

**Historical Development of Legal  
Instruments to Control  
Settlement Risks of the Deutsche  
Bundesbank's Electronic Large  
Value Net Payment Systems  
Following Technical  
Improvements**

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## I. HISTORICAL DEVELOPMENT OF NETTING SYSTEMS AT THE GERMAN CENTRAL BANK

The German central bank (*Reichsbank* as it was then called) had traditionally run classical paper-based net settlement systems (called *Abrechnungsstellen*) since 1883, which were used to offset claims and obligations between credit institutions by the exchange of vouchers, with only the resulting net positions being settled on the participants' central bank accounts. Participants were usually all credit institutions located at the place of a subsidiary of the central bank. Sometimes several banking places were connected via an inter-regional netting system.

After the Bundesbank was set up it continued this tradition. So the Bundesbank had always operated such classical paper-based netting systems at its offices. Incidentally, the last of those classical paper-based net settlement systems was closed down this year – on March 31, 2000. The most important paper-based systems had always been located in Frankfurt as the major banking centre in Germany. As the volume of payments to be processed and the technical possibilities increased, an electronic version of that system was developed in Frankfurt called EAF for *Elektronische Abrechnung Frankfurt* (later renamed Euro Access Frankfurt, under which name it became known internationally). As far as the legal concept was concerned, no adaptation resulted from the changeover to electronic processing. The legal framework remained the same, as the system merely exchanged electronic data instead of the traditional vouchers. In view of its origins, the payment system had all the risks of a classical netting system and did not contain any precautions to avoid them. These risks consisted of the following. Classical netting schemes do not demand full cover – unlike the gross settlement systems also operated by Bundesbank, in which payments are effected one by one only if covered by adequate funds. Under a netting scheme all incoming and outgoing payments of a large group of participants are offset by a special clearing mechanism. This system has the advantage that the procedure demands very little liquidity from the participants since matching payments offset each other and do not have to be covered by liquid funds, and only the marginal amounts actually have to be paid. The big disadvantage of all classical netting schemes, as you no doubt know, is that the process of offsetting mostly means that it takes a long time for payments to become final, since the marginal amounts are usually settled only at the end of day. If one participant fails to cover his marginal amount then, it means that no payments can become final, as they are all jointly involved in the settlement process. Therefore, the entire settlement process for that day has to be unwound, which can result in much higher debit positions for the other participants. Since they have not anticipated any further demands and may already have credited the expected proceeds from the settlement process, this

can lead to serious liquidity shortages on the part of the other partners as well. These risks have always existed, but they did not cause any major concerns at the beginning, as the group of participants was usually quite homogenous and locally concentrated, and, therefore, it was possible to maintain a general overview without much difficulty. But when the introduction of computers allowed the transformation to a much bigger group of participants effecting ever bigger amounts of transactions, the danger of domino effects rose, since the need for an unwinding could have forced further participants to be excluded from the settlement process, putting even heavier demands on the remaining few, and therefore risking even more defaults. Finally, such a domino effect could have caused serious problems for the entire national payment system and could also have had international repercussions as EAF attracted more and more foreign participants.

## **II. NEW AWARENESS OF SETTLEMENT RISKS**

This was not a specific German development. With the growing number of transactions, the growing size of electronic net fund transfer systems and the growing importance of interdependencies between the systems world-wide, the awareness of the risks involved also grew. So the international banking community became fully aware of the settlement risks involved in net systems. As a consequence, the "Committee for Interbank Netting Systems of the Central Banks of the G10 countries" was set up at the Bank for International Settlements (BIS) chaired by Alexandre Lamfalussy. It drew up the now almost famous Lamfalussy Standards for netting systems, which were first published in the Committee's final report in 1990 and which became very influential, because even though this report was not formally binding, all operators of net payment systems tried to follow its recommendations. The importance of these Standards is further underlined by the fact that just recently they have become the basis for the Core Principles for Systemically Important Payment Systems, published by the Bank for International Settlements. Since the criteria also concerned legal matters, an adaptation of the legal framework became necessary. Therefore, I would like to outline the legal structure and the security concepts employed by EAF as an example of a modern payment system trying to cope with the demands of the Lamfalussy Standards, in the process showing that technical changes and new demands by the markets require a revision of the legal structure of such a system in ever shorter periods of time.

## **III. LAMFALUSSY CRITERIA**

To start with, it is helpful to recall the criteria themselves for this goal as they are now the standard for a legal concept of such a system. They read as

follows:

1. Netting schemes should have a well founded legal basis under all relevant jurisdictions.
2. Netting scheme participants should have a clear understanding of the impact of the particular scheme on each of the financial risks affected by the netting process.
3. Multilateral netting systems should have clearly defined procedures for the management of credit risks and liquidity risks which specify the respective responsibilities of the netting provider and the participants. These procedures should also ensure that all parties have both the incentives and the capabilities to manage and contain each of the risks they bear and that limits are placed on the maximum level of credit exposure that can be produced by each participant.
4. Multilateral netting systems should, as a minimum requirement, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single net debit position.
5. Multilateral netting systems should have objective and publicly disclosed criteria for admission which permit fair and open access.
6. All netting schemes should ensure the operational reliability of technical systems and the availability of back-up facilities capable of completing daily processing requirements.

#### **IV. APPLICATION OF THE LAMFALUSSY CRITERIA**

From a legal point of view, the Standards 3. and 4. were essential for the EAF system existing when the Lamfalussy Report was published. As I mentioned earlier, the system did not include any contingency measures in the event of insolvency of one of its participants. Instead it depended totally on the possibility of an unwinding, which was not consistent with Standard 4. For that reason the system had to be revised to make it comply with the full set of Lamfalussy Standards:

A. The obvious and easiest way to achieve that seemed to be to adopt the model provided by the market leader at the time, CHIPS of the New York Clearing House Association, which had already complied with the Lamfalussy Report before it was published. Following the publication of the Lamfalussy Report, some other net settlement systems (such as the EBA-

Clearing: Euro 1) successively introduced CHIPS-like risk control measures into their systems, for example credit limits, debit caps and loss-sharing agreements backed by collateral. The first and second measure make sure that the net debit position usually cannot become too big to be handled by a bank, while the third obliges the other partners to bail out an insolvent partner if it should become insolvent. Over and above such safeguards, EBA for instance has obliged its participants to keep liquid funds available at the ECB for the settlement. In this way the demands of Standard 4. are fulfilled.

B. In initial talks with the banking community in Germany, the Bundesbank regarded this approach as an acceptable solution, particularly as it had been adopted by the biggest financial market. But the German participants frankly rejected that approach, so that the Bundesbank could not implement it. Incidentally, this episode clearly demonstrates the influence of the German banking industry on the design of a payment system, even without having a formal stake or representation on a board of directors in the system, which is solely operated by the Bundesbank.

C. The rejection of the CHIPS model was even more surprising since some of the major German banks participate in this system, which has an effective monopoly on the settlement of the US dollar leg of FX transactions. The reason was that the German banks simply did not like the idea of loss-sharing. They were not willing to accept an approach which is currently called the "survivors pay principle".

D. So an alternative idea was developed. The new proposal was based on the "cover principle", which is used in the context of gross settlement today; in relation to net settlement systems, this principle is called the "debtor pays principle": that means that a participant who wants to send a single payment or to settle a debit balance resulting from offsetting outgoing and incoming payments has to provide liquidity as cover. The first case describes the situation in an RTGS system, whereas the second case describes precisely the situation which we have had since the enhanced EAF started operation in March 1996.

1. In the process EAF became what is now called a hybrid system, as the very first system of this species. Interestingly enough, CHIPS, the model for a lot of other systems, will employ hybrid features from January 2001, as will the French PNS system. These developments indicate that the Lamfalussy Standards, which are exclusively oriented to classical netting schemes, are perhaps becoming a little bit outdated. Systems may provide the security desired by the Standards without applying the prescribed methods. This became even more apparent when the Standards were used as a basis for

the even more general Core Principles for Systemically Important Payment Systems, which I referred to previously.

EAF's security concept from this point on can be described very easily from a legal point of view by saying that it only functions if funds are available. This removed the end-of-day settlement risk. Instead, the system always made sure that it only produced net debit positions which could be covered at the moment of execution.

On the other hand, the participants were not willing to reserve too much liquidity for the processing of payments as liquidity was urgently needed for other fields of business, too. Therefore, they insisted that the system should not require as much liquidity as a gross settlement system. This meant that the problem could not be solved by simply transforming the EAF into a gross settlement system, which many experts considered the most desirable solution from the point of view of security. For this reason, some innovative features were needed which would combine the advantages of a net system with those of a gross system.

The concept by which this was done is basically very simple and only became possible with the enormous computer power which became available at this time.

The new basic structure which was developed was to split the whole procedure into two phases, a bilateral phase in which the prompt delivery of payments was possible and a later multilateral phase in which the remaining payments were settled. One of the lessons learned from the practical experience of the earlier settlement processes was that a very high proportion of the payments are bilateral positions. Therefore, all those bilateral positions could be extracted and settled separately, thereby reducing the volumes which had to be involved in a final multilateral netting procedure. The latter was still needed to settle the remaining volumes of payments, but the risks arising from this netting process were drastically reduced because of the lower volumes involved, and this also accelerated the processing.

2. In addition, the net balances were not drawn just once at the end of the day, but instead bilateral balances were drawn every twenty minutes in the first phase. For technical reasons these balances could not be directly settled immediately on the main giro accounts of the participants. Therefore, for each bilateral relationship the participants had to set aside a dedicated amount of money which was assigned to the bilateral partner. This assignment meant that the partner received full entitlement to the amounts assigned to him on condition that he would return the amounts not needed to cover the debit

position owed to the partner out of the settlement process after finality was reached. This assignment was insolvency-proof, so that under German law it was always assured that the net debit position could be taken over to the next settlement run as a single position, since it was always secured by the assigned money. By this means the payments could become final even if the net debit positions had not finally been booked on a giro account.

3. Because the volume of the payments left over was heavily reduced, in phase two a classical netting scheme could take place. The security concept for this phase was that the system made sure that it would only offset as many payments as were covered by funds in the participants' main operational giro accounts. This lifted the restriction of cover to the assigned amounts. If those funds were not sufficient, the participants were given an opportunity to top up their accounts, and a second settlement run was started. Once again only those payments could be offset which produced net debit positions for the participants covered by the funds in their accounts. All other payments were returned and could only be redelivered the next day into EAF or transferred to the Bundesbank's gross settlement system if they were urgent. But it was very rare that any payments delivered to the system could not be settled.

I would like to re-emphasise that, thanks to the strict application of the cover principle, the system did not face the danger of unwinding, in contrast to conventional RTGS systems, but instead would always extract uncovered payments and not execute them.

## **V. ADAPTATION OF THE EAF TO MARKET NEEDS**

This system had worked very well and had produced a very large volume of payments exchanged while requiring a relatively small amount of liquidity. But as we say in Germany: "The better is the worst enemy of the good", which means that there were market demands to further reduce the amount of liquidity which the participants had to set aside for the functioning of the system. The Bundesbank took these demands seriously, as EAF had to find customers in an increasingly competitive environment. Traditionally the cash settlement of FX trades in D-Marks had been one of the most important parts of its business as it was the most effective system for exchanging the large payments originating from that business, and in fact the Bundesbank had a virtual monopoly in this field. The introduction of the euro at the beginning of 1999 had a double impact on EAF: firstly, FX trades in D-Marks ceased to exist, and, secondly, as a system operated on the basis of the euro currency, it became just one of many competing systems in the market designed for the settlement of euro payments. Therefore, the German EAF system could no longer rely on its traditional

clientele but instead had to demonstrate its outstanding attractiveness based on its innovative features.

A. After some research had been done, it was decided that the only way to reduce liquidity demands was to redesign phase 1. Under the original EAF system the amounts assigned to the bilateral partners were trapped for the entire duration of phase 1. As a result, the system lacked flexibility, because the amounts assigned could only be used for the one bilateral relationship they belonged to. Therefore, the assigned amounts were not available for other business, even though they might not have been needed in the bilateral relationship since the participant never incurred a net debit position.

B. To change that implied abandoning the whole legal concept of assignment as a security measure, since money can only be assigned to a single partner, not to all counterparties simultaneously. In its place the Bundesbank invented a totally different system of liquidity circulation which the participants have to pre-finance by transferring money from their giro accounts to a Collective Liquidity Account maintained jointly by all participants at the Bundesbank for the sole purpose of securing the EAF system. Put simply, the legal concept to secure the procedure can be described in the following way: all net debit positions produced in phase 1 will now be settled directly on sub-accounts of this collective account. These internal sub-accounts are held by the participants, and the system ensures, as in phase 2, that it only produces net debit positions that are covered by funds in these accounts. That leads to a solution which comes very close to a scenario in which all net balances are actually booked on giro accounts and therefore offer finality at a very early stage. Since the net balances are drawn after very short runs, this has basically the same effect as a real-time gross settlement system. It therefore offered the opportunity to integrate multilateral netting schemes, which had previously been reserved to phase 2, in phase 1 as well. Multilateral runs now take place alternating with bilateral ones. Nevertheless, the system sticks to the strict segregation of payments into those assigned by the participants to be exchanged only in the relevant bilateral relationship and those which the participant has decided are exchangeable on a multilateral level also. This was demanded by the participants, since it supports a steady flow of payments exchanged. This is because the restriction to bilateral relationships forces the relevant partner to execute reciprocal payments early on to generate matching payments for this relationship. In this way they provide cover and thereby make an exchange of payments possible, as the partner cannot hold back payments which would otherwise allow him to somehow unilaterally extract liquidity from his partner who has provided sufficient funds for his payments to be effected.



For this reason, payments ordered for bilateral runs usually cannot be transferred to the multilateral ones.

1. Therefore, EAF sticks to bilateral elements to secure a smooth and equal running of the system.

2. In addition, the participants can determine the part of their liquidity provided by them which can be used in the different runs by defining Maximum Sender Amounts and also a multi-cap, which restricts the overall amounts of liquidity available.

3. The real challenge for the Bundesbank's lawyers consisted in the fact that the system, for various reasons, cannot provide detailed current statements of the internal sub-accounts, which were invented as described for reasons of clarity. It can only tell the participants how big their share in the Collective Liquidity Account is. From a legal point of view, therefore, these sub-accounts cannot be treated as real accounts. This makes it very difficult from a legal point of view to construct finality, as the net positions are booked on these "virtual" sub-accounts only.

a) Therefore, a complicated legal structure had to be developed: the business provisions which constitute the legal framework for EAF are designed as a mutual agreement to which the participants submit themselves when they apply to become a member.

b) In this agreement the participants accept the change in their share in the credit balance of the Collective Liquidity Account as meeting their claims of a settlement instead of a real transfer from one account to the other. By these means the clearing of the net debit positions can be accepted as final even though the actual balance on the Collective Liquidity Account held in the books of Bundesbank always stays the same; only the entitlement to a part of the mutually held funds in the account changes with every booking on the virtual sub-accounts. Naturally, the business provisions contain an obligation of the Bundesbank to be able to document the respective share in the account at any time, because it is essential for the functioning of the system that whenever a participant becomes insolvent in the course of a clearing day, it can be excluded from the settlement procedure. This is only possible if the entitlement to his share of the amount on the settlement finality account can be determined at the very second when the Bundesbank, as the operator of the system, is informed about the insolvency. An exclusion at this point in time has always been seen as sufficient under German law to avoid claims from the administrator of an insolvent participant on the funds involved in the already final settlements of the system, as German law has never accepted

retroactive effects of the initiation of insolvency proceedings. Under this aspect of insolvency-proofness this procedure has always been safe for all German participants. One question remained: would this be acceptable to all foreign participants and insolvency administrators if their insolvency law grants retroactive effects to the initiation of insolvency proceedings? Foreign participants, therefore, had to provide legal opinions confirming that the effects of their national insolvency law would not call into question the finality of the payments under the concept of the scheme.

c) This problem has since been solved, since German law alone is now relevant for these questions. This is laid down by section 102 subsection 4 of the introductory law for the German Insolvency Code which, in implementation of Art. 8 of the Guideline 98/26/EG, submits all claims of a participant in a payment system stemming from such a system to the relevant insolvency law of the operating system in any insolvency proceedings involving the participant. In case of the EAF this is German law. This new law entered into force on December 11, 1999. It also incorporated a new section 96 subsection 2 into the German Insolvency Code which excludes all payments already delivered to a payment system from the effects of the initiation of insolvency proceedings up to the end of the day of the initiation. In this way the law ensures that the system can always settle all payments delivered on the day on which a participant falls insolvent, since it only uses the funds provided beforehand. By these measures settlement risk should be avoided as far as possible.

**The legal changes, together with the technical changes to the system, entered into force in September 1998.** They produced a virtually new system in which only phase 2 stayed almost the same, but even in this phase the Collective Liquidity Account is used for the first settlement run and only the second run is directly cleared on the participants' normal giro accounts. As a result, EAF has created a system to exchange payments that requires only a relatively small amount of liquidity. Moreover, it allows participants to extract the funds provided for phase 1 as soon as it has become evident that they will not be needed for further runs, thereby allowing the highest degree of flexibility possible without changing the original basic structure.

## **VI. LATEST DEVELOPMENTS TOWARDS AN INTEGRATED SYSTEM**

After all these developments and refinements, the Bundesbank offers one of the most advanced payment systems in the world. However, the changing nature of the markets has already put new pressure on the system to adapt to changing circumstances. There were two main reasons for this: firstly, the desire of

German and international banks to use global standards for data formats and for communication; secondly, the possibility of achieving synergies by "merging" EAF with the Euro Link System (ELS) – the current German real-time gross settlement system also operated by Bundesbank. Moreover, participants in various euro payment systems perceive a need to have interactive information and control facilities.

The new situation was also influenced by the introduction of TARGET, the Trans-European Real-Time Gross Settlement Express Transfer System, which consists of RTGS systems in all EU countries (and the payment mechanism of the ECB). All systems are interlinked, enabling cross-border euro payments to be settled between the EU member countries in a matter of minutes. The reason the system was set up was to create an adequate payment system in connection with the European Central Bank's monetary policy operations as well as to increase the efficiency of intra-EU cross-border payments. Consequently, the system can be used for large-volume commercial payments as well.

The idea is now to integrate parts of the concepts of the existing EAF and ELS into a single gross payment system with liquidity-saving elements. The new system envisaged for that is called RTGS<sup>plus®</sup>. It will function concurrently as the German TARGET component, thereby optimising the processing and improving the ease of use for the customer.

As TARGET is supposed to consist of gross settlement systems only, for security reasons, it is important to design the new RTGS<sup>plus®</sup> system such that it fulfils the characteristic features of a gross system, while allowing the application of liquidity-saving features as well.

A. This will be achieved by a single-transaction-oriented management procedure for incoming orders in real time, providing immediate settlement and finality. As in any other RTGS system, the precondition, of course, is that sufficient liquidity is available. But RTGS<sup>plus®</sup> has the advantage that it will take reciprocal payment flows into consideration in the entry disposition procedure. Thus, it can combine a secure and fast processing of payments with an optimised use of the available liquidity.

B. There will be two different types of payments in RTGS<sup>plus®</sup> – Express Payments and Limit Payments. Generally, both payment types are processed in the same way. The difference is that

- for Express Payments the entire RTGS<sup>plus®</sup> liquidity is used
- whereas for Limit Payments the participant can additionally use limits defining the maximum liquidity input.

Nevertheless, whenever there is cover available these payments will be effected immediately as well.

Payments which cannot be executed immediately due to a lack of cover will be put into a queue – as in any other RTGS-system – differentiated by their classification.

The Express queue will be resolved event-oriented, i.e. when a defined event (e.g. liquidity input) takes place, the optimisation procedure will be started. In this context only bilateral relationships will be considered. The principle for dealing with the Express queue will follow an optimised First In First Out (FIFO) principle. That means that Express orders which are further behind in the queue could also be executed (even before Express payments which are further to the front of the queue) if an incoming payment leads by offsetting – on balance – to a sufficient liquidity inflow on the account of the participant intending to effect a payment.

The Limit Payments will be treated by similar, but further optimised algorithms to those already employed by EAF. These mechanisms consist of identifying bilaterally or multilaterally offsetting payment flows and using them as cover, thereby allowing a simultaneous booking of all individual payments.

In effect, the queue of Limit Payments will be dissolved in an ongoing process using three types of algorithms. These algorithms are adaptable and will be used according to the situation. The algorithms are differentiated by the size of the group of payments included in an attempt to find matching payments which will even include multilateral approaches. Therefore, the duration of the run increases with the size of the group of payments and participants involved. For this reason, the system will only switch to the next more complex algorithm whenever it cannot achieve acceptable results by the less complex one.

C. The participant will be able to influence the availability of funds for the execution of Limit Payments, since he will have the capability to define limits for the amount which the system can assign to the Limit Payments as a whole and even to an individual bilateral partner, as under EAF, if he wants to. Therefore, the bilateral and multilateral limits for Limit Payments will be considered when applying all algorithms.

In this way the system can provide intelligent queuing, which ensures that payments will be executed as fast as possible, leading to earlier finality.

D. To sum up, it may be said that the character of the system is defined by its orientation to the individual transaction and that the system will always make sure that the execution of Express Payments will not be hindered by the processing of Limit Payments in order not to compromise their finality. Nevertheless, the effects of both elements will be taken care of by the system immediately allowing even more flexible use of the liquidity provided for the system. Thus on the one hand, the system will offer participants a highly sophisticated instrument for managing their liquidity needs, if they want to employ all the fine-tuning elements. On the other hand, it will run on a standard program – assuming no "gimmicks" are requested – making it very easy to handle.

All payments that are not covered by the end of the business day will be returned.

E. Finality will be achieved in this system by direct booking on an account. Therefore, the system this time will include participants' real accounts as the settlement accounts. But these accounts will be segregated from the participants' traditional giro accounts at the Bundesbank and will be reserved exclusively for the needs of RTGS<sup>plus</sup>®. They will have to be replenished in the morning for the system's liquidity needs and will be emptied automatically at the end of day by transferring the balance to a normal giro account of the participant, which may be carried at the Bundesbank but does not have to be. Nevertheless, there will be a so-called "Liquidity Bridge" which will allow participants to transfer funds from the settlement account or top up the settlement account from the regular liquidity accounts according to their needs. The creation of a system of segregated accounts will avoid complicated interfaces between different computer systems which would not allow the speed necessary for the system to search for matching payments and cover.

Hence the technical advances have made it possible to avoid complicated juridical constructs by coming back to the best and most simple way of finality by booking on accounts in short intervals. Owing to the sophisticated information technology employed, the system provides real-time information to the participants which allows them to monitor and actually see when a payment becomes final at the same moment they receive it. This, together with the legal situation in Germany described above (which protects the finality of the system against the effects of insolvency proceedings), will lead to a system without settlement risks.

F. The clarity of the legal structure achieved by this is a helpful side-effect in that the risk-avoiding measures of a system have become an

important marketing feature. As the group of participants grows more and more international, the legal structure devised in order to avoid settlement risks should, therefore, consist of elements easily recognisable for lawyers coming from different jurisdictions. As past experience showed, the legal constructs employed by EAF which were strongly based on peculiarities of German law and German legal thinking proved hard for foreigners to understand. This led to competitive disadvantages.