



# **Reconciliation and Settlement of Card Based Transactions via SCT Inst**

## **A White Paper Introduction to the Topic**

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## 1 Introduction

### Card Clearing, Current Market

A card based transaction provides authorisation to debit an account of the cardholder and to credit an account of the card acceptor, which is e.g. a merchant or an ATM provider, with the respective transaction amount. Up to now, transfer of the transaction amount from an account of the cardholder to an account of the card acceptor is a two-step process for payments with cards, divided in clearing and settlement.

Clearing is performed in order to transmit the transaction data needed to validate the transaction between the card acceptor, the cardholder and their respective institutions within the card payment scheme, the acquirer and the card issuer. Settlement is performed between the banks of the card issuer and the acquirer in order to finally debit the cardholder's bank account and to credit the card acceptor's account at the acquiring bank<sup>1</sup>. Normally it takes place between zero and two days after the clearing.

### Synergies with new SEPA Instant Payment Infrastructure

The European banking industry has implemented the European Payments Council (EPC) managed "SEPA Credit Transfer Instant (SCT Inst)" scheme to support a pan-European instant payment. Within this scheme, funds are made available to the creditor within seconds. The financial risks for these transactions in the interbank sphere are managed by the settlement system between the related debtor and creditor banks.

It is now analysed within the European banking industry whether the new payment instruments will also be used for the reconciliation and settlement of card transactions by extending the processes and formats used for SCT Inst to the requirements of settling single card transactions directly through the infrastructure by changing the today's pull mechanism between the acquirers of card transactions and the issuers of cards.

The reasons for such a solution are manifold. The main reason is, that this leads to a full Straight-Through-Processing (STP) for settling card transactions by using the same processes and formats between different banks and between banks and Clearing and Settlement Mechanisms (CSM), comparable to what the SCC Framework of Berlin Group had delivered in [BG SCC] before. This STP processing is expected to reduce the costs of the clearing processing significantly, if only one SEPA format for card settlement is to be supported within Europe in a midterm perspective, irrespective of local or cross-border interfaces.

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<sup>1</sup> Please note that issuers and acquirers within card schemes are not necessarily banks. For the framework the role of participation to a card scheme and holding contracts with the card holder on one side and the card acceptors on the other side is separated from the banking role as participants to EPC payment schemes.

In addition, the instantaneous character of the payment is potentially providing funds to card acceptors instantly and is reducing settlement risks between issuer and acquirer heavily, which might be of specific interest in case of cross-border transactions. Another potential advantage would be to harmonise processing of card transactions with the processing via upcoming API access schemes and extended API payment functionalities as they are defined in the openFinance API Framework of the Berlin Group.

### **SEPA card transactions through SCT Inst**

For re-using the SCT Inst infrastructure for reconciliation and settlement of card based transactions, some specifics have to be considered within such a solution. This solution is referred to in the following as "SCT Inst for cards":

- Match the roles of actors within card schemes to the roles of actors within the SCT Inst scheme.
- Define the information to be transported between issuer and acquirer to guarantee well defined account statements resulting from these SCT Inst transactions and for matching the resulting SCT Inst with the card transaction in the card acceptor's system. The latter is referred to as reconciliation in the following.
- Consider reversals of card transactions to be covered due to e.g. time outs in the card acceptor system or other operational problems.
- Consider merchant refunds/charge backs of card based transactions.

### **Aim of this document**

The aim of this document is to progress further thinking in the Berlin Group work on meeting the vision of European regulators regarding the usage of SCT Inst as the new normal for mass payments in a transparent way towards the European payment industry.

To support this, the document at hand is discussing these above items within different technical scenarios. This document then offers to banks and processors technical models detailed enough to be used for studies on potential implementation efforts and potential synergies with related standardisation and implementation projects.

The purpose of the document is **not** to deliver a technical standard or a detailed implementation feasibility analysis on its own.

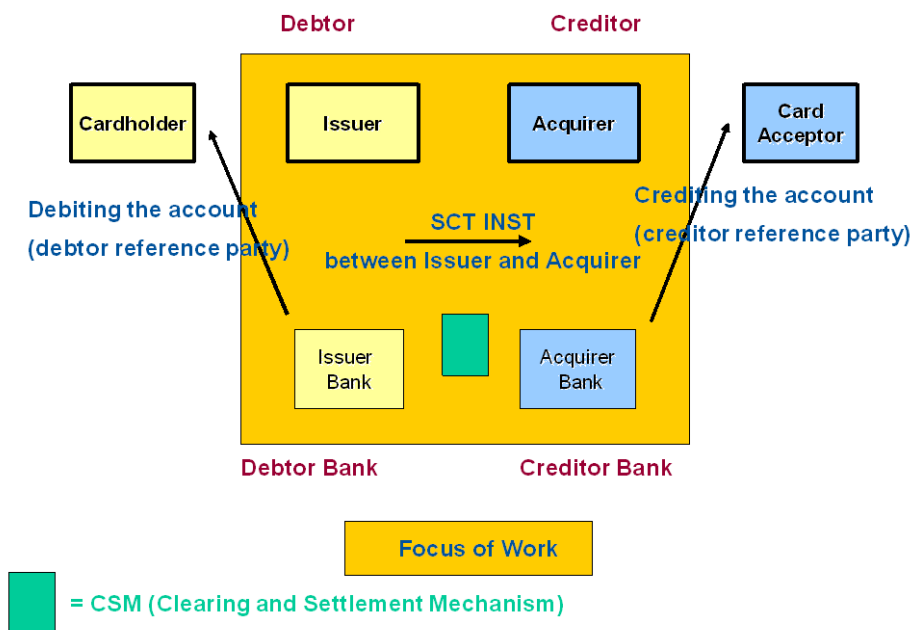
## 2 SEPA-Model for Settling Card Transactions

In the following, a model for SCT Inst for Cards is described. First, the actors and roles for a settlement on transaction base are defined.

The card transaction settlement consists firstly of moving funds between an issuer of cards and an acquirer acting on behalf of card acceptors: payment guarantees and contracts are defined between these two parties within a card scheme. The relations between issuer and cardholder and between card acceptor and acquirer are defined within their own spheres, and not relevant for the settling of card transactions at an inter-bank-level.

### SEPA 4-Corner Model

The general model for settling a card transaction between card acceptor and cardholder via acquirer and issuer by matching it to the EPC payment scheme models of debtor, debtor bank, creditor and creditor bank as identified by the Berlin Group is the following:



**Figure 1: Model for SCT Inst for Cards**

**Note:** Exactly this model has been applied by the SEPA Card Clearing Framework (SCC) of Berlin Group, which is a pull mechanism for card clearing based on the SEPA payment infrastructure.

**Note:** This document is focusing on the interbank standard. This standard should work independently from processing models, i.e. with a central processor or also in a bilateral mode.

## Nature of the Payment

As mentioned above, the focus of SCT Inst will be on the crediting from issuer to acquirer. Cardholders and card acceptors still are reference parties mentioned in the transactions. The ultimate booking between cardholder and issuer and between acquirer and card acceptor is within their own sphere defined by own contracts and procedures and is not in scope of the work on a general SCT Inst for cards. Still, the notion of reference parties might have an impact on the legal assessment of such transactions as Person to Business payments versus Bank to Bank payments.

**Note:** The assessment of SCT Inst for cards as a direct funds transfer from cardholder to card acceptor as debtor and creditor would lead to a different data modelling. In this case, e.g. the name of the cardholder as debtor would be delivered via the SCT Inst to the card acceptor automatically.

**Note:** The Berlin Group SEPA Card Clearing Framework (SCC) was designed already as a clearing mechanism using batch processing via SEPA Clearing and Settlement Mechanisms (CSM). Settlement optimisations like netting would be provided by the CSM like for other SEPA payment instruments. For that reason, operative settlement functionalities are not addressed by SCC. The same would apply for SCT Inst for cards. Any CSM functionalities offered within SCT Inst could also be offered to SCT Inst for cards and are not addressed by this document.



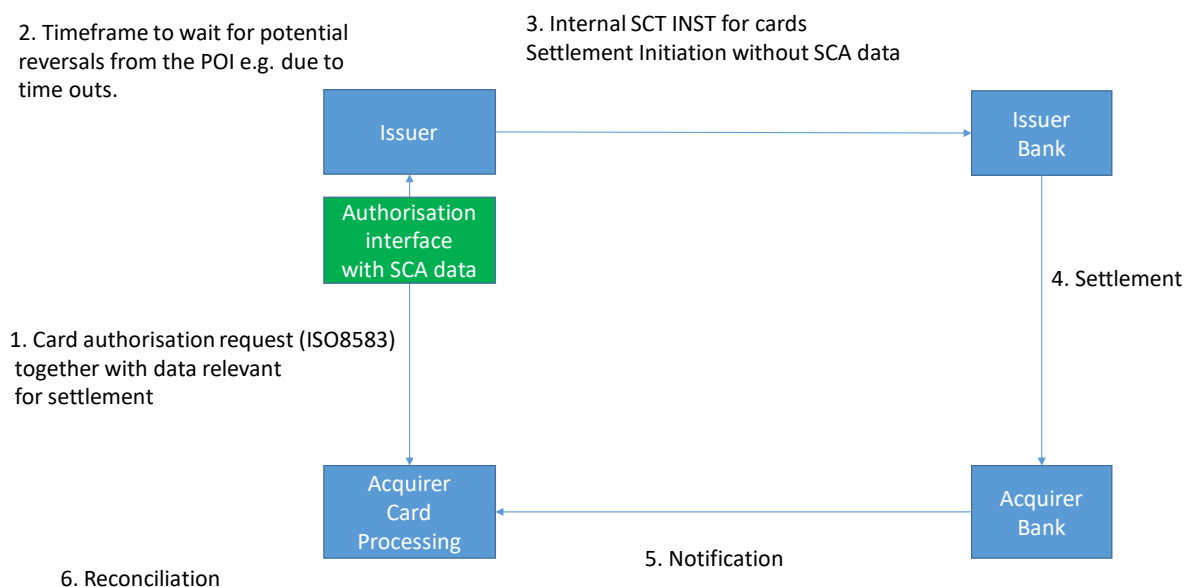
### 3 Data Flow for SCT Inst for Cards

There are three potential models to be discussed in this document for the initiation of SCT Inst for cards:

- Settlement integrated in authorisation scenario, **single message** system: In the first scenario, the acquirer is addressing the issuer with card authorisation data enhanced by data relevant for settlement. The payment will then be initiated by the Issuer after a successful authorisation, potentially after a short period waiting for reversals.
- Settlement integrated in authorisation scenario, **dual message** system: In the second scenario, the acquirer is addressing the issuer with card authorisation data enhanced by data relevant for settlement as in the first scenario. The acquirer is then informed about a successful authorisation. In addition, the acquirer then needs to confirm the positive result of the authorisation process at the POI to the issuer.
- Settlement decoupled from authorisation scenario (similar in process flow, but separation of infrastructure and standards to be used): In the third scenario, the Acquirer is performing an authorisation process with the issuer as today and requests the initiation of the SCT Inst towards the Issuer payment frontend **after** a successful completion of the authorisation process at the POI.

#### 3.1 Variant: Settlement integrated in Authorisation, single authorisation message

The following picture provides the transaction flow, where the green box is the external interface which might be impacted by the SCT Inst for cards model.



### Step 1: Authorisation Request

The acquirer is addressing an authorisation request with settlement related data to the issuer. The issuer is performing SCA/risk analysis and responding to the acquirer whether the transaction is authorised. The acquirer will inform the card acceptor on the authorisation result.

### Step 2: Time Delay

The POI, specifically in a POS environment of merchants, might generate reversals e.g. in a time out situation for the authorisation response. The reversal might need time to be evident even on acquirer processing systems. For this reason, a certain time frame for waiting for potential reversals to be accepted should be introduced in this step, e.g. 5 minutes.

### Step 3: SCT Inst for cards initiation

After a positive authorisation and timeframe reached (cp. Step 2), the issuing system is initiating an SCT Inst for cards settlement within the internal systems.

### Step 4: SCT Inst for cards inter-bank

The SCT Inst for cards is processed in the inter-bank sphere.

### Step 5: Notification of the acquirer

The acquirer bank is notifying the acquirer about incoming funds.

### Step 6: Reconciliation within the acquirer

These incoming funds are then reconciled within the acquirer with the positive authorisations performed.

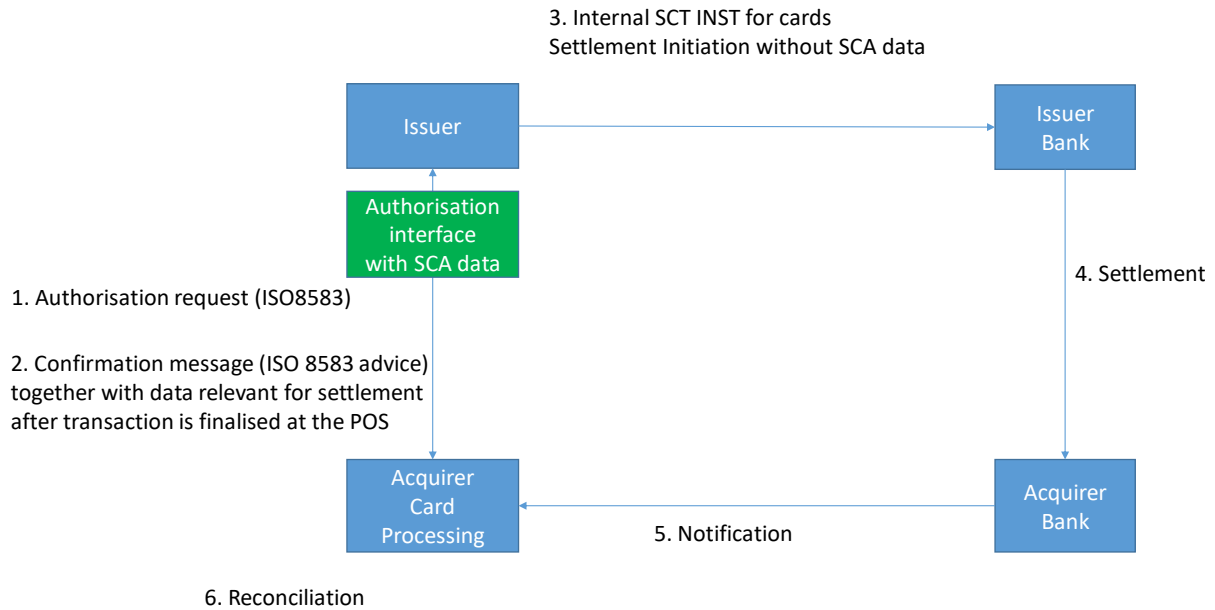
## Evaluation

This technical model comes with challenges,

- since settlements might need to be revoked for technical reversals arriving too late at the authorisation interface, which still happens often due to terminal network issues,
- since customers might see such erroneous bookings early in their banking apps,
- since more complex transaction types like deferred payments or pre-authorised transactions would have to be processed differently in the authorisation system: for both transaction types advice messages would be necessary to start the related settlement processes, and
- since authorisation systems would need to implement payment initiation routines and related investments would need to be made.

### 3.2 Variant: Settlement integrated in Authorisation, dual authorisation message

The following picture provides the transaction flow, where the green box is the external interface which might be impacted by the SCT Inst for cards model.



#### Step 1: Authorisation Request

The acquirer is addressing authorisation data to the issuer exactly as today. The issuer is performing SCA/risk analysis and responding to the acquirer whether the transaction is authorised. The acquirer will inform the card acceptor on the authorisation result.

#### Step 2: Confirmation message

The acquirer is confirming in a second (advice) message towards the issuer that the transaction result has been successfully communicated at the POI to the card acceptor and the Cardholder. This transaction also contains settlement related data.

**Note:** For offline transactions, only advice messages about the successful transaction would be sent. In case of deferred payments or pre-authorisations this advice message would only be sent when the actual settlement amount has been fixed.

#### Step 3: SCT Inst for cards initiation

After a confirmation of the positive authorisation, the issuing system is initiating an SCT Inst for cards settlement within the internal systems.

#### Step 4: SCT Inst for cards inter-bank

The SCT Inst for cards is processed in the inter-bank sphere.

#### Step 5: Notification of the Acquirer

The acquirer bank is notifying the acquirer about incoming funds.

#### Step 6: Reconciliation within the Acquirer

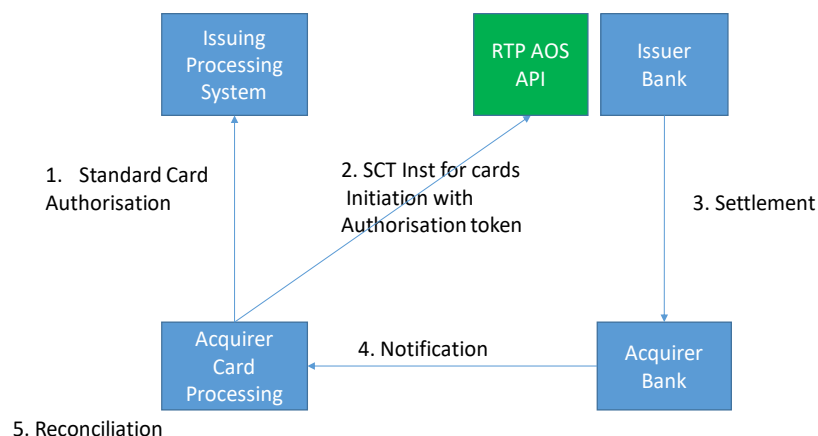
These incoming funds are then reconciled within the acquirer with the positive authorisations performed.

#### Evaluation:

This model would work seamless in operations but would need potentially high investments due to the strong process change relative to today's card processing with the authorisation system of the issuer being involved in settlement and reconciliation.

### 3.3 Variant: Settlement decoupled from Authorisation, single transaction initiation

The following picture provides the transaction flow.



**Remark:** The green box here stands for an API for payment initiation. From a technical XS2A API perspective, this API would follow a delegated SCA approach. The delegation of SCA from the Issuing bank perspective is to the card scheme. This payment initiation could also be seen as an Additional Optional Service to upcoming Request to pay (RTP) Schemes – cardholder

authorisation does not need any more to be processed, and in this case the Issuer Bank would be the receiver of the request to pay with the cardholder as the ultimate debtor as described above. For this reason, the above API is denoted as RTP AOS API.

#### Step 1

The issuer is authorising the card transactions as today. The acquirer receives an "API authorisation token" by the Issuer in case of an online authorised card transaction.

#### Step 2

The Acquirer is starting the settlement initiation towards the Issuer Bank with the authorisation token included. The debtor account is either identified via a pre-agreed debtor account or indirectly via the card PAN. In the latter case, the issuer needs to convert the PAN to the related IBAN.

In case of an offline authorised transaction, the EMV card cryptogram needs to be used as an authorisation token. Alternatively, the issuing processing system is providing authorisation tokens also for offline transactions previously sent via advice messages to the issuing processing system.

**Note:** In addition the acquirer might need to add information about the card transaction for later dispute management, (e.g. about SCA measures, acceptance channel, merchant category code) within the payment initiation API as a separate container, not to be used in the interbank SCT Inst message. The reason is that banks' dispute management systems are based on clearing data today as it is used e.g. in SCC.

#### Step 3:

The SCT Inst for cards is processed in the inter-bank sphere.

#### Step 4: Notification of the acquirer

The acquirer bank is notifying the acquirer about incoming funds.

#### Step 5: Reconciliation within the acquirer

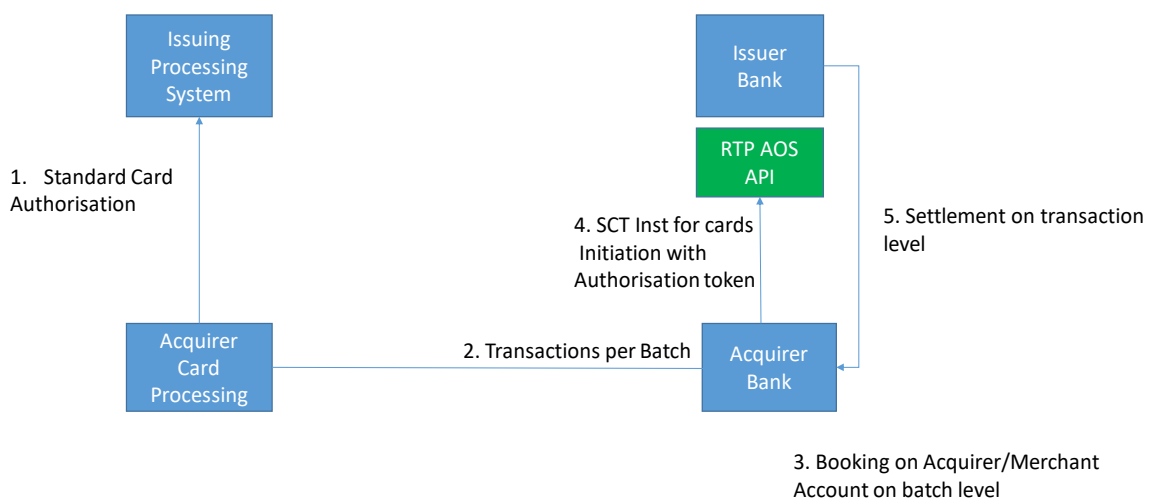
These incoming funds are then reconciled within the acquirer with the positive authorisations performed.

### Evaluation

This model would work seamless in operations. The advantage of this model compared to the model in Section 3.2 is that the issuing authorisation system does not need to be adapted strongly. The investments of establishing the new settlement procedure and the operative costs are located directly with the institutions involved into the reconciliation and settlement process, i.e. it is implemented fully within today's clearing infrastructure.

### 3.4 Variant: Settlement decoupled from Authorisation, initiation via batch

The following picture provides an adaption of the variant defined in Section 3.3, where the initiation is done from the acquirer to the acquirer bank in a batch. This batch is booked to the merchant account as today. The acquirer bank then retrieves the funds from the issuers by collecting the single transactions via the RTP AOS (either as API or via CSM mechanisms) as defined above:



#### Step 1 Authorisation

The issuer is authorising the card transactions as today.

#### Step 2 Batch submission

The acquirer is submitting successfully finalised transactions as batch to the acquirer bank. The debtor account is either identified via an access token provided by the authorisation system or indirectly via the card PAN. In the latter case, the issuer needs to convert the PAN to the related IBAN.

In case of an offline authorised transaction, the EMV card cryptogram needs to be used as an authorisation proof. Alternatively, the issuing processing system is providing authorisation tokens also for offline transactions previously sent via advice messages to the issuing processing system.

**Note:** In addition the acquirer might need to add information about the card transaction for later dispute management, (e.g. about SCA measures, acceptance channel, merchant category

code). The batch format needs to support this additional information. The reason is that banks' dispute management systems might be based on clearing data today as it is used e.g. in SCC.

#### Step 3: Batch booking to the creditor

The acquirer bank is booking the batch on the related creditor account (acquirer account or merchant account).

#### Step 4: Requesting the settlement to the issuer

The acquirer bank is requesting the issuers to settle the single transactions by using the RTP AOS API of the issuer. The related payment requests also contain card transactional data, e.g. for dispute management, cp. Step 2.

#### Step 5: Issuer settles

The SCT Inst for cards is processed in the inter-bank sphere.

### Evaluation

This model would work seamless in operations as the similar model above. As above, the advantage of this model compared to the model in Section 3.2 is that the issuing authorisation system does not need to be adapted strongly. The investments of establishing the new settlement procedure and the operative costs are located directly with the institutions involved into the reconciliation and settlement process, i.e. it is implemented fully within today's clearing infrastructure.

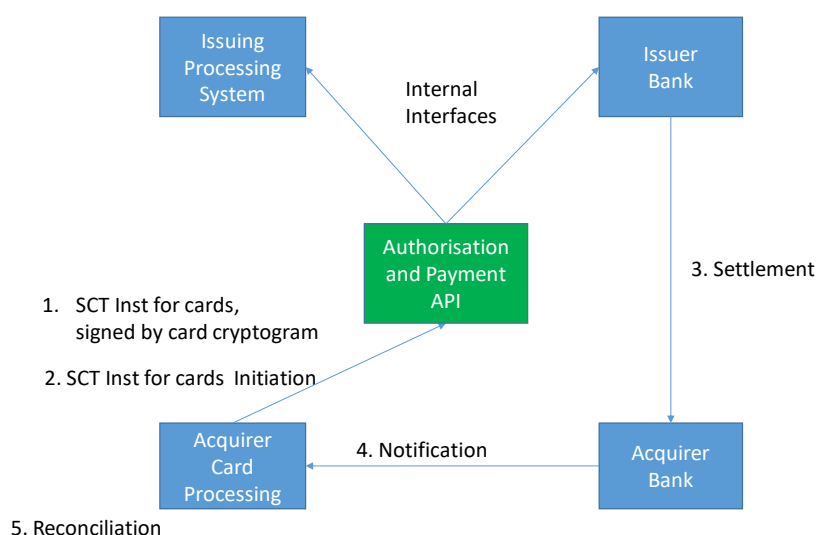
The advantage vs. the variant defined in Section 3.3 is that the acquiring bank could use the same booking logic towards merchants as today. A disadvantage of this model would be the potential PCI DSS consequences for the acquirer bank when not using tokenized PANs/access tokens.

Since both models are quite similar, it could also be a choice of the acquirer whether to use either variant.

### 3.5 Implementation of the Authorisation Interface as an API

The authorisation interfaces mentioned above are based on ISO8583 messages as widely used in the card business today. New API technologies and upcoming standards would also allow to implement these interfaces as an API Service, in technical analogy to PSD2 XS2A accounts. In the latter case, this variant is similar to an **Embedded SCA processing** model resp. a signed payment request model, where authorisation relevant SCA data is transported through the API to the issuer to ensure correct SCA processing at the POI.

If an API-like technical model is chosen later on for the authorisation interface, then the second variant coincides with the third variant from the process flow. It results in the following architecture:



## Evaluation

This model is a further technical development of the model described in Section 3.3. The potential advantage of this model would depend on potential synergies with the APIs as they are addressed in the SEPA API Access Scheme of the ERPB and are developed in the openFinance API framework. It would enable for cards the same processing as for potential upcoming API access schemes, where SCA is provided via online banking authentication methods. Thus, such a model might be advantageous in cases where issuers would like to position their banking services within card schemes as well as account based API access schemes. Anyhow it must be noted that the openFinance API standardisation programme of Berlin Group is still work in progress. Especially the scope of the openFinance API specifications [BG oFA WP] still needs an extension to card related SCA measures.

## 3.6 Overview data modelling

To support the settlement and reconciliation within SCT Inst for cards, the following data modelling is proposed. The data usage is compared to the ISO20022 based modelling of the SEPA Cards Clearing Framework (SCC) as published by the Berlin Group and then transposed to the ISO20022 model of SCT inst. Please note that this is a first overview for a better understanding and needs further refinement if standardised on technical level.

Please note, that more data than transported via the SCT Inst for card mechanism on the card based transaction needs to be stored in the acquiring and issuing system e.g. for dispute processes. This data includes e.g. acceptance channels, merchant category code or SCA



related information. This data is not needed to be transported in the settlement transaction because it is known on both sides. This might still have an impact on a potential API design for the initiation of the SCT Inst payment, cp. Section 3.3, such that the issuing bank has dispute related information directly in the core systems. For this reason, it is still referred in the below table, but marked as "not relevant inter-bank" for the actual SCT Inst for cards inter-bank transaction.

<b>Card transaction data element (reference to ISO8583 where applicable)</b>	<b>SCC usage</b>	<b>proposed SCT Inst for cards usage</b>
Reference to a card scheme	card container	Could be transported implicitly by using it e.g. as a scheme name for identities etc. Usage on group header level would be preferred since this is important information about potential underlying card scheme rules e.g. for dispute processes.
PAN, BMP2	card container	Not relevant inter-bank, but could be transported as maskedPAN in ultimate Debtor ID to show the used card to cardholder in account statements.
Transaction amount, BMP4	instructed amount	<p>instructed amount in case of integrated interchange fee processing.</p> <p>If this transaction is in foreign currency, this information should be transported in the remittance information field since this needs to be transported to the cardholder.</p> <p>Implies closed user groups for CSMs since this is a "white field" in SCT Inst. CSMs support closed user groups.</p>
Reconciliation amount, BMP5	interbank settlement amount	<p>interbank settlement amount</p> <p>If interbank fees are not processed within the clearing/settlement of the transaction, then this is the transaction amount (potentially translated to Euro if accepted in foreign currency)</p>
Conversion rates	card container	A clear model for currency conversion needs to be developed first.

Card transaction data element (reference to ISO8583 where applicable)	SCC usage	proposed SCT Inst for cards usage
Trace number, BMP11	card container	Not relevant inter-bank, but could be part of acquirer reference, see below
Local transaction date time, BMP12	card container	Not relevant inter-bank, but could be part of acquirer reference, see above.
Date Expiration, BMP14	card container	Not relevant inter-bank
POS Data code, BMP22 (Acceptance channel information)	card container	Not relevant inter-bank
Card sequence number, BMP23	card container	Not relevant inter-bank
Merchant Category Code, BMP26	card container	Not relevant inter-bank
Acquirer reference data, BMP31	end to end identification	<p>end to end identification</p> <p>Should be pre-structured by using the components</p> <ul style="list-style-type: none"> <li>• Terminal ID: 8 char</li> <li>• Trace Number: 6 char</li> <li>• TransactionDateTime: 12 char</li> <li>• Acquirer own Reference: 9 char.</li> </ul> <p>Then this identification could also be supported as acquirer reference when initiated by the authorisation system.</p> <p>This data should be sufficient on the acquiring side to reconcile the transactions with the successful authorisations.</p> <p>In case of a full API solution, this definition would not be needed. The acquirer reference would be free to use for the acquirer.</p>

<b>Card transaction data element (reference to ISO8583 where applicable)</b>	<b>SCC usage</b>	<b>proposed SCT Inst for cards usage</b>
Acquirer id, BMP32	creditor identification	Creditor identification
Approval Code, BMP38	mandate identification	Not relevant inter-bank
Terminal ID, BMP41	card data	Not relevant inter-bank, but could be part of acquirer reference, see above
Card Acceptor Identification Code, BMP42	Ultimate Creditor Identification	Ultimate Creditor ID
Card Acceptor Name Location, BMP43	Ultimate Creditor Name	Ultimate Creditor Name with a substructure Acceptor name//city/2 char country code as defined in the SCC framework.
Amount fees, BMP44	charges information	Fee amount information is mapped to charges information fields. This might imply a closed user group with the CSMs.
Amounts additional, BMP54	card container	Not relevant inter-bank if specific amount information like tip etc.
ICC Systems related data, BMP55	card container	Not relevant inter-bank
reconciliation account acquirer	creditor account	creditor account
reconciliation account issuer	debtor account	debtor account  depending on card scheme definitions, this might be the account of the ultimate debtor
issuer id	debtor id	debtor id
issuer name	debtor name	debtor name as provided by issuer

Card transaction data element (reference to ISO8583 where applicable)	SCC usage	proposed SCT Inst for cards usage
		If initiated by the acquirer directly, a constant "ISSUER" would be sufficient, cp. SCC definitions.

**Note:** In case the card scheme is not mandating the processing via a dedicated acquirer, the card acceptor information might directly be used for the creditor related fields.

## **4 R-Transactions**

### **4.1 Reversals and Charge Backs**

Under certain circumstances, the SCT Inst for card transactions might need to be reverted. This is due to e.g.

- Reversal in Variant 1, if a technical reversal appears after payment initiation of the authorisation system.
- Reversal for any sort of a technically erroneous SCT Inst for Cards transactions
- Charge Back: A payment was correctly processed, but the underlying business transaction has been (partially) revoked by the customer or the business transaction has not been performed correctly.

For reversals, the acquirer may literally return the SCT Inst for cards received erroneously.

For charge backs, the Issuer Bank can perform a "request to return" (camt.056 message) on basis of the addressed SCT Inst transaction with potentially dedicated reason codes. The acquirer then needs to return the related SCT Inst, if the charge back was applicable by corresponding card scheme rules.

### **4.2 Merchant Refund**

Merchant Refunds do not relate necessarily to card transactions in the past. Such a refund transaction would be an SCT Inst from the acquirer to the issuer where the ultimate creditor would be identified using reference data returned in a merchant refund authorisation response. Such a solution would need a reconciliation process within the issuing system, if the reference does not equal the cardholder account.

All the R-transaction issues are related heavily to implementation and are not further addressed in this document.

## 5 References

- [BG SCC] Berlin Group, SEPA Card Clearing Framework (SCC), Operational Rules, Release Note 2014, 30 June 2014, [www.berlin-group.org](http://www.berlin-group.org)
- [BG oFA WP] Berlin Group, openFinance API Framework, openFinance Workplan 2021, 30 November 2020, [www.berlin-group.org](http://www.berlin-group.org)