figure 8 Overview of key replenishment management

This diagram illustrates the key replenishment process for NFC mobile payments using a beta digital euro account in scenarios where no internet connection is available.

Placeholder for E2E flow reference: Key replenishment for NFC mobile payment

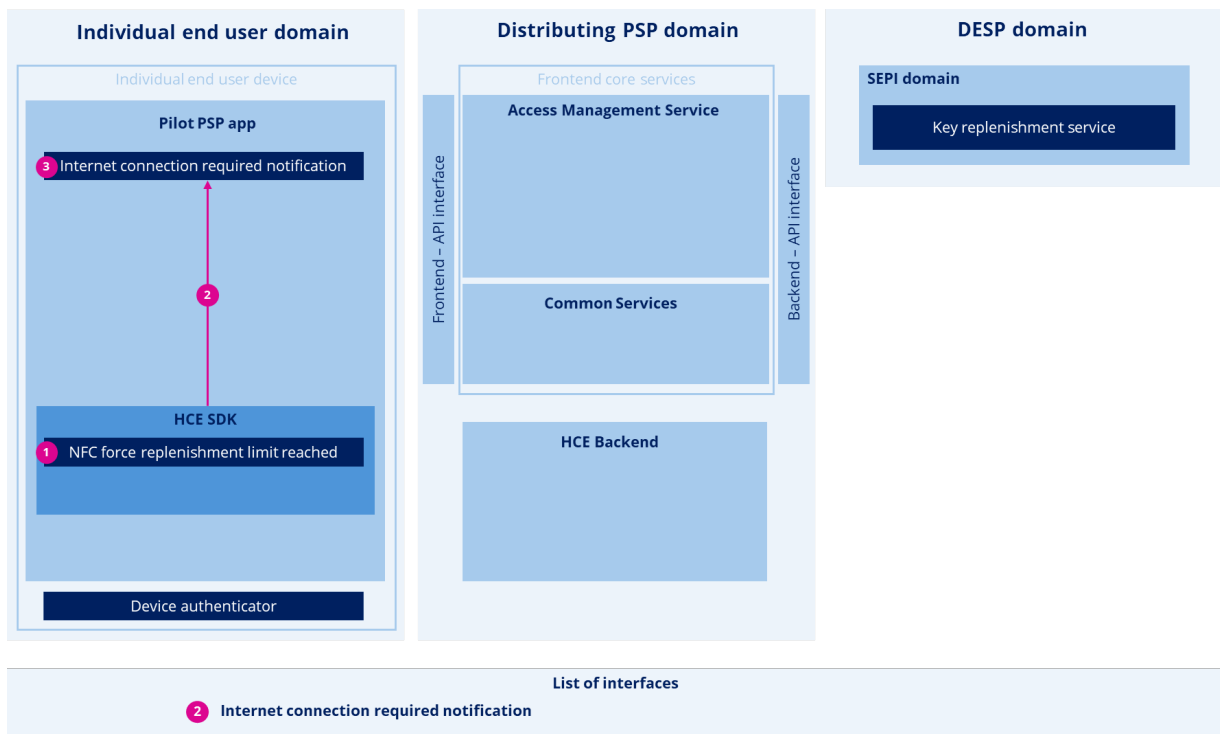


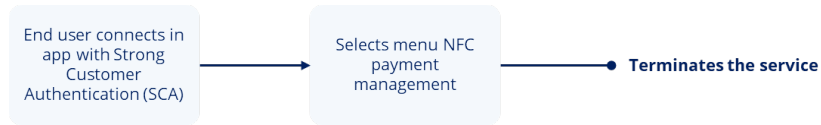
Figure 9 NFC CPACE key replenishment alert 'internet is unavailable'

This section covers the following topics:

- 1 – NFC Force replenishment Limit
- 2 – Internet connection required Notification
- 3 – Internet connection required Notification



3.2.1.3.10.2. *Overview of NFC termination by App service*



**Figure 10 - Overview of NFC termination by app**

3.2.1.3.10.3. *Full integration scheme overview*

Since the end-to-end process flows related to NFC services are defined in a generic manner and do not account for the integration of the two Eurosystem components (the HCE SDK within the pilot PSP app and the HCE SDK backend in the pilot PSP distribution environment), flow diagrams have been introduced to improve visualisation and understanding.

This diagram provides a detailed view of the termination process by pilot PSP for NFC mobile payments using a beta digital euro account.

**Placeholder for E2E flow reference: NFC service termination by app**



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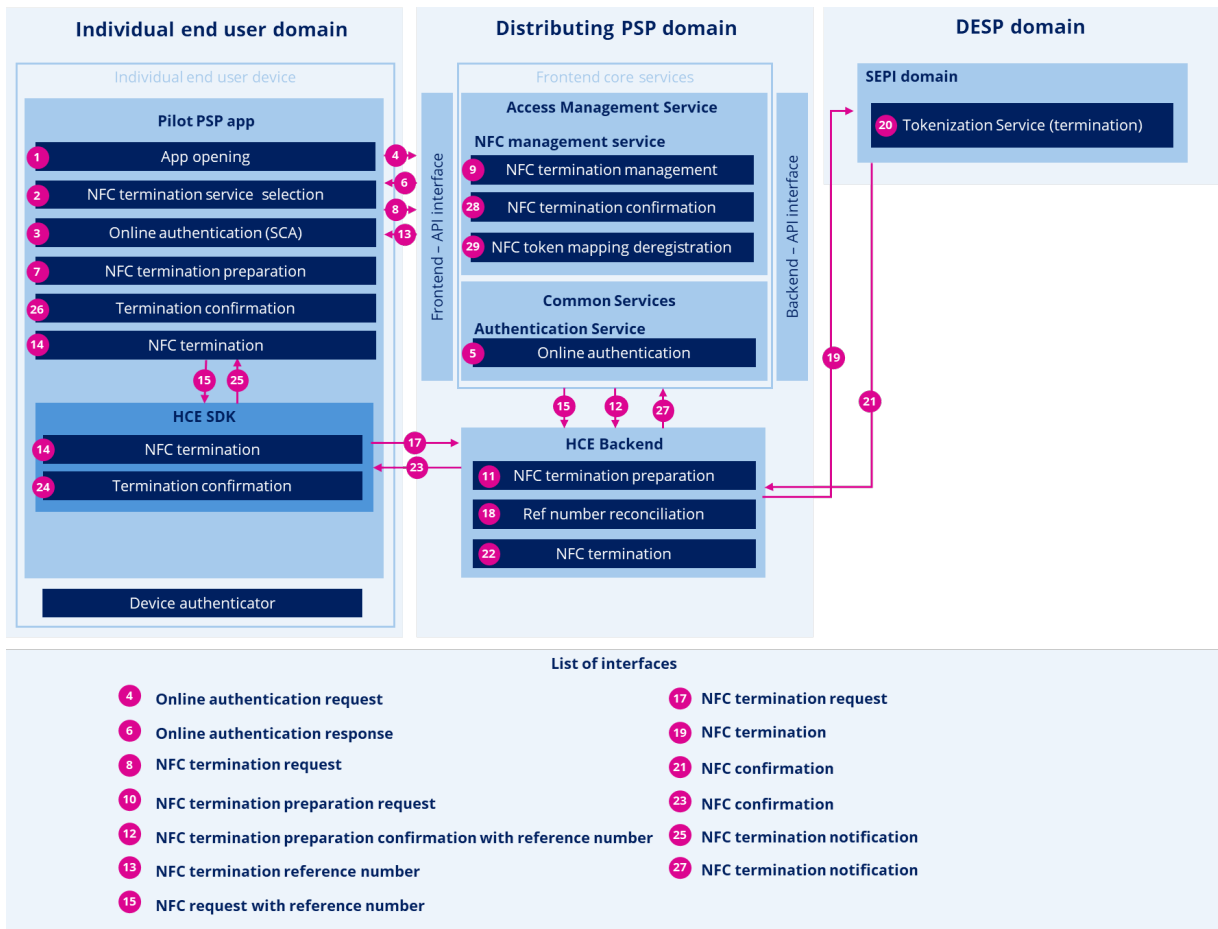


Figure 11 NFC CPACE termination by app

This section covers the following topics:

- 1 - App opening
- 2 - NFC service termination (select)
- 3 - Online authentication (SCA)
- 4 - Online authentication request
- 6 - Online authentication response
- 7 - NFC termination preparation
- 8 - NFC termination Request
- 13 - NFC termination ref number
- 14 - NFC termination



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- 15 - NFC termination Request with ref number
- 25 - NFC termination notification
- 26 - NFC termination confirmation

#### 3.2.1.3.10.4. *User NFC termination Flow for Digital Euro NFC Payment (via HCE)*

##### Prerequisites

- Before initiating the termination process, the NFC service must be active.

##### NFC Termination Process overview

- **Initiation of termination Request**

The client application (pilot PSP app) sends a request to the distributing PSP to initiate a termination in the NFC service.

- NFC service termination request to the HCE Backend with provision of termination Data

An NFC termination request is sent to the HCE backend, including the EMV token. These data are passed to the HCE SDK Backend, which initiates the NFC termination process. The HCE SDK backend then returns a reference for the NFC termination initiation to the distributing PSP.

- **NFC termination**

Once the distributing PSP receives the reference for the NFC termination initiation from the HCE SDK backend, it forwards this reference to the pilot PSP app. This enables the app to trigger the NFC termination request via the HCE SDK.

The HCE SDK then orchestrates the termination process in coordination with the HCE SDK backend and SEPI.

Upon completion, the HCE SDK returns a confirmation of termination to the pilot PSP app. The app can then finalise the process by notifying the end user.

Finally, the HCE SDK backend confirms the successful NFC termination to the distributing PSP.

- **Token Mapping**

The distributing PSP deletes the association from the EMV token with both the DEAN (digital euro access number) and the PSP app ID.



#	Mandatory Optional Conditional	Business rules description
1	Mandatory	Terminating the NFC Payment with a beta digital euro account service must not affect the lifecycle or status of the beta digital euro account itself.
2	Mandatory	The pilot PSP app enables customers to terminate the NFC service through a dedicated Digital Euro NFC service termination menu, accessible when they open the pilot PSP app.
3	Mandatory	Explicit consent to terminate the NFC service must be collected (e.g., via a checkbox or electronic signature).
4	Mandatory	Proof of consent must be archived, including timestamp, contract version, and other relevant metadata.
5	Mandatory	The pilot PSP app requests the NFC termination from the distributing PSP, which manages the initiation of the process with the HCE SDK backend. The backend then returns a reference for the NFC termination preparation to the pilot PSP app. The pilot PSP app requests the termination preparation. Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 5.10. - NFC service management)</b> .
6	Mandatory	The pilot PSP app uses an HCE SDK API to request the NFC termination. The pilot PSP app sends the NFC termination request to the HCE SDK as specified in ECB. (Placeholder for HCE SDK and HCE SDK backend ECB implementation guidelines)
7	Conditional	If termination fails, the pilot PSP app must display a clear message indicating the reason for the rejection, based either on the core reason returned by the SDK or the response from the distributing PSP's server.
8	Mandatory	At the end of the termination process, the pilot PSP app must display a clear message informing the end user that NFC payments with their beta digital euro account have been cancelled.

### 3.2.1.3.11. Display end user profile management

Objective: NFC Service Status-Based Menu Flow

The application must first determine the current status of the device's NFC service—whether it is active or inactive. This status check is essential to dynamically present the appropriate user flow:

- If NFC is inactive:  
The app should guide the user through the enrollment process, which may include enabling NFC and initialising secure elements or tokens required for contactless payments.
- If NFC is active:  
The app should offer the option to terminate the NFC service, which may involve deactivating tokens, removing credentials, or disabling contactless functionality.



3.2.1.3.11.1. Overview of user profile display

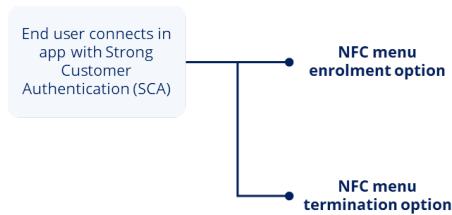


Figure 12 - Overview of end user profile display

3.2.1.3.11.2. Full integration scheme overview

Since the end-to-end process flows related to NFC services are defined in a generic manner and do not account for the integration of the two Eurosystem components—the HCE SDK within the pilot PSP app and the HCE SDK backend in the pilot PSP distribution environment—flow diagrams have been introduced to improve visualisation and understanding.

This diagram illustrates the status retrieval process for NFC mobile payments using a beta digital euro account, along with the corresponding menu display in the pilot PSP app.

Placeholder for E2E flow reference: NFC user profile management

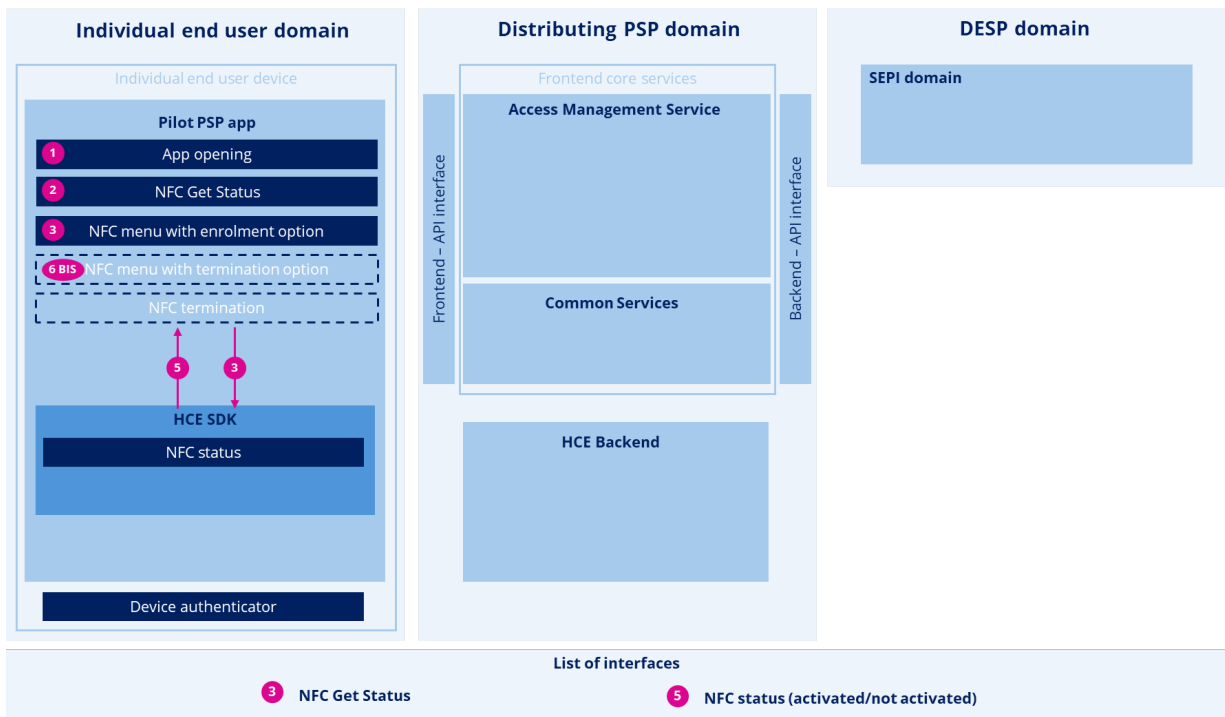


Figure 13 NFC CPACE Get Status by app capability



This section covers the following topics:

- 1 - App opening
- 2 - NFC Get Status
- 3 - NFC Get status
- 4 - NFC status
- 5 - NFC status (activated / not activated)
- 6 - NFC Menu with enrolment option
- 6 BIS - NFC Menu with termination option

### 3.2.1.3.11.3. *User NFC Get Status by app flow for beta digital euro NFC Payment (via HCE)*

#### NFC Get Status by App Process overview

The HCE SDK provides an API that allows the pilot PSP app to retrieve the activation status (activated / not activated) and accordingly manage the NFC menu (NFC enrolment versus NFC Termination by app).

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	The SDK HCE to allow getting the status API is detailed in <a href="#">(Placeholder for HCE SDK and HCE SDK backend ECB implementation guidelines)</a> .
2	Mandatory	Each time the end user connects to the pilot PSP app, this pilot PSP app must retrieve the NFC status (activated / not activated) from the HCE SDK and adjust the menu accordingly.

## 3.2.2. Business end user

### 3.2.2.1. Business end user onboarding

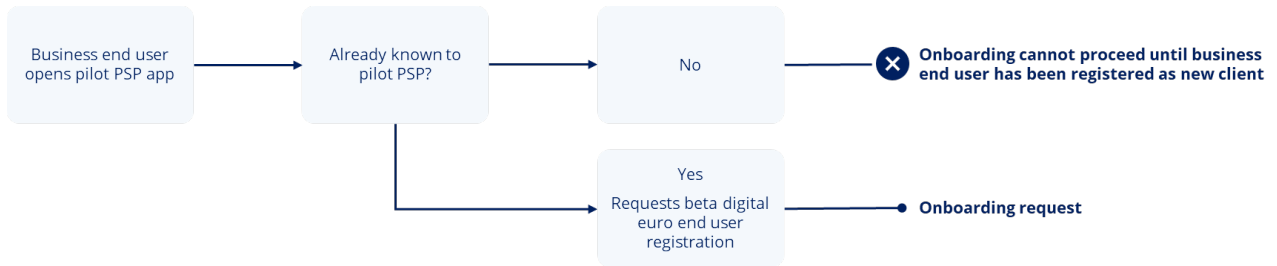
During the onboarding process, the new business end user is created in the system along with the accounts and permissions necessary to use the pilot payment services. The business end user provides all required information to facilitate the onboarding which may include multiple settings.

1. If the business end user is already known by the pilot PSP, the onboarding process can begin immediately.
2. If the business end user is not known by the pilot PSP, the business end user must first be registered as a new customer before the onboarding process can start.



This section details the rules applicable to the creation of a new business end user and the corresponding settings.

### 3.2.2.1.1. Overview of onboarding process



**Figure 14 - Overview of business end user onboarding process**

### 3.2.2.1.2. Business end user onboarding

The pilot PSP app must allow registration and onboarding of business end users who want access to the pilot payment services and the ability to pay and be paid in beta digital euro.

Pre-requisites

1. Once the application is installed the business end user is identified according to the pilot PSP mobile identification rules.
2. The business end user is already known by the pilot PSP.

#### **E2E flow reference: AM1.2 Onboarding of a business end user**

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The business end user must be able to request a beta digital euro account through the pilot PSP app.
2	Mandatory	- The pilot PSP app must be able to send an onboarding request to the acquiring PSP. Refer to <b>Digital euro pilot – Frontend specifications – Acquiring PSP (section 5.1. – Business end user access management service)</b> .
3	Optional	- The terms and conditions must be communicated to the business end user. - The business end user must be able to accept or reject the terms and conditions. - The onboarding cannot be successful if the business end user does not accept the terms and conditions. - The pilot PSP can propose other communication channels to manage beta digital euro terms and conditions.
4	Mandatory	- The business end user must be able to link a commercial bank money account at onboarding and enter a digital euro payment account. Refer to <b>Digital euro pilot – Frontend specifications – Common Services (section 1.5. – Linked account settings service)</b> .



#	Mandatory Optional Conditional	Business rules description
5	Mandatory	- The business end user must be able to configure notifications at onboarding and enter the corresponding parameters. Refer to <b>Digital euro pilot –Frontend specifications – Acquiring PSP (section 5.3. - Notification settings)</b> .
6	Mandatory	- The business end user must be able to request several beta digital euro accounts.
7	Conditional	- If the business end user wants to open several beta digital euro accounts, they should be able to request either to link a commercial bank account that is already associated with another beta digital euro account or to link a another commercial bank money account.
8	Conditional	- If the onboarding is successful, the pilot PSP app must display the adigital euro access numbers and provide the corresponding technical proof.
9	Mandatory	- The technical proof must be communicated through the existing procedures for providing information to the business end user.
10	Mandatory	- The final status must be displayed to the business end user in case of completion and rejection. - In case of failure, the reason for the rejection must be provided to the business end user.

### 3.2.2.2. Business end user offboarding

The business end user initiates their offboarding by requesting the closure of contractual relationships. The closure of contractual relationships determine the date from which beta digital euro transactions will no longer be accepted and the period of time during which the business end user must still accept and process refunds and claims.

When this period is over, the deregistrations of DEAN are performed and the offboarding process is completed.

#### 3.2.2.2.1. Overview of offboarding process

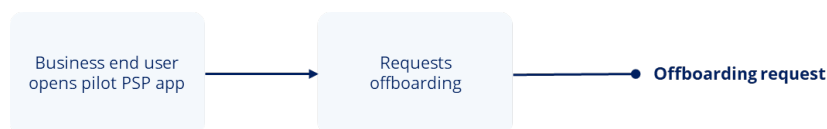


Figure 15 - Overview of business end user offboarding process

#### 3.2.2.2.2. Business end user offboarding through pilot PSP app

The offboarding process supports the end user who might decide to stop using beta digital euro at any point.

The end user follows specific steps to perform the offboarding.



This section details the rules applicable to terminate the pilot payment services, close the beta digital euro account and deactivate the business end user.

#### Pre-requisites

1. The business end user has a valid acceptance contract.
2. The business end user has opened the pilot PSP app and is authenticated

#### E2E flow reference: AM-3.2 offboarding of a business end user

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The end user must be able to request an offboarding through the pilot PSP app.
2	Mandatory	- The offboarding request option is available only if the pre-requisites are met.
3	Mandatory	- The valid acceptance contracts must be displayed to the business end user and the business end user must be able to choose the beta digital euro contract and to confirm its closure. - The list of valid acceptance contract must be communicated through the existing process.
4	Mandatory	- After the business end user confirms the closure of the acceptance contract, the pilot PSP app must be able to send an offboarding request to the acquiring PSP. <b>Refer to Digital euro pilot – Frontend specifications – Acquiring PSP (section 5.1. – Business end user access management service).</b>
5	Conditional	- If the request is not valid, the process must be discontinued. And the reason for the rejection must be provided to the business end user. - If the request is validated, the pilot PSP app must confirm to the business end user. <ul style="list-style-type: none"> <li>- The acceptance contract closing date (<a href="#">depending on the legislation</a>).</li> <li>- The target date for the offboarding final completion (depending deadline for receiving refunds and claims).</li> </ul> <b>Refer to Digital euro pilot – Frontend specifications – Common Services (section 4. – Cross functional service).</b>
6	Mandatory	- The pilot PSP app must be able to manage the confirmation of the completion of the offboarding process. <b>Refer to Digital euro pilot – Frontend specifications – Common Services (section 4. – Cross functional service).</b>

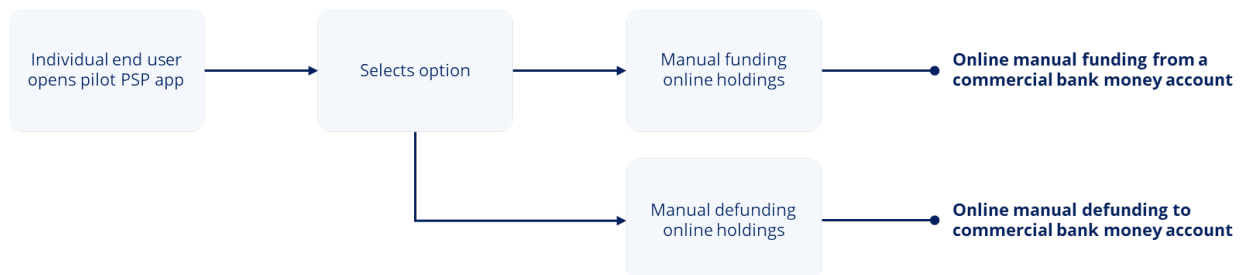
### 3.3. Liquidity Management Requirements

This section describes the functions provided to an end user to fund and defund their beta digital euro account. An individual end user shall be able to:

- Fund his/her beta digital euro account from a commercial bank money account
- Defund his/her beta digital euro account to a commercial bank money account

Funding/Defunding beta digital euro can be a manual process according to the pilot payment services in scope of the digital euro pilot.

- Online manual funding from Commercial Bank Money Account (same pilot PSP)
- Online manual defunding to Commercial Bank Money Account (same pilot PSP)



**Figure 16 Individual end user online manual funding and defunding**

### 3.3.1. Global pre-requisite

The pilot PSP app is already connected to the distributing PSP through a Strong Customer Authentication process specific to that pilot PSP.

### 3.3.2. Manual funding online holdings

The individual end user can fund the beta digital euro holdings from the commercial bank money account.

Pre-requisites

1. The distributing PSP services the end user’s beta digital euro account.

**E2E flow reference: LM-1.1 Online manual funding from non-digital euro payment account - same PSP**

#	Mandatory Optional Conditional	Business rules description
1	Conditional	- The request option is available only if the pre-requisites are met.
2	Optional	- From a user experience perspective, the distributing PSP can decide to display beta digital euro account balance and holding limits. Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 5.4. – Balance and holding limits service)</b>
3	Conditional	- If the individual end user didn’t link any commercial bank money account to his/her beta digital euro account, he/she must be able to enter it or select it (if this CBMA IBAN was already registerer in the end user’s app).  Note: The Commercial bank money account IBAN provided may be any IBAN, whether or not it corresponds to an account owned by the holder of the beta digital euro account.



#	Mandatory Optional Conditional	Business rules description
4	Optional	- Even if a commercial bank money account is already linked to the beta digital euro account, the individual end user should be able to enter another commercial bank money account (IBAN) or select a commercial bank money account (IBAN) (if this CBMA IBAN was already registered in the end user's app).
5	Conditional	- If the individual end user enters an IBAN, it must be consistent.
6	Mandatory	- The individual end user must be able to enter the amount to be funded.
7	Optional	- The individual end user should be able to enter a message intended for the owner of the targeted account to be informed about the defunding of the commercial bank money account.
8	Optional	- The individual end user should be able to enter a Transaction Reference (End to End Identification).
9	Mandatory	- A manual funding request is sent to the distributing PSP. Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 6.1. – Manual (de)funding initiation service)</b> .
10	Mandatory	- The end user must receive information regarding the result of the manual funding process.
11	Conditional	- In case of rejection, a message must be displayed with the reason for the rejection.

### 3.3.3. Manual defunding online holdings

An individual end user can defund the beta digital euro holdings from the commercial bank money account.

Pre-requisites

1. The distributing PSP services the end user's beta digital euro account.

**E2E flow reference: LM-2.1 Online manual defunding to commercial bank money payment account - same pilot PSP**

#	Mandatory Optional Conditional	Business rules description
1	Conditional	- The request option is available only if the pre-requisites are met.
2	Optional	Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 5.4. – Balance and holding limits service)</b> .
3	Conditional	- If the individual end user has linked a commercial bank money account to his/her beta digital euro account, the commercial bank money account is displayed and from a user experience perspective, the distributing PSP can decide to display commercial bank money account balance (provided that it is serviced by the same pilot PSP). Refer to <b>Digital euro pilot – Frontend specifications – Common Services (section 1.5. – Linked account settings service)</b> to retrieve the linked account



#	Mandatory Optional Conditional	Business rules description
		Refer to <b>Digital euro pilot – Frontend specifications – Common Services (section 1.6. – Commercial bank money account service)</b> to retrieve the balance.
4	Conditional	- If the individual end user didn't link any commercial bank money account to his/her beta digital euro account, he/she must be able to enter it or select it (if this Commercial bank money account was already registered in the end user's app). <b>Note:</b> The commercial bank money account IBAN provided may be any IBAN, whether or not it corresponds to an account owned by the holder of the beta digital euro account.
5	Optional	- Even if a commercial bank money account is already linked to the beta digital euro account, the individual end user should be able to enter another commercial bank money account (IBAN) or select a commercial bank money account (IBAN) (if this CBMA IBAN was already registered in the end user's app).
6	Conditional	- If the individual end user enters an IBAN, it must be consistent.
7	Mandatory	- The individual end user enters the amount to be defunded.
8	Optional	- The individual end user could be able to enter a message intended for the owner of the targeted account to be informed about the funding of the commercial bank money account.
9	Optional	- The individual end user could be able to enter a Transaction Reference (End to End Identification).
10	Mandatory	- A manual defunding request is sent to the distributing PSP. Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 6.1. – Manual (de)funding initiation service)</b> .
11	Mandatory	- The end user must receive information regarding the result of the manual funding process.
12	Conditional	- In case of rejection, a message must be displayed with the reason for the rejection.

### 3.4. Transaction management requirements

This section outlines the processes related to beta digital euro transactions involving a mobile application.

It covers the following transaction types:

- Peer-to-Peer (P2P) transactions
- Transactions at (Soft)POS

#### 3.4.1. Peer-to-Peer (P2P) transactions

P2P transactions cover payments between two individual end users (a payer and a payee) who use the pilot PSP app to conduct the payment. The payment is initiated by the payer or the payee according to the selected payment instrument. This section details the rules applied to P2P transactions.



### 3.4.1.1. Overview of P2P transactions

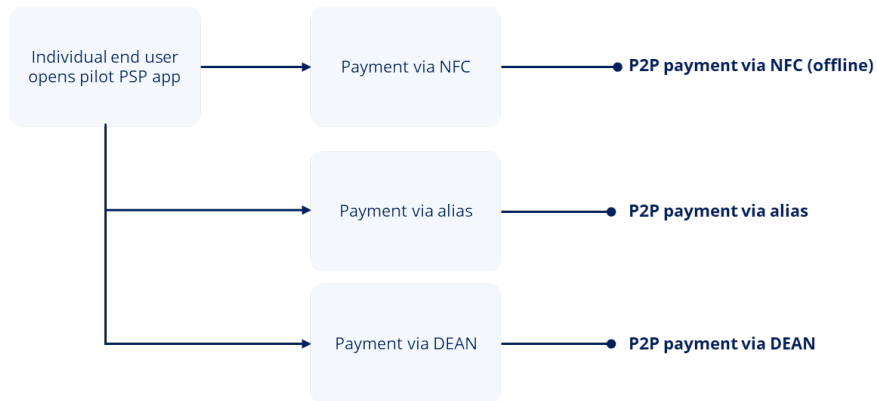


Figure 17 - Overview of P2P transactions

### 3.4.1.2. P2P transaction via alias

#### 3.4.1.2.1. Transaction via alias initiated by a payer

##### Pre-requisites

1. Both payer and payee must have a beta digital euro account.
2. Both payer and payee must be allowed by their pilot PSPs to pay via alias.
3. Payer knows the alias of the payee.
4. The end user authenticates successfully.

**E2E flow reference: TM3.5 P2P payment via alias - payer initiated.**



#	Mandatory Optional Conditional	Business rules description
1	Mandatory	<ul style="list-style-type: none"> <li>- The pilot PSP app must allow the end user acting as a payer to select a payment via alias.</li> <li>- The pilot PSP app must allow the end user acting as a payer to select an alias among the list of alias already used in a previous payment and to modify it if needed.</li> <li>- The pilot PSP app must allow the end user acting as a payer to select an alias from their contact list. This data is then imported to the corresponding data fields.</li> <li>- The pilot PSP app must allow the end user acting as a payer to enter manually an alias. An alias type must be selected (among the list of alias' allowed in beta digital euro context) and the alias value format must be consistent with the alias type.</li> </ul>
2	Mandatory	<ul style="list-style-type: none"> <li>- The pilot PSP app must be able allow the end user to enter the amount to be sent to the payee.</li> </ul>
3	Optional	<ul style="list-style-type: none"> <li>- The payer should be able to enter a message intended for the payee to be informed about the transaction.</li> </ul>
4	Optional	<ul style="list-style-type: none"> <li>- The payer should be able to enter a Transaction Reference (End-to-End Identification).</li> </ul>
5	Mandatory	<ul style="list-style-type: none"> <li>- The pilot PSP app must be able submit a alias validity check request to the payer PSP Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 7.1 – Payment initiation service)</b>.</li> </ul>
6	Mandatory	<ul style="list-style-type: none"> <li>- The pilot PSP app must allow the end user acting as a payer to confirm the transaction details.</li> <li>- The pilot PSP app must allow the end user acting as a payer to reject the transaction details.</li> </ul>
7	Conditional	<ul style="list-style-type: none"> <li>- If the transaction is confirmed, the payer PSP app must submit a payment request to the payer PSP Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 7.1. – Payment initiation service)</b>.</li> </ul>
8	Conditional	<ul style="list-style-type: none"> <li>- If the transaction is not confirmed, the process must be discontinued</li> </ul>
9	Mandatory	<ul style="list-style-type: none"> <li>- The pilot PSP app must display the final status of the payment.</li> </ul>

### 3.4.1.3. P2P transaction with DEAN

The payment with DEAN is an Account to Account (A2A) transfer initiated by the payer. The payer's PSP and the payee's PSP may be the same or not.

#### Pre-requisites

1. Both payer and payee must have a beta digital euro account.
2. The payer knows the DEAN of the payee.
3. The payer authenticates successfully.

**E2E flow reference: TM3.10 & TM3.11 P2P Account to Account payment with DEAN.**



#	Mandatory Optional Conditional	Business rules description
1	Mandatory	- The mobile app must allow the end user acting as a payer to select a payment with DEAN.
2	Mandatory	- The mobile app must allow the end user acting as a payer to select a DEAN among the list of DEAN already used in a previous payment and to modify it in needed.
3	Mandatory	- The mobile app must allow the end user acting as a payer to enter manually a DEAN. - An initial format check must be performed. The DEAN must: <ul style="list-style-type: none"> <li>- Contain 18 characters</li> <li>- Start with "EU"</li> <li>- Include 16 numeric characters</li> <li>- Indicate that the payee is an individual end user : the fifth character of the DEAN must be equal to "0".</li> </ul> - A full DEAN validity must be requested to the PSP. <b>Refer to <a href="#">Digital euro pilot – Frontend specifications – Common Services (section 1.4. – Beta digital euro account service)</a>.</b>
4	Mandatory	- If the DEAN is not valid, the payer must be informed and must be allowed to retry.
5	Optional	- If the DEAN is valid, the corresponding PSP ID (PSP of the payee) could be displayed.
6	Mandatory	- The mobile app must allow the payer to enter the amount of the transaction.
7	Optional	- The payer should be able to enter a message intended for the payee to be informed about the transaction.
8	Optional	- The payer should be able to enter a Transaction Reference (End to End Identification)
9	Mandatory	- The pilot PSP app must allow the end user acting as a payer to confirm the transaction details. - The pilot PSP app must allow the end user acting as a payer to reject the transaction details.
10	Conditional	- If the transaction is confirmed, the mobile app must be able to generate a payment request that is transmitted to the payer's PSP. <b>Refer to <a href="#">Digital euro pilot – Frontend specifications – Distributing PSP (section 7.1. – Payment initiation service)</a>.</b>
11	Conditional	- If the transaction is not confirmed, the process must be discontinued.
12	Mandatory	- The mobile app must be able to receive the final status of the payment request execution.
13	Mandatory	- The mobile app must display the final status of the payment.

### 3.4.2. Transactions at (Soft)POS

As part of the digital euro pilot, mobile applications play a pivotal role in enabling secure, user-friendly, and interoperable payment experiences. This chapter focuses exclusively on the mobile app component of the payment journey, detailing the mechanisms that allow end-users to initiate beta digital euro transactions using their smartphones.

The chapter covers the following key mobile payment modalities:



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EUROSYSTEM

- HCE NFC Payments (Host Card Emulation – Near Field Communication): A contactless payment method where the mobile device emulates a payment card, enabling tap-to-pay functionality at compatible (Soft)POS terminals.

It is important to note that this chapter addresses only the mobile application side of the transaction. The corresponding acceptance mechanisms on the POS side are described separately in **Digital euro pilot – Frontend specifications – Acceptance instruments**.

### 3.4.2.1. Scope of Applicability – Payment Terminal Types

This specification applies to payment terminal implementations used for beta digital euro proximity payments:

- **Software-Based Terminals (SoftPOS)**

Software-only solutions installed on commercial off-the-shelf (COTS) devices such as smartphones or tablets, enabling contactless payments without additional hardware.

In this specification, the term 'POS' refers to both hardware-based terminals and software-based terminals (SoftPOS).

### 3.4.2.2. NFC Payment transactions

#### 3.4.2.2.1.1. *Protocol for beta digital euro account payment*

The mobile payment application for beta digital euro transactions via NFC is designed to support the CPACE Kernel 2E protocol when interacting with POS terminals.

#### 3.4.2.2.1.2. *Distributing PSP Onboarding Precondition*

The distributing PSP has integrated the ECB SDK, which includes the HCE SDK, into its end user application, as well as the SDK backend, which includes the HCE SDK backend, into its backend environment.

[\(Placeholder for HCE SDK and HCE SDK backend ECB implementation guidelines\)](#).



### 3.4.2.2.1.3. NFC payment transaction

#### 3.4.2.2.1.3.1. Overview of NFC payment with a beta digital euro account

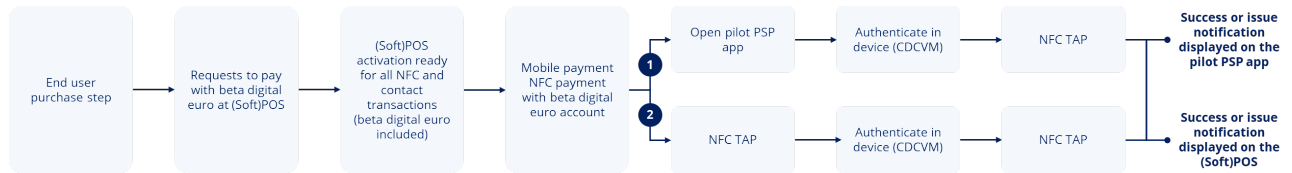


Figure 18 - Overview of NFC payment with a beta digital euro account

#### 3.4.2.2.1.3.2. Beta digital euro NFC transaction flow (via HCE)

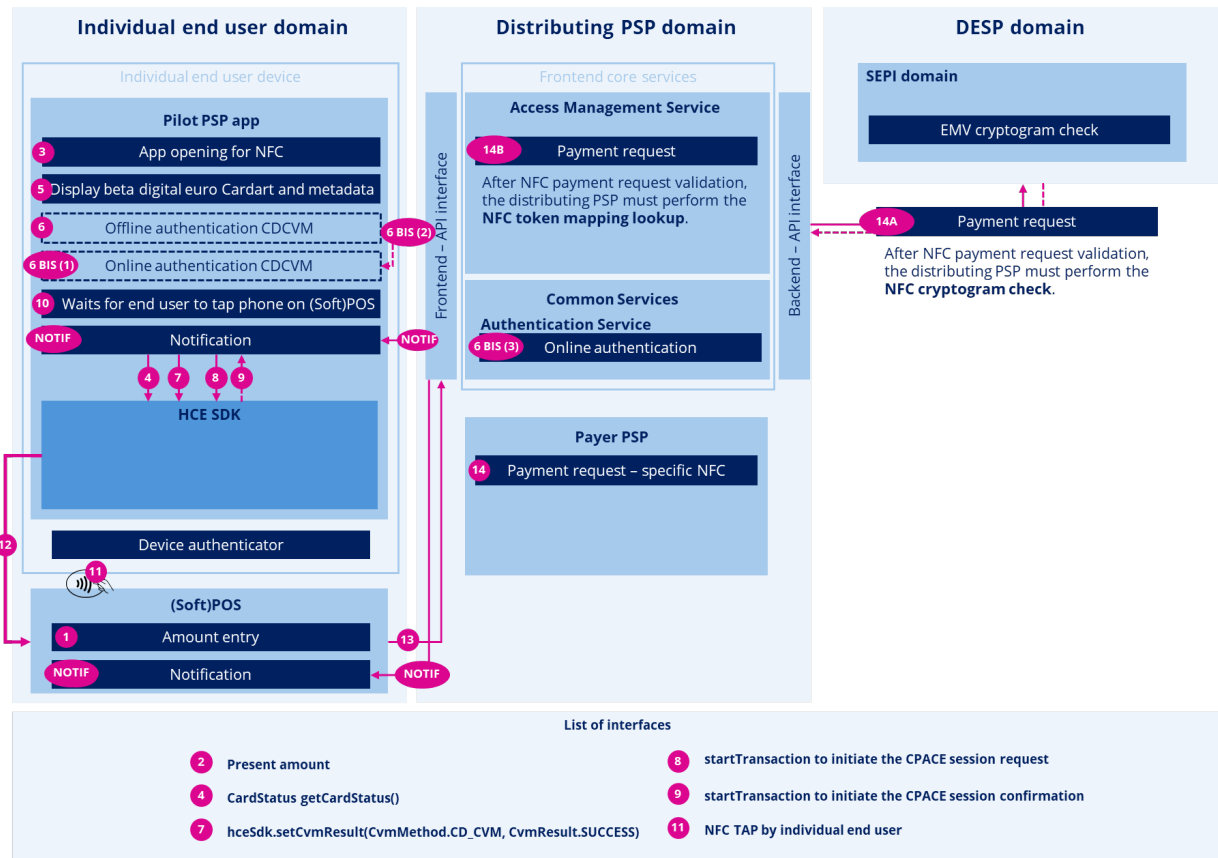
As the end-to-end process flows related to NFC services are not yet updated, sequence diagrams are introduced to enhance visualisation and understanding. These diagrams are temporary and will be removed from the implementation specifications once the corresponding end-to-end process flows are provided.

This diagram provides a detailed view of the NFC mobile payments process using a beta digital euro account.

**E2E flow reference : TM-1.6 Online contactless SoftPOS payment with mobile device - same pilot PSP**



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**Figure 19 P2B transaction with CPACE NFC at (Soft)POS – same pilot PSP**

**3.4.2.2.1.3.3. Prerequisites**

Before initiating an NFC transaction, the following conditions must be met:

- The end user is already enrolled in the NFC payment service with a beta digital euro account.
- The device has completed HCE session key provisioning (via enrollment or replenishment).
- The pilot PSP app supporting NFC payments must be registered in the device’s operating system NFC settings, either as the default payment application or as an available option.
- NFC must be enabled on the device.

**3.4.2.2.1.3.4. Transaction Process overview**

**User journey 1**

Beta digital euro NFC Transaction Flow (via HCE) – Open App / Authenticate / Tap

- **Customer opens its NFC payment app menu**



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EUROSYSTEM

The customer accesses the NFC payment menu either automatically (by double-clicking if the beta digital euro wallet in the pilot PSP app is set as the default in the NFC OS menu) or manually by selecting the NFC payment option within the pilot PSP app.

- **Customer authenticates**

The customer performs Strong Customer Authentication (SCA) using biometrics or passcode either on-device authentication or device-based remote authentication.

- **Customer performs NFC TAP on the POS terminal**

The customer initiates the payment by directly tapping their consumer device on the POS terminal.

- **POS and HCE SDK interaction**

Upon TAP, the POS communicates with the HCE SDK via standard APDU (Application Protocol Data Unit) commands:

- SELECT PPSE
- SELECT AID Digital Euro
- GET PROCESSING OPTION
- READ RECORDS

Then, the POS requests an EMV cryptogram via the APDU command First Generate AC, which the HCE SDK generates using a previous replenishment key.

- **Sending the payment request**

The POS sends the payment request to the acquiring PSP, which forwards it to DESP.

- **Routing to the distributing PSP**

The DESP identifies the distributing PSP using the distributing PSP ID provided by the HCE SDK during the SELECT AID beta digital euro APDU and routes the request accordingly.

- **Transaction detokenisation**

The distributing PSP performs detokenisation by retrieving the DEAN and the PSP App ID from the token.

**Reminder:** During the enrolment process, the distributor receives the token generated by the Token Service Provider (SEPI) via the HCE SDK backend. It records the association between the token, the DEAN, and the PSP App ID.

- **EMV cryptogram check**

The distributing PSP requests SEPI to check the EMV cryptogram.

- **Checks and authorisation**

The distributing PSP performs:

- Protocol checks
- Internal fraud control
- Financial validations
- Optionally, a reverse waterfall mechanism for fund management

- **Settlement and notification**

The distributing PSP initiates a settlement request to the DESP, which:

- Debits the individual end user's beta digital euro account
- Credits the payee's beta digital euro account

- **Result notifications**

DESP sends a notification both to the acquiring and distributing PSP which then sends a notification respectively to the POS and the pilot PSP app. But the distributing PSP can't alert the pilot PSP app until settlement is not confirmed.

## User journey 2

Digital Euro NFC Transaction Flow (via HCE) – First TAP / Authenticate / Second TAP

- **Conditions for applicability:**
  - The pilot PSP app must be configured as the default wallet in the NFC operating system settings.
  - With a POS capable of directly sending an APDU command 'SELECT PPSE', this User journey 2 does not work when the customer pays using their pilot PSP app on a SoftPOS, which must initiate a connection through a tag of type 'isodep' (for Android) or 'cardsession' (for iOS) emulated by the pilot PSP app.
- **First TAP – Initial POS to prompt the customer authentication**

The customer initiates the payment by performing a first NFC TAP on the POS terminal.

The POS communicates with the smartphone's NFC component using standard APDU commands:

- SELECT PPSE



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EUROSYSTEM

Upon receiving a 'SELECT PPSE' command, the smartphone's NFC component launches the pilot PSP app (configured as the default wallet in the NFC OS settings) to prompt the end user to authenticate on the device, either through 'device-based remote authentication' or 'on-device authentication'.

- **Customer authentication on the device**

The customer performs a Strong Customer Authentication (SCA) using either biometrics or passcode (« device-based remote authentication » or « on-device authentication »)

- **Second TAP – Final POS and HCE SDK interaction**

Upon the second TAP, the POS communicates with the HCE SDK via standard APDU (Application Protocol Data Unit) commands:

- SELECT PPSE
- SELECT AID beta digital euro
  - GET PROCESSING OPTION
  - READ RECORDS

Then, the POS requests an EMV cryptogram via the APDU command First Generate AC, which the HCE SDK generates using a previous replenishment key.

- **Validation and continuation of payment**

Once authentication is successful, the pilot PSP app confirms the transaction and allows the cryptogram to be used for payment authorisation.

- **Sending the payment request**

The POS sends the payment request to the acquiring PSP, which forwards it to DESP.

- **Routing to the distributing PSP**

The DESP scheme identifies the distributing PSP using the distributing PSP ID provided by the HCE SDK during the SELECT AID Digital Euro APDU and routes the request accordingly.

- **Transaction detokenisation**

The distributing PSP performs detokenisation by retrieving the DEAN and the PSP App ID from the token.

- **EMV cryptogram check**

The distributing PSP requests SEPI to check the EMV cryptogram.



EUROPEAN CENTRAL BANK

EUROSYSTEM

- **Checks and authorisation**

The distributing PSP performs:

- Protocol checks
- Internal fraud control
- Financial validations
- Optionally, a reverse waterfall mechanism for fund management

- **Settlement and notification**

The distributing PSP initiates a settlement request to the DESP, which:

- Debits the individual end user's beta digital euro account
- Credits the payee's beta digital euro account

- **Result notifications**

DESP sends a notification both to the acquiring and distributing PSP which then sends a notification respectively to the POS and the pilot PSP app. The distributing PSP cannot notify the pilot PSP app until the settlement has been confirmed.

#### 3.4.2.2.1.3.5. *Business rules*

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	To perform an NFC payment transaction using their beta digital euro account, the end user must be enrolled in the service, have the service activated, and have at least one remaining replenishment key.
2	Mandatory	NFC must be enabled on the device.
3	Conditional	In the case of a beta digital euro NFC transaction flow (via HCE) involving a First TAP / Authentication / Second TAP sequence, the NFC settings must have the beta digital euro payment application set as the default.
4	Mandatory	The pilot PSP app must not enforce any restrictions on transaction processing, whether related to velocity, geolocation, connectivity, or any other limitations.
5	Conditional	To orchestrate an NFC transaction with a beta digital euro account, the pilot PSP app must integrate the SDK provided by the ECB (DESP SEPI) and fully comply with the associated implementation guidelines. <a href="#">(Placeholder for HCE SDK and HCE SDK backend ECB implementation guidelines)</a>
6	Mandatory	The pilot PSP app must allow the individual end user to select the beta digital euro account to be used by default for NFC payment transactions with the HCE SDK.
7	Conditional	In case of offline authentication, the distributing PSP must be able to retrieve from the pilot PSP app the log proving that authentication was performed by the consumer device.
8	Conditional	In case of online authentication, the pilot PSP app must perform an authentication in accordance with the distributing PSP's specifications, as defined in <b>Digital euro</b>



#	Mandatory Optional Conditional	Business rules description
		<b>pilot – Frontend specifications – Common Services (section 4.1 – Authentication).</b>
9	Conditional	If the transaction fails, the pilot PSP app must display a clear message indicating the reason for the rejection, based on the core reason provided by the distributing PSP.
10	Mandatory	When the NFC Payment menu is launched—whether automatically, manually, or triggered by a first TAP—the PSP App must display a clear screen indicating that it is awaiting end user authentication before proceeding with the NFC TAP (whether it is the first or second one).
11	Mandatory	When the end user authentication has been performed, the pilot PSP app must display a clear message to confirm that the device is ready to perform the NFC transaction.
12	Mandatory	Following end user authentication and the NFC TAP, the pilot PSP app must display a clear and informative message to provide visual feedback during the transaction—for example, “Transaction is in progress.”
13	Mandatory	After performing a TAP NFC, the transaction is processed between the HCE SDK and the POS according to the CPACE protocol.
14	Mandatory	Upon receiving a result notification from the distributing PSP app’s backend, the pilot PSP app must clearly display a message confirming whether the transaction was successful or failed.

### 3.4.3. Balance enquiry and transactions history

The pilot PSP app shall provide functionalities whereby the end user shall be able to check their current online holdings and the history of transactions.

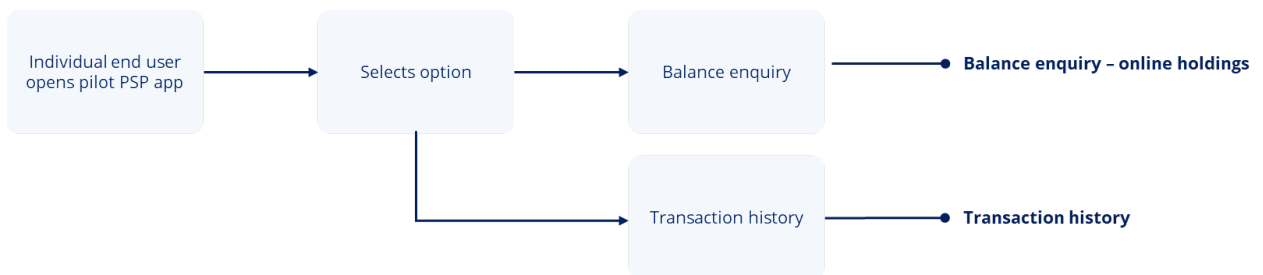


Figure 20 Overview of balance enquiry and transactions history

#### 3.4.3.1. Global pre-requisite

The pilot PSP app is already connected to the distributing PSP through a Strong Customer Authentication process specific to that pilot PSP.



### 3.4.3.2. Balance enquiry (online holdings)

#### Pre-requisites

1. The distributing PSP services the end user's beta digital euro account.

#### E2E flow reference:TM9.1 Balance enquiry mobile app – online balance

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	<ul style="list-style-type: none"> <li>- The end user must be able to select the corresponding option if the pre-requisites are met.</li> <li>- The pilot PSP must also be able to display the balance after end user authentication with any prior request.</li> </ul>
2	Mandatory	<ul style="list-style-type: none"> <li>- A balance enquiry request is sent to the distributing PSP that must validate it and retrieve the corresponding balance.</li> </ul> <b>Refer to Digital euro pilot – Frontend specifications – Distributing PSP (section 5.4. – Balance and holding limits service).</b>
3	Mandatory	<ul style="list-style-type: none"> <li>- The beta digital euro balance provided by the distributing PSP must be shown to the end user.</li> </ul>
4	Optional	<ul style="list-style-type: none"> <li>- To provide a clearer and more intuitive experience, the mobile app should display the available balance on one line and the upcoming balance on another.</li> </ul>
5	Conditional	<ul style="list-style-type: none"> <li>- If the online holdings balance is null, the balance is still displayed.</li> </ul>
6	Conditional	<ul style="list-style-type: none"> <li>- If the distributing PSP receives an invalid request or is not able to retrieve the balance, the end user must be informed.</li> </ul>

### 3.4.3.3. Transactions history

#### Pre-requisites

1. The distributing PSP services the end user's beta digital euro account.

#### E2E flow reference:TM9.3 Transaction history mobile app

#	Mandatory Optional Conditional	Business rules description
1	Mandatory	<ul style="list-style-type: none"> <li>- The end user must be able to select the corresponding option if the pre-requisites are met.</li> </ul>
2	Optional	<ul style="list-style-type: none"> <li>- The end user must be able to define selection criteria: <ul style="list-style-type: none"> <li>- Range of dates:</li> <li>- Type of transaction,</li> <li>- Transaction reference</li> </ul> </li> </ul>
3	Conditional	<ul style="list-style-type: none"> <li>- If the end user enters a range of dates, the following rules must be applied: <ul style="list-style-type: none"> <li>- If both starting date and end date are entered, they must be consistent: end-date must be greater than starting date.</li> <li>- The starting date and end-date must not be greater than the current date.</li> </ul> </li> <li>- It must be possible to enter only a starting date or only an end date.</li> </ul> (The pilot PSP has the ability to determine how much history is included)



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#	Mandatory Optional Conditional	Business rules description
4	Conditional	<ul style="list-style-type: none"><li>- If the end user selects a type of transaction, the only following types must be chosen:<ul style="list-style-type: none"><li>- Purchase</li><li>- Refund</li><li>- Account to Account</li></ul></li><li>- It must be possible to select multiple types of transactions.</li><li>- Selecting all the criteria means not making a choice</li></ul>
5	Conditional	<ul style="list-style-type: none"><li>- If the end user enters a transaction reference, entering other data must not be permitted.</li></ul>
6	Mandatory	<ul style="list-style-type: none"><li>- The end user must be requested to confirm the transaction history request</li></ul>
7	Conditional	<ul style="list-style-type: none"><li>- If the end user does not confirm the transaction history request, the process is discontinued, and the end user is informed.</li></ul>
8	Conditional	<ul style="list-style-type: none"><li>- If the end user confirms the transaction history request, a transaction history request is sent to the distributing PSP that must validate it and retrieve the corresponding list of transactions.</li></ul> <p>Refer to <b>Digital euro pilot – Frontend specifications – Distributing PSP (section 7.2. – Transaction history service)</b>.</p>
9	Conditional	<ul style="list-style-type: none"><li>- If the distributing PSP receives an invalid request or is not able to retrieve the transactions history according to the criteria, the end user must be informed.</li></ul>
10	Mandatory	<ul style="list-style-type: none"><li>- The end user must be able to scroll through the list of displayed transactions.</li></ul>