



EUROPEAN CENTRAL BANK

EUROSYSTEM

T2S CHANGE REQUEST FORM		
<b>General Information (Origin of Request)</b> <input type="checkbox"/> User Requirements (URD) or GUI Business Functionality Document (BFD) <input checked="" type="checkbox"/> Other User Functional or Technical Documentation (SYS)		
<b>Request raised by:</b> Euroclear, Iberclear	<b>Institute:</b> CSD	<b>Date raised:</b> 24/07/2020
<b>Request title:</b> Prioritise transactions with an older intended settlement date over newer ones also after ISD+3 of the newer transaction		<b>Request No.:</b> T2S 0739 SYS
<b>Request type:</b> Common	<b>Classification:</b> Enhancement	<b>Urgency:</b> Normal
<b>1. Legal/business importance parameter<sup>1</sup>:</b> High	<b>2. Market implementation efforts parameter<sup>2</sup>:</b> Low	
<b>3. Operational/Technical risk parameter<sup>3</sup>:</b> Medium	<b>4. Financial impact parameter<sup>4</sup>:</b> Medium	
<b>Requestor Category:</b> CSD	<b>Status:</b> Implemented	

**Reason for change and expected benefits/business motivation:**

During the T2S real-time settlement period (RTS), newer transactions might settle before older ones.

This can happen for any instruction, but it is more noticeable with CCP instructions, as CSD participants monitor these more carefully.

In the past few months, there has been an increase in the cases where this scenario is happening (almost on a daily basis). This might be due to the fact that some CCPs moved to trade date netting, and that the volumes increased significantly in March 2020.

Such unexpected order of settlement can result in the non-settlement of transactions and in some cases, buy-in procedures being triggered. The expected benefit of the CR is to avoid such scenarios. The relevance of this rationale is expected to increase further when CSDR enters into force and in particular its buy-in provisions,

With regards to the expected benefits of the change, it must be highlighted that the possibility of an unexpected order of settlement would not be fully eliminated, due to parallel processing of transactions performed by T2S during Real-Time Settlement (RTS).

This change request should also not be considered as a mandatory regulatory change, as a strict order of settlement is not mandated by CSDR, and CSD participants have various tools offered by T2S to manage the settlement order of their transactions (linkage, hold / release...).

<sup>1</sup> Legal/business importance parameter was set to high because the unexpected order of settlement affects T2S actors and their customers and is expected to become even more sensitive when CSD provisions fully apply.

<sup>2</sup> Market implementation effort parameter was set to low because the CR would not require implementation efforts by T2S actors

<sup>3</sup> Operational/technical risk parameter was set to medium because the CR affect the SETT functions and is volume sensitive

<sup>4</sup> Financial impact parameter: Medium (200-400 kEUR)

**Description of requested change:**

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The change requested is to adjust the RTS settlement algorithms and/or booking processes, or other relevant T2S functionalities and parameters, in order to minimise cases where younger transactions (in terms of days past their Intended Settlement Date - ISD) settle before older transactions, especially where both transactions are 3 days or more past their ISD.

The adjustments considered:

- Should not interfere with the “priority” level set per instructions. The levels of priority must not be changed and must always be considered before the ‘oldest settlement date’.
- Should apply only to recycled transactions, and not to the first settlement attempt of a transaction
- Are expected to reduce, but not fully eliminate the possibility of an unexpected order of settlement, due to parallel processing of transactions by T2S
- Should avoid significant impacts on T2S performance
- Should take into account the relevant business scenarios (after how many days after ISD do we see an insignificant number of aged fails)
- Should take into account that a buy-in process is to be triggered after 4 to x days after ISD (SDR requirement)

**Submitted annexes / related documents:**

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[T2S-0682-SYS](#) (Transaction ages up to 15 days should be differentiated by the settlement optimisation process): CR-682 was a CR pursuing similar objectives as CR-739, during T2S Night Time Settlement. CR-682 was withdrawn on 15 January 2019 following its preliminary assessment.

**Outcome/Decisions:**

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- \* CRG on 17 September 2020: The CRG agreed to launch the preliminary assessment of the CR.
- \* CRG on 19 January 2021: the CRG agreed to recommend CR-739 for authorization by the T2S Steering Level.
- \* AMI-SeCo on 27 January 2021: the AMI-SeCo agreed to the recommendation of the CRG to authorise CR-739.
- \* CSG on 27 January 2021: the NECSG agreed to authorise CR-739.
- \* NECSG on 27 January 2021: the NECSG agreed to authorise CR-739.
- \* PMG on 8 February 2021: the PMG agreed to launch the detailed assessment of CR-739 in view of R6.0.
- \* MIB on 11 February 2021: the MIB agreed to authorise CR-739.
- \* CRG on 21 June 2021: the CRG agreed to recommend to the PMG the inclusion of CR-739 in Release 6.0
- \* OMG on 21 June 2021: the OMG identified an operational impact from the inclusion of CR-739 in R6.0.
- \* PMG on 22 June 2021: the PMG agrees to the inclusion of CR-739 in the scope of R6.0
- \* CSG on 09 July 2021: the CSG approved the inclusion of CR-739 in the scope of R6.0.
- \* NECSG on 09 July 2021: the NECSG approved the inclusion of CR-739 in the scope of R6.0.
- \* MIB on 14 July 2021: the MIB approved the inclusion of CR-739 in the scope of R6.0.

**Proposed wording for the Change request:**

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**UDFS**

The following UDFS section should be modified.

**1.4. Settlement Day**

1.4.4. Detailed description of the settlement day

**1.4.4.4. Real-time Settlement (RTS)**

The previously unsettled Settlement Instructions and Settlement Restrictions from night-time settlement are attempted for settlement in the real-time settlement period with the arrival of new resources (securities for delivery, securities in positions earmarked available for collateral, cash).<sup>5</sup>

**Adding the following footnote**

*During the regular recycling, the mechanism ensures that a transaction will not be recycled if the transaction sent just before has not been attempted for settlement. This serialization process will concern all transactions with age >= 3 selected by the Regular Recycling process following a credit in securities or cash or an increase in CMB headroom or limit, guaranteeing that an older transaction will be attempted before a younger one with the same priority. The transactions selected by one given recycling process will be segregated into eight groups, depending on their priority and age:*

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<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>	<u>Group 5</u>	<u>Group 6</u>	<u>Group 7</u>	<u>Group 8</u>
<u>Priority 1</u>	<u>Priority 1</u>	<u>Priority 2</u>	<u>Priority 2</u>	<u>Priority 3</u>	<u>Priority 3</u>	<u>Priority 4</u>	<u>Priority 4</u>
<u>Age &gt;= 3</u>	<u>Age &lt; 3</u>						

Should the serialization process be too long (over a predetermined adjustable maximum duration), it will be automatically stopped to come back to the regular recycling process.

#### UDFS 1.6.1.9.2. Prioritisation (p.401)

During the real-time settlement period, T2S takes into account the applicable level of priority only for pending Settlement Instructions during the recycling <sup>(1)</sup> and optimisation process. T2S does not take into account the level of priority at the first settlement attempt of Settlement Instructions and Settlement Restrictions

(1) During the regular recycling, the mechanism ensures that a transaction will not be recycled if the transaction sent just before has not been attempted for settlement. This serialization process will concern all transactions with age >= 3 selected by the Regular Recycling process following a credit in securities or cash or an increase in CMB headroom or limit, guaranteeing that an older transaction will be attempted before a younger one with the same priority. The transactions selected by one given recycling process will be segregated into eight groups, depending on their priority and age:

<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>	<u>Group 5</u>	<u>Group 6</u>	<u>Group 7</u>	<u>Group 8</u>
<u>Priority 1</u>	<u>Priority 1</u>	<u>Priority 2</u>	<u>Priority 2</u>	<u>Priority 3</u>	<u>Priority 3</u>	<u>Priority 4</u>	<u>Priority 4</u>
<u>Age &gt;= 3</u>	<u>Age &lt; 3</u>						

Should the serialization process be too long (over a predetermined adjustable maximum duration), it will be automatically stopped to come back to the regular recycling process.

#### **GFS:**

The following GFS references should be updated:

GFS 3.5.2, p. 471, v8.2

3.5.7.3 Description of the functions of the module

#### **6 – Recycling**

*Settled collection*

##### **Reference Id SETT.R&O.REC.1.1**

...

It regroups them in new collections (each Settlement Transaction has its own collection or grouped with others with respect of their “with” link if relevant) and sends those collections for settlement to the Daytime Validation, Provisioning and Booking module, complying with the priorities defined in SETT.R&O.OAF.2.1 **{T2S.08.050}**.\*

*Increase limits Event*

##### **Reference Id SETT.R&O.REC.2.1**

...

It regroups them in new collections (each Settlement Transaction has its own collection or grouped with others with respect of their “with” link if relevant) and sends those collections for settlement to the Daytime Validation, Provisioning and Booking module, complying with the priorities defined in SETT.R&O.OAF.2.1 **{T2S.08.050}**.\*

**\* Adding the following footnote:** due to parallelism in the recycling function, it may happen that, in some cases, the priorities may not be respected between two Settlement Transactions of the same recycling process. However, the main one, the *highest priority criteria*, is always respected, and the second one, the *oldest intended settlement date*, is always respected when at least one of the two Settlement Transactions is three days or more past its intended settlement date (i.e. its age is greater than or equal to three days). If the *oldest intended settlement date* is strictly considered, then so are the two remaining criteria (*highest quantity or amount* and *earliest T2S timestamp*).



**Preliminary assessment:**

- **Financial impact: Medium**
- **Impacted modules: SETT**
- **Findings:**

*Description of the issue:*

The CR addresses the recycling case where a newer transaction gets settled before an older one, that is, a transaction with a more recent ISD settles before one with an older ISD.

This may happen at the first settlement attempt in line with the requirements and specifications when a new transaction settles for resources while older ones remain in lack.

As far as recycling is concerned this apparently stands in conflict with the statement present in the UDFS according to which a transaction with an older ISD should always be recycled before a transaction with a newer ISD.

However, this contradiction is merely seeming since the software ought to comply not only with functional specifications but also with specifications stemming from performance needs, as is stated in the Service Level Agreements (SLA). That's why parallelism had to be implemented: all transactions selected by the recycling process are being sent to the RTS booking engine respecting the priority and ISD criteria, but one just after the other, the last transaction being sent without waiting for the settlement (or no) of the previous transaction just sent. Even so, the increase in the cases noticed over the last few months requires a more thorough investigation in order to work out how to improve the observation of the settlement order, without calling into question performances and the commitment to fulfill the SLAs:

*Current workarounds:*

Nevertheless, clients are offered several possibilities to make sure that the transactions they intend to send will be processed in their strict sending order: for instance:

- Linking instructions together (before/after – with – pool)
- Holding an instruction and releasing it only when another one has been settled
- Using restricted sub-positions / sub-balances in the delivering / debiting leg to make sure a transaction can only settle when these specific sub-positions / sub-balances are credited
- Applying an intraday restriction on a transaction that is wished to be settled later on
- Using pre-empting mechanisms

*Proposed improvement:*

The following software improvement intends to reduce the number of unexpected settlements, while preserving the performances of the system:

Three modules are concerned by the issue raised in the CR: these are all recycling modules which send messages to the booking module during RTS, i.e.:

- Regular Recycling: following either a credit upon a securities position, a cash account, or an increase in a CMB headroom or limit
- Partial Settlement Attempt module: recycling launched upon opening of a partial window (SAPT event) to the RTS booking module for partialisation purpose.
- Massive Recycling of all unsettled transactions upon RREC event

All those modules recycle the transactions they send to the RTS booking module in the following order: those with highest priority are sent first, then those with oldest intended settlement date (ISD).

Among the three modules concerned by the issue, an improvement respectful of performances can be made regarding Regular Recycling as far as transactions with age 3 or more are concerned. As a matter of fact, this criterion:

- Meets the main CR requirement, which particularly insists on respecting the settlement order for transactions with age 3 or more.
- Does not hamper performances of the system, since this group of transactions contains a reasonable number of transactions.

The improvement envisaged can thus be based on this criterion, adding a mechanism to ensure that a transaction will not be recycled if the transaction sent just before has not been attempted for settlement. This serialization process will concern all transactions with age  $\geq 3$  selected by the Regular Recycling process following a credit in securities or cash or an increase in CMB headroom or limit, guaranteeing that an older transaction will be attempted before a younger one with the same priority:

More precisely, transactions selected by one given recycling process will be segregated into eight groups, depending on their priority and age:

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Priority 1	Priority 1	Priority 2	Priority 2	Priority 3	Priority 3	Priority 4	Priority 4

Age >= 3	Age < 3						
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These groups will be built up in real time, whenever a credit comes in.

The serialization will then take place between:

- Two transactions belonging to different groups (*i.e.* a transaction from group *i* will be guaranteed to be attempted before another transaction of group *j* where  $i < j$ )
- Two transactions of the same group of age  $\geq 3$  (that is, inside groups 1, 3, 5 or 7)

Which can be illustrated by the following example:

Let us consider the following transactions belonging to the first four groups:

	Group 1	Group 2	Group 3	Group 4
	Priority 1	Priority 1	Priority 2	Priority 2
	Age $\geq 3$	Age < 3	Age $\geq 3$	Age < 3
Settlement	ST.11 (age 5)	ST.23 (age 2)	ST.35 (age 4)	ST.37 (age 0)
Transaction Id	S.T12 (age 3)	ST.24 (age 1)	ST.36 (age 3)	ST.38 (age 1)

Then the Settlement Transactions booking order will be:

Order	Settlement Transactions booking order
1 <sup>st</sup>	ST.11
2 <sup>nd</sup>	ST.12
3 <sup>rd</sup> , 4 <sup>th</sup>	ST.23 should most probably be booked first ( but ST.24 might be booked before ST.23) <sup>6</sup> ST.24
5 <sup>th</sup>	ST.35
6 <sup>th</sup>	ST.36
7 <sup>th</sup> , 8 <sup>th</sup>	ST.37 should most probably be booked first (but ST.38 might be booked before ST.37) <sup>7</sup> ST.38

*Limitations of the solution envisioned:*

- Serialization between transactions inside groups 2, 4, 6 or 8 (age < 3) cannot be envisaged out of performance reasons: thus a transaction aged 1 day may still, in some particular cases, settle before a transaction aged 2 days with the same priority. For these transactions, parallel sending has to remain the rule.

<sup>6</sup> See limitations of solution for further explanation

<sup>7</sup> See limitations of solution for further explanation

- Partial Settlement Attempt and Massive Recycling modules are to be kept out of scope out of performance reasons. Furthermore:
  - o Very few transactions get settled via Massive Recycling so it is very unlikely that the issue may arise due to this module.
  - o Competition between Partial Settlement Attempt module and Regular Recycling module leads to submissions to RTS booking engine which do not necessarily respect oldest ISD, and this not manageable through the envisaged solution.
- Competing Regular Recycling Processes: if a credit on a given resource takes place while there is already a Regular Recycling ongoing on this same resource, then a transaction with a recent ISD submitted to the RTS booking engine just after this second credit will benefit from it and thus may settle to the detriment of a transaction with an older ISD, submitted just before the second credit occurs:
- For the sake of clarity, let us consider the following Settlement Transactions in the stock of unsettled transactions, debiting the same security position SP1, both requiring 100 securities to settle (no initial security stands on the position):
  - o ST.01 with older ISD
  - o ST.02 with newer ISD
- Both have same priority. Then the sequence of events will be:

Sequence of events	Settlement Transactions	Security Position SP1
First credit of 45 securities on SP1	First recycling of ST.01 and ST.02	45
ST.01 (1 <sup>st</sup> recycling) submitted to RTS booking engine	ST.01 remains unsettled (lack of 55 securities)	45
Second credit of 55 securities on SP1	Second recycling of ST.01 and ST.02	100
ST.02 (1 <sup>st</sup> recycling) submitted to RTS booking engine	<b>ST.02 settles whereas its ISD is newer than that of ST.01</b>	0
ST.01 (2 <sup>nd</sup> recycling) submitted to RTS booking engine	<b>ST.01 remains unsettled (lack of 100 securities) whereas it should have settled before ST.02</b>	0

- If the volume of recycled Settlement Transactions with age greater than 3 were to increase considerably in the future, then an inhibition of the serialization process, through a protection mechanism, should be envisaged in order to limit the resulting impact on the performances of the system.
- The competition between a Settlement Transaction attempted for settlement for the first time and an older one submitted by the Regular Recycling Process cannot be managed through the proposed solution.

- **Open issues/ questions to be clarified by the originator:**

n/a

**Detailed assessment:**

EUROSYSTEM ANALYSIS – GENERAL INFORMATION			
T2S Specific Components		Common Components	
<b>LCMM</b>			
	Instructions validation		
	Status management		
	Instruction matching		
	Instructions maintenance		
	Penalty Mechanism		
<b>Settlement</b>			
	Standardisation and preparation to settlement		
	Night-time Settlement		
<b>X</b>	Daytime Recycling and optimisation		
	Daytime Validation, provisioning & booking		
	Auto-collateralisation		
<b>Liquidity Management</b>			
	Outbound Information Management		
	NCB Business Procedures		
	Liquidity Operations		
<b>T2S Interface</b> (as of June 2022 without Static Data Management, Communication for SDMG, Scheduler, Billing)			
	Communication		
	Outbound Processing		
	Inbound Processing		
<b>Static Data Management</b> (until June 2022)		<b>Common Reference Data Management</b> (from R6.0 June 2022)	
	Party data management		Party data management
	Securities data management		Securities data management
	Cash account data management		Cash account data management
	Securities account data management		Securities account data management
	Rules and parameters data management		Rules and parameters data management
<b>Statistics and archive</b>		<b>Statistics and archive</b>	
	Statistical information (until June 2022)		Short term statistical information
	Legal archiving (until June 2022)		Legal archiving (from R6.0)
			Data Warehouse (from R6.0)
<b>Information</b> (until June 2022 containing reference data)		<b>CRDM business interface</b> (from R6.0 June 2022)	
	Report management		Report management
	Query management		Query management
			Communication
			Outbound Processing
			Inbound Processing
<b>Operational Services</b>			
	Data Migration (T2S DMT)		Data Migration (CRDM DMT, from R6.0)
	Scheduling (until June 2022)		Business Day Management (from R6.0)
			Business Day Management business interface (from R6.0)
	Billing (until June 2022)		Billing (from R6.0)
			Billing business interface (from R6.0)
	Operational Monitoring		Operational and Business Monitoring
	MOP Contingency Templates		



Impact on major documentation			
Document	Chapter	Change	
Impacted GFS chapter	3.5.7: Daytime Recycling and Optimization 3.5.7.3 Description of the functions of the module	Adding the specific cases where priorities are now strictly observed.	
Impacted UDFS chapter	UDFS 1.6.1.9.2. Prioritisation (p.401)	Refer to section "L3 Detailed analysis" and "Functional Analysis"	
Additional deliveries for Message Specification (UDFS, MyStandards, MOP contingency templates)			
UHB			
External training materials			
Links with other requests			
Links	Reference	Title	
OVERVIEW OF THE IMPACT OF THE REQUEST ON THE T2S SYSTEM AND ON THE PROJECT			
Summary of functional, development, infrastructure and migration impacts			
<p>The CR addresses the Regular Recycling case where a newer transaction gets settled before an older one, that is, a transaction with a more recent ISD settles before one with an older ISD. To cope with this issue, a new serialization mechanism will be implemented to improve the respect of the following recycling criteria in the Regular Recycling process (by order of importance):</p> <ol style="list-style-type: none"> <li>1) <i>highest priority</i></li> <li>2) <i>oldest intended settlement date</i></li> <li>3) <i>highest securities quantity or cash amount</i></li> <li>4) <i>earliest T2S timestamp</i></li> </ol> <p>with a focus on settlement transactions whose age is greater than or equal to 3 days.</p> <p><b>Protection mechanism :</b></p> <p>If the volume of recycled Settlement Transactions with age greater than 3 were to increase considerably in the future, then an inhibition of the serialization process, through a protection mechanism, will take place in order to limit the resulting impact on the performances of the system. More in detail, this protection mechanism works as follows:</p> <ul style="list-style-type: none"> <li>- Applies only to the recycling process that follows a given credit on a given resource, if this particular recycling process takes too much time. Other recycling processes triggered by other credits (same resource or not) are not impacted by the protection mechanism if their duration is acceptable.</li> <li>- Based on a maximum duration allowed (SETT parameter) for the recycling process, proportional to the number of transactions being recycled</li> <li>- Should this duration be exceeded for a given recycling process (that is: a given credit on a given resource), then the serialization mechanism described in the CR will be dropped for this particular recycling process:</li> </ul> <p>=&gt; the considered recycling process will complete without any serialization introduced by the CR and will follow the business as usual process before implementation of the CR.</p> <p><b>Main cost drivers:</b></p> <ul style="list-style-type: none"> <li>- <b>Implementation of new serialization mechanism</b></li> <li>- <b>Implementation of the protection mechanism to prevent negative performance impacts by the</b></li> </ul>			

<b>serialization mechanism</b>
<b>Impact on other TARGET Services and projects</b>
ECMS: no impact TIPS: no impact CSLD: no impact TARGET2: no impact DWH: no impact
<b>Summary of project risk</b>
None
<b>Security analysis</b>
No potentially adverse effect has been identified during security assessment.



## Cost assessment on Change Requests

<b>T2S-739-SYS – Prioritise transactions with an older intended settlement date over newer ones also after ISD+3 of the newer transaction</b>			
One-off	Assessment costs*		
	- Preliminary	2,000.00	Euro
	- Detailed	10,000.00	Euro
One-off	Development costs	280,674.01	Euro
Annual	Operational costs		
	- Maintenance costs	25,297.38	Euro
	- Running costs	0.00	Euro

\*The relevant assessment costs will be charged regardless of whether the CR is implemented (Cf. T2S Framework Agreement, Schedule 7, par. 5.2.3).