

December 14, 2018

**RE: Potential Federal Reserve Actions to Support Interbank Settlement of Faster Payments - Request for Comments**

Dear Federal Reserve Banks,

Thank you for the opportunity to comment on the important issues of faster payments and their settlement alternatives.

The opinions and analysis below are my private thoughts based on payment experiences during decades of payment system involvement and use. Before answering the specific listed questions, I have some general remarks on the issues covered in the FED background document and on real-time payment developments in general.

**The main points of my comments are that true real-time payment systems will be the outcome of implementing new payment processing technologies and that the change-over is best promoted by providing a simple, open and completely real-time-based infrastructure built on international standards for payment and settlement processing tuned for 24/7/365 processing and by letting the old legacy payment services and processing patterns to fade away gradually. Real-time developments will profoundly change the liquidity market and competition among financial service providers.**

**Real-time payment vs delayed payments.** The convention of batching and thereby delaying and netting payments was created during the era of paper-based interbank processing and due to telecommunication and processing limitations in 1970s and 1980s when electronic payment services were introduced. These processing limitations have since then disappeared, which can for example be observed in banks' ATM networks, in which cash withdrawals are debited in real-time within global ATM service networks. Moving to real-time credit transfers, which technically are even simpler to provide than ATM withdrawals, has been delayed by the negative incentives of banks to reduce float and increase competition among banks, which real-time services will result in. Real-time payments, especially credit transfers, will make consumers' and companies' payment services more efficient. They can get immediate responses on payment completion and do not need to check later for receivables and possible other payment errors. The payment transfers will be delivered immediately between customers. We are generally moving towards what could be called a "real-time economy", in which all kinds of ordering and delivery information is updated in real-time all through the different involved sub-systems of all commercial participants. In countries where real-time and faster payments have been introduced, volumes have grown rapidly for example in UK and Sweden. It is worth recognizing that most of consumer payments are made during weekends. Night volumes are also growing due to internal payments and automated "internet of things" -type of payments. Different kinds of payment automation schemes will benefit from true real-time payments. Non-cash consumer-to-consumer payments need to become as rapid and final as cash payments. E- and m-commerce will also benefit from simple and final real-time transfers. **Customers will be ready to move large volumes of payments to real-time payments when this modern service is priced based on actual costs, which will undercut the costs of current legacy payments, when real-time payments are processed in a simple and straight-forward mode and in volumes related to the demand at this fee-level.**

**Individual end-to-end controlled real-time vs fast store&forward-based payments.** In real-time processing, payments will be processed individually and without dependencies on each other. This is a major difference compared to old batch-based systems, in which large batches of payments had to be processed simultaneously and non-independently. The other major benefit of true real-time processing is end-to-end control of each individual payment. Payments will be processed using real-time end-to-end dialogues stretching from the sender to the receiver, which ensures that the payment has been correctly recorded and processed all through the employed delivery channels and within in every subsystem of the involved processing parties. Banks have also in some countries introduced faster or near real-time payments, which process individual payments based on store&forward conventions, in which transactions are placed in store&forward queues. These kinds of services lack a built-in end-to-end control, but participants just forward payment transactions and will then have to wait for separate non-linked replies to the original payment transactions in case of processing errors and possible confirmations from the receiving end. It results in that the overall system and its subsystems must process several times the same payment message, when it is placed and resent from different queues and the overall outcome of the payment process is less controlled. The reply messages of successful processing have to be matched with original payment initiation messages and in error situations revocation transactions need to be sent resulting in more complex error handling situations. Modern and efficient real-time systems are based on end-to-end control, which result in more streamlined and easier to control system structures. In a real-time environment successful processing will be confirmed immediately or in case of errors, like unknown receiver, will be immediately noted and corrected. **Today, the most efficient development path is to move directly to true real-time payment processing. Any temporary solutions based on netting and near-real-time solutions will with large probability result in increased costs of intermediary steps, postponement of some of the real-time benefits and delaying competition benefits. Without moving directly to true real-time, the outcome would also lead to payment system complexities of several legacy and modernized systems operating in parallel for a long period without a clear view on what the new common payment technology level should be.**

**Real-time settlement vs delayed net settlement impact on liquidity and risks.** In real-time processing, the individual payment transactions will need to update simultaneously the settlement balances of both the sending and receiving bank (or other type of payment institution). This will result in a settlement balance continuously varying according to the incoming and outgoing payment flow. It will imply that so called long banks with receiving surplus of transaction value will have positive settlement balances, while short banks with surplus of sending value will have negative balances. In a 24/7/365 system there will not be any clear end-of-day break in the payment processing, the payment flow just continues eternally. If the settlement system operates based on immediate settlement transfers, the sending banks need to ensure that they have enough liquidity on the settlement account before sending a transaction, because otherwise the transaction will be stopped. In a system based on credit caps, sending banks can send payments until their settlement balance would violate their credit limits within the system. It is often incorrectly stated that net settlement would reduce liquidity needs in real-time systems. That was true in batch processing, but in real-time payments the settlement balances will vary continuously. If the system would require the long banks to provide short banks credit by delaying settlement requirements (although receiving customer accounts are finally credited), the long banks would grant free credit and accept credit risks of the short banks. Basically, the short banks would free-ride and their liquidity costs would be transferred to the long banks. As the long banks would not receive any liquidity immediately, they would lose opportunities of investing this liquidity, which would belong to them. If the short banks are required to provide collateral for the credit limit to the system, the credit risks would be reduced, but it would still mean that long banks would lose investment possibilities although their credit risks would be covered. However, in a collateral-based overdraft system, the short banks (and basically all banks requiring a credit line) would probably provide more collateral than what would be needed on average for their average negative settlement balances. **The most efficient, simplest and straight-forward settlement convention in a real-**

**time environment is that the settlement of any customer transaction is booked simultaneously (or actually a split second before) crediting of the receiving customer account. All other solutions would become more complex, costly and unfair.**

**Liquidity provision alternatives and markets.** Increasing use of real-time payments and 24/7/365 business hours will change the liquidity markets from day and end-of-day focused markets to continuous markets. A real-time liquidity market operating over all time zones will not show any specific end-of-day timings and processes. There will just be a continuous flow of liquidity and transactions. The end-of-day settlement occasion will lose its significance. In future, liquidity loans/deposits will be provided for shorter time periods within the day and interest will be calculated continuously at least per second. In order to accommodate real-time market developments, central banks would need to move from end-of-day fixings of reserve and intraday day-level credit line calculations to intraday short time interval-based average calculations incorporating intraday fluctuations in account balances of central bank money. In a real-time world, central banks would need to be able to extend liquidity to their counterparties in a flexible and highly automated way, in order for their counterparties to be able to rely on central bank resources even at a very short notice. With growing real-time volumes, banks would probably also start up proper highly automated intraday liquidity markets. The volumes traded on open intraday liquidity markets versus central banks' liquidity services will depend on price/cost levels of these alternatives. If the central bank under-cut costs of the private liquidity market, it will crowd out private volumes and the opposite is true when central bank pricing is too high. Choices will also depend of the cost level of possible collateral requirements. **Economically, the most efficient solution would consist of an open interbank real-time liquidity market supported by automated 24/7 liquidity provision of the central bank with both operating using small time-intervals (e.g. seconds) for interest calculations.**

**Private vs public settlement services.** Basically, providing settlement services implies maintaining settlement accounts for payment system participants. The accounting methodology, processing technology and even platforms for maintaining settlement accounts are exactly the same independent of the settlement service provider. Public settlement services rely on central bank money as a settlement media. In order to function at the same low level of credit/settlement risks, private systems can use collateralized central bank money or government bonds (or other very low-risk assets) as settlement media. The average costs for this type of service will be the same for a private and a public service provider. Any differences would depend on possible efficiency and volume differences. The cost structure of settlement services, in the same way as of payment services in general, is dominated by fixed costs and network externalities, which in most cases results in natural monopolies. Due to the network externalities, there will be limited possibilities for true competition among settlement service providers, without the competition resulting in a monopoly. A duopoly (or another limited number) of parallel systems may emerge, if payment system participants find its important to share their volumes on different service providers in order to ensure some type of artificial competition in the market. The efficiency and price level of the central bank offerings will determine, to which extent the market find it interesting to cooperate on a private settlement service. However, the interest for private settlement solutions is limited in a situation where all banks share the settlement costs on acceptable terms. They will just be content to add same level of settlement costs on their customers. However, there is a risk that especially large, but also other groups of banks, create their own settlement services, because they can see an advantage for a limited group of large participants to form a "closed" settlement group, which provide them with cooperation benefits and at the same time increase the costs of competing smaller, specialized and start-up banks, which then will be become dependent of low-volume public settlement services or layered correspondent-type of settlement services provided by larger banks. **From social point of view, the most efficient solution would be one efficient and open private or public settlement system for which monopoly weaknesses can be controlled and limited. In addition, it would important to avoid the appearance of "closed-group" solutions.**

**Central bank payment and/or settlement support.** A popular discussing issue has been whether the central bank should only provide settlement services or also support payment transfers. It would be better to view this not as an either-or but as a both services setup. Technically the data content will be the same when modern payment standards, like ISO 20022 XML, are used. The only difference is in the more detailed data content needed for complete payments that central banks would need to pass through their systems as remittance information to the receiving banks and their customers. However, the amount of data connected to a payment is no cost or capacity problem in modern IT systems. The important difference will be the solution for end-to-end control in real-time payments:

- in the settlement-only setup, the central bank system needs just to update the sending and receiving settlement accounts and provide an encrypted confirmation reference to the sending bank, which the sending bank will attach to the receiving bank for settlement verification. When the actual payment message is sent directly to the receiving bank this encrypted reference will enable the receiving bank to control correct settlement. In this setup, the sending bank will be in charge of the end-to-end control throughout the payment process.
- in the payment transfer setup, the central bank will take the position of an intermediary, which needs to link the real-time end-to-end control dialogue all the way to the receiving bank. This will also require the central bank to provide different error handling routines for end-to-end dialogue breaks and negative confirmations from the receiving banks (for example non-recognized customer account)

**The most flexible central bank service would be provided, when it would contain both a pure settlement facility and a payment transfer process. Payment service providers could then, case by case, select the most convenient for the specific payment transactions. However, a settlement-only setup would be sufficient when banks have selected to maintain the end-to-end control by themselves.**

**Open or closed infrastructures, flat or hierarchical structure and competition implications.** In most countries, banking and payment services have been a regulated and licensed industry. In the past, some parts of the industry, mainly the largest service providers, built infrastructures for payment and settlement processing with limited “club”-type of participation. Due to logistical limitations in old-time paper- and batch-based processing, those infrastructures were often hierarchical with two or more levels of participants and processing centers. Large banks operated on the highest level and the smaller banks and other payment related institutions had to connect to a large bank for interbank connections. However, modern internet-based solutions are mostly open and flat. All participants of any size operate on equal terms and on same level (compare for example with the structures found in e-mail and mobile telephone systems). Open and flat infrastructures promote competition. All service providers can provide electronic and immediate payments to all their customers in an interconnected network and using integrated solutions. Solutions based on separated non-integrated “silos” will be major obstacles for ubiquity as this will require receivers and senders to connect to several silo-structures to be able to make payments to all business/payment partners. **Openness and flatness are important prerequisites for ubiquity in real-time payments. This implies that any settlement service provided by central banks would need to be based on open participation possibilities for all payment service providers on equal terms. All payment service providers need to be interconnected within the same common integrated payment network environment.**

**Common or proprietary standards.** Another important requirement for general use of a payment infrastructure is common standards. Today, the ISO 20022 XML standard seems to be the most obvious alternative to become the general standard for payment transactions. It has been developed as a

standard suitable to cover the whole payment transaction route from sending to receiving customer, different payment instruments and all service providers along the processing route. It has also many common elements with the related business transactions, for example orders, order confirmations, invoices etc. This makes it easier to integrate these business transactions directly with corresponding payments. Using a general common transaction standard for real-time payment processing will ease the change-over process from legacy payments to modern real-time payments. The ISO 20022 XML standard can contain varying transaction contents during a change-over process and thereby also contain the content of old legacy standards. Creating special proprietary standards for real-time payments would separate the overall payment flow into different processing streams, which would require different kinds of processing patterns and data content in the different payment processes. This is not necessary and not beneficial just because there is a possible difference in the selected processing time requirements. **The payment transaction standard used for real-time payments and their settlements should be based on the currently most efficient payment standards in order to be future-proof and paving the way towards the future, in which real-time payments is the new payment norm.**

**National and/or international reachability.** In practice, Internet is borderless. The number of cross-border payments grows rapidly especially due to the growth of cross-border e/m-commerce. This is also true for different capital and money market transactions. Central banks have, with some small exceptions, focused on providing settlement services for domestic participants in domestic systems. This national focus of central banks results in increasing risks for financial institutions, as they cannot rely on central bank settlement for international transactions, but need to use more risky alternatives. The financial markets have had to rely on complex and risky correspondent banking services for international payments or build international private systems, like CLS, for international settlements. In order to reduce the cross-border settlement risks of financial institutions, central banks would need to accept foreign banks as settlement participants in their settlement systems. For example, foreign banks should be able to settle their dollar transactions directly with US banks on FED accounts and in the same way US banks should be able to settle their foreign currency transactions of a particular currency directly at the central bank providing that currency, for example YEN at Bank of Japan. **In the current open financial capital market and borderless Internet, central banks would need to open their settlement service for international reach in order to support efficient international ubiquity.**

**High efficiency and capacity requirements for large volume processing.** Based on experiences from countries already providing real-time and faster payments, the volume of real-time payments will grow rapidly and constitute to a large extent of normal retail payments. The average value of real-time payments will decrease even further in future, when consumer-to-consumer and automated internet-of-things payments increase in number. This calls for a highly efficient processing structure for real-time payment infrastructures. These infrastructures need also to cope with peak hour capacity demands, because in real-time, consumer payment processing payments cannot be delayed for more than some or at most some tens of seconds before customers will get impatient. The efficiency and capacity levels of current RTGS systems are seldom in line with the future requirements for real-time settlement operations. **Providing real-time settlement services for large retail volumes will most probably require a completely new technical platform developed for high-volume processing for retail payments alone or for a combination of large and retail value payments. In the long-run, a multi-purpose platform will be more efficient as large value payments can be processed along retail payments without any additional capacity requirements and in future the security level of large and retail payments need be aligned (for example, a large number of copied fraudulent retail payments will result in same risks as one fraudulent large-value payment).**

**Simple future-based structure vs legacy-based developments.** It is often tempting to make developments based on available solutions. However, sometimes the technological changes are so advanced that old and new solutions are very difficult to integrated in an efficient way. Providing faster payments based on batch-processing and netting with short intervals will with a high probability result in a suboptimal outcome, both for customers and their service providers. True rea-time services have become the norm in all other industries and especially data processing-based industries. There is no processing relating facts that would point to some other situation within the payment industry. As pointed out earlier, the reason for delayed employment of new technologies in the interbank space is mainly due to lack of competition. Delaying developments have made it possible for banks to postpone investments and customers have had to be content with current inefficient services and pay the higher legacy fees of current payment services as there are very few alternatives. **When the technology changes are so large as with true real-time processing, the most efficient solution will be achieved by building a new future-proof payment infrastructure based the most efficient real-time, network and encryption technologies.**

**Ubiquity and the future overall payment system structure.** The background paper has, in my view, the correct strong emphasis on the need for ubiquitous wide access to safe and efficient faster payments. However, this cannot be achieved by just designing a new efficient settlement system. **The new payment system design will need to cover the whole infrastructure from sending to receiving customer with the objectives to deliver ubiquity, strong security and high efficiency including electronic integration. The new infrastructure must especially be open and flat and including a interconnecting real-time network encompassing all service providers at equal terms. It needs to be based on modern data content, processing and encryption/security standards. Implementation of such real-time infrastructure will require wide cooperation within the industry and with relevant authorities, among which the central bank has often a key position.**

I hope you find my comments helpful in developing the needed real-time payment services and their settlement solutions. Please find below responses to you detailed questions. I will be happy to analyze further specific issues and answer any questions, you would find of interest.

Best regards,

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Answers to specific questions:

1. Yes, an RTGS system can be an appropriate platform for settlement of real-time payments given that it provides standardized application-to-application interfaces for maintaining end-to-end control for processing individual real-time transactions and tuned for processing large numbers of retail payments also during peak hours without prolonged processing times for individual payments.
2. Yes, 24x7x365 payment services will be the future industry norm in the same way as in other internet-based electronic services. Payments will not be an exception from this general trend.
- 3a. In other countries, typical areas for initial faster payment volumes have been consumer-to-consumer payments, consumer-to-small business payments and e/m-commerce related payments. Corporate customers tend to use faster payments also for liquidity transfers and urgent payments. Based on developments in other countries like UK and Sweden, there should clearly be a sufficient demand also on the US market. The US demand could in fact be relatively even larger, because of large e/m-commerce market.
- 3b. How large customer adjustments are needed, depends on the change-over support and policies employed by the individual banks to their customers. At best, customer adjustments are very limited when faster payments are implemented as part of the general e- and m-banking interfaces of the bank and based on already available customer interface standards. How much adjustments are needed by the banks, depends on the current employment of e/m-banking services and real-time system readiness of the particular bank. Banks investment needs and interest depend on how they want to place themselves on the expanding e/m-market. A development strategy of e/m-banking services without faster/real-time payments would in future put a bank with such a strategy in a very inferior competition position compared to other e/m-banking providers.
- 3c. Ideal time to start real-time settlement developments is now and not later. If the central bank will not offer such service in a near future based on a trustworthy project, financial institutions would need to start up their own private interbank settlement system project. When banks have invested in and launched such a settlement system and it has been successful in processing growing real-time payment volumes, it will be very difficult due to network externalities to entice volumes to move to a new public system. Due to the natural monopoly situation, it would probably even be seen as wasting money by creating a parallel competing system for the same volumes without reaching any cost benefits.
- 3d. Banks and bank customers have already in place payment practices supporting 24/7-operations, as most shops are open during weekends and making long hours. In e/m-commerce the norm is 24/7 operations. Companies operating on international markets follow also the international time-zones in their main market areas. Banks that provide ATM and e/m-banking services to their customers have implemented already now 24/7-readiness in their systems. In view of the future real-time developments, it

would be advisable that the central bank updates at least some of its reporting practices from end-of-day reports to daily average reports, which would give more representative statistics on for example liquidity balances.

3e. Keeping separate central bank settlement accounts for real-time settlements will split the liquidity of the banks into two pools. It would increase the liquidity needs of banks and require them to follow both pools and transfer liquidity between these pools. It would be more efficient for most of the banks to use just one account with the same interest earning and reserve requirement rules for all their central bank liquidity. However, some banks might be interested to keep several central bank settlement accounts when this is in-line with their internal liquidity management solutions and payment prioritization conventions. Using just one central bank account for the settlement of all kinds of settlement transactions will for sure be the efficient future norm. Special initial solutions would require changes in the future and would increase overall costs.

3f.i An efficient account address standard is a very essential part of any payment system structure. IBAN has been selected as the international standard for account addressing. In parallel with other cross-reference directories, it would be important to create also a cross-reference directory, which enable straight-forward lookups between IBAN- and the US-type of bank routing and account information. This would promote efficiency of international payments between US and foreign payment accounts. It might also solve some problems within the current US-type of account addressing. Cross-reference tables using telephone-numbers or email-addresses have been used in some countries for different kinds of payments. These could make payment initiation easier for private persons in some situations, however, when private persons initiate electronic payments, they seldom use account numbers, because their customer-friendly e/m-banking interfaces generally provide the possibility to refer to their friends, business associates etc. using nicknames selected by the customers themselves (basically they create their own specific alias/nickname directories for their personal use). With the growing use of e-invoices and e-payment-proposals the receiving account number information is included in the electronic information provided to the sender, so the payers will not need to input any receiving bank account number at all. Some countries have also implemented “portable” account numbers, which promote competition as the customers would have an “own” eternal account number. This portable account number refers continuously to the technical account number in use by the current bank the customer. The portable account number will always be valid and when customers change their bank, it is just the reference information to the actual account that need to be updated, because all payments are initiated using the portable eternal account number. These kinds of reference tables are in continuous use in the Internet and mobile phone environment for example for every email sent and every mobile phone call made. Modern cross-reference table systems are efficient and low-cost. Any such cross-reference directory or systems for several cross-reference directories need to be open for all payment service providers. They need to be efficient to access and update and need to have good data protection features in use. From cost-efficiency point of view, the best alternative would probably be to create a public utility-type of organization operating at self-cost basis, because running such directories is clearly a monopoly setup.

3f.ii The basic starting point for fraud detection should be that the participants in the

settlement system should have such internal fraud detection measures that fraudulent transactions would never reach the settlement system. The settlement system needs to have strong identification and encryption solutions, which hinder any attempts to send any transactions to the settlement system, which are not authorized by the system participants. Basically, every settlement transaction needs to have valid e-signatures. Requiring two separate signatures would improve the security level. Although, the main responsibility stays with the sending participant, it would be advisable to include in the settlement system different kinds of monitoring alarms, which are alerting for example on too large or small volumes, too many transactions to non-typical accounts etc. within the settlement system.

- 3f.iii Generally, it is best to create a very simple “core” settlement system, which in future can handle very large number of even very small settlement transactions. The core needs to be highly efficient and not burden by seldom used auxiliary services. In modern real-time environments, it is easy to create separate “modules” for auxiliary services, which are accessed when needed. For efficient liquidity handling in the real-time world, financial institutions need to create their own internal liquidity management tools, which will control the payment flows in different payment and settlement systems based on the expected liquidity needs and the liquidity policy of the specific institution.
- 3g. Ubiquity require a common settlement system and transaction route platform employed by all payment service providers. This could be a developed version of current RTGS services, but it could also be a private real-time interbank payment platform. It is up to the industry and the central bank to agree on the investment plan for creating the common real-time payment platform.
- 3h. The developed RTGS service could be the general settlement platform for all kinds of payment flows. It could also, as pointed out in the beginning, be used to route payment information annexed to the settlement transactions. This is also an issue for which the market participants and the central bank need to find agreement.
- 3i. Creating efficient payment infrastructures requires deep cooperation among all parties.
4. The most efficient outcome would be when the liquidity available would reside in one common pool and there would not be a need for transferring liquidity back and forth between different liquidity accounts, as this would split the overall liquidity and result in unnecessary transfers and monitoring tasks.
5. If the central bank creates a system, which require the use of two or more liquidity accounts some kind of liquidity management tools will be necessary. However, it would be worthwhile to try to find solutions with which such system complexities could be avoided. There is very little - or probably even no - benefits to be gained by using parallel liquidity accounts in the emerging real-time payment processing environment.
6. To develop a highly efficient modern 24x7x365 RTGS service would the best option.
7. Payment ubiquity will not be achieved by just providing a settlement system with or without a liquidity management tool. It is highly important that the industry participates in creating the overall standards and customer service conditions, which enable customers to start using real-time (faster) payments. In some countries, ubiquitous

real-time payment services have been implemented by banks in cooperation without active central bank (or other authority) involvement. In other countries, central banks have employed weaker or stronger moral suasion-type of pressures. In some cases, strong regulatory-type of solutions might be needed.

8. There is a need to design an overall infrastructure for real-time payments of which the settlement service needs to be a highly efficient and integrated part.
9. The current US payment system seems to be very fragmented compared to many other national payment systems. Payments are to a lower extent efficiently integrated with other business processes and old-time payment solutions, like cheques, are still used in large numbers, compared to more modern payment environments. Launching an overall payment efficiency upgrading and true competition increasing undertaking based on end-customer needs could provide major benefits for the US economy.