



### Business challenge

To make transfers related to the buying and selling of securities under T2S (TARGET2-Securities), Banque de France needed a mathematical optimization solution capable of handling settlements quickly, to support more than a million transactions processed every night.

### Transformation

Prior to the implementation of T2S, the large number of counterparties involved in securities exchanges drove up settlement costs and liquidity requirements. With a unique secondary market platform, built on IBM® ILOG® CPLEX® Optimization Studio, Banque de France reduces costs while maintaining transaction security.



**Dan Gugenheim**  
Operations Research  
Team Leader  
Banque de France

### Business benefits:

**250,000**  
securities transactions  
carried out every night

**1.5-2 hours**  
to process transactions

**3-10x**  
lower cost for processing  
end-to-end transactions

# Banque de France Optimizes settlement and delivery of securities in Europe

Banque de France is one of the four national central banks in the Eurozone responsible for the development and operational management of the TARGET2-Securities (T2S) platform. T2S was launched by the European Central Bank to optimize and harmonize securities settlement and delivery in the Eurozone and beyond. In this system, the Banque de France is responsible for optimizing the settlement of securities and cash. The sheer number and monetary value of transactions, the complexity of the aftermarket and the need to quickly find an optimal solution led the bank to choose an IBM ILOG CPLEX solution to drive the platform's algorithmic engine.

*"We leverage CPLEX's high performance optimization technology on z/OS. This solution satisfies the requirements of the T2S system and offers the mathematical guarantee that we absolutely need when dealing with very large settlement volumes."*

Dan Gugenheim  
Operations Research Team Leader  
Banque de France

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## Pan-European securities settlement

Settlement-delivery refers to the final phase of the buying and selling process for securities. The simultaneous exchange of securities (shares, bonds, UCITS mutual funds, warrants, options, etc.) against cash allows for the transfer of ownership between the buyer and the seller to be finalized.

Several parties are involved in this process, including the Central Securities Depository (CSD). In France, the CSD is Euroclear France, which houses the securities accounts held by French banks and brokers, as well as a number of foreign financial intermediaries affiliated with the CSD.



Euroclear France is the sole operator responsible for executing buy and sell transactions on behalf of these parties. The organization guarantees that the securities are present on the seller's account and that the cash is also available on the buyer side (a process known as counterparty management).

Of course, these transactions have a cost. In the 2000s, a report by the Giovannini group identified a significant difference—of a ratio of one to ten—between the cost borne by cross-border, but intra-European, securities transactions and the cost of domestic transactions. The reason: the intervention of many domestic CSDs and financial intermediaries, each taking its cut.

These challenges gave rise to the idea of a pan-European settlement system, which could reduce costs and facilitate capital flows between member countries of the European Union. This is the T2S system put in place by the European Central Bank from June 2015.





## Unique system for a complex world

T2S is a technical platform that the CSDs of the 19 Eurozone countries rely on to manage their settlement and delivery processes for securities, using central bank money (exclusively used for payments between banks). National and international operations are managed in the same way and with a single tariff.

Responsibility for the development and operational management of the platform has been delegated to a group of four national central banks: Germany, Spain, France, Italy.

“Banque de France is responsible for coordinating the project, and managing the settlement engine for movements of securities and cash. This is the heart of the system,” says Philippe Leblanc, Operational Director of European Market Infrastructures at Banque de France.

“We operate in a complex world in which optimization models play a key role. They offer a mechanism for banks and financial institutions to settle and receive assets that correspond to the transactions they have made in the markets, without necessarily having the cash and securities to honor the requests.



“Settlement consists of a net balance due or receivable, as well as net flows of securities to be delivered or received. For example: Bank A owes 100 to Bank B, which owes it 80. The settlement from A to B will be 20. The same principle applies to securities.”

## Mathematical optimization

The T2S platform calculates the cash needed to cover settlement operations at a European level. The platform will eventually support several currencies, including the Euro, but also, for example, the Danish krone, which will be integrated from 2018.

When performing intra-eurozone, cross-border and multicurrency settlement-delivery, “classic algorithmic solutions could fail,” notes Dan Gugenheim, Operations Research Team Leader at Banque de France. “We turned to a different mathematical optimization solution, choosing IBM CPLEX software. Assisted by IBM experts, we leverage CPLEX’s high-performance optimization technology on z/OS.

“This solution satisfies the requirements of the T2S platform, in particular the compensation, and offers the mathematical guarantees that we absolutely need when dealing with very large settlement volumes.”

The IBM z/OS® infrastructure was selected by the four central banks for its robustness, security, and performance across the T2S platform.

The IBM CPLEX solution handles 250,000 transactions each night, when the financial markets are closed, for amounts of several hundred billion euros. It contributes to the efficiency of the European secondary market by reducing costs and improving capital flows. Its power and scalability are also assets for a market that will evolve, and integrate new players and new countries in the future.



## Solution components

- IBM® ILOG® CPLEX® Optimization Studio
- IBM CPLEX Optimizer for z/OS®
- IBM Software Services

## Take the next step

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