



Faster Payments Interoperability

As US payments stakeholders address policy issues concerning faster payments, there have been many discussions around the best ways to achieve ubiquity in the ecosystem. We understand that as we move to modernize the US payments system, end users - both businesses and consumers – will want solutions that allow them to easily pay or be paid by others. The idea is to enable individuals to make payments to anyone else in a seamless, secure and simple way that meets the demands of today’s customers – digital, fast and easy to use. Interoperability, which can take a variety of forms, may help the US extend faster payment functionality to consumers and businesses across the country and further the goal of spreading the benefits of faster payments broadly.

Part of the mission of the US Faster Payments Council (FPC) is to facilitate understanding, convene stakeholders and reconcile issues that may limit interoperability of payments networks and services. The Network Committee of the FPC, comprised of payment network operators, is well positioned to provide objective information to FPC members and all stakeholders in the U.S. about faster payments interoperability based on our role in the payments ecosystem, our international experience, and collective institutional history. To ensure that the industry is exploring the topic with a common baseline of understanding, the FPC believes it is critical to compare the different models and considerations that must be addressed.

We present this paper as a first, important step as we build a common understanding of payments interoperability. We envision the industry adopting an approach that considers both solid short-term solutions as well as the vision for the US payment system longer-term. We believe that when the industry comes together with this common understanding of payments interoperability, we can achieve the desired impact.

Overview of Payment Interoperability

Interoperability in a faster payment system can help achieve seamless processing - both sending and receiving - of payment instructions across various payment solutions. This can significantly benefit all players in the ecosystem if it provides access and reach to any end-user, regardless of the network their financial institution connects to. Through interoperability, the ecosystem can promote competition, reach and scale.

Models for Payments Interoperability

It is important to remember that interoperability is a tool, not a goal in and of itself. For some networks, the goal could be to extend reach; however, another network may need interoperability to add functionality to its network. Given the complexities and differences between faster payment systems, there is no one model required to achieve payment system interoperability. When considering different approaches, it is important to keep three questions top of mind:

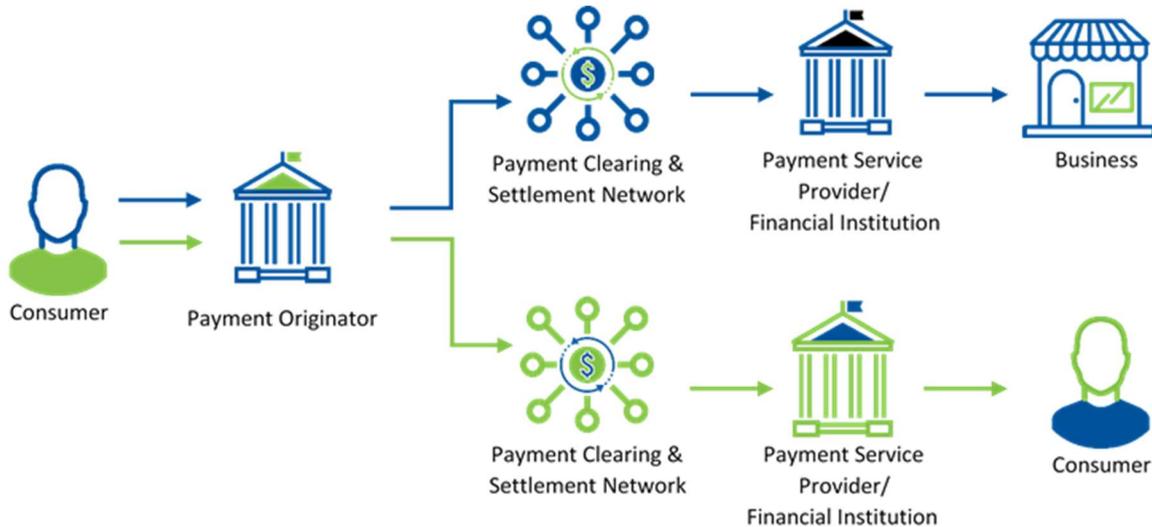
1. What is the overall objective of interoperability?
2. Which parties should be interoperable?
3. What impact will it have on senders and receivers, if any?

Answering the first question, and defining the objective for interoperability, will help identify which parties are interoperable. Payment service providers, third-party processors, and other networks are all viable options to accomplish interoperability, and their impact varies depending on the model chosen.

In general, payment system interoperability can occur three ways: at the point of origination, at the network level, or with an intermediary.

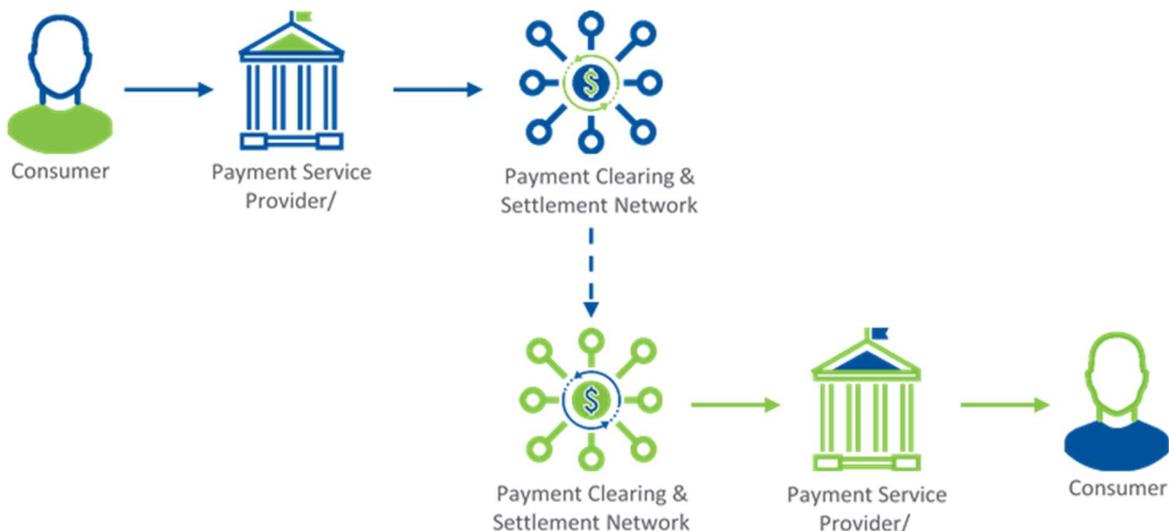
1. Point of Origination

A payment service provider or financial institution to the payment originator has access to two or more clearing and settlement networks.¹ The payment originator can accept or send payments on any of the networks, with the payment service provider enabling the transaction. For example, through the point of origination model, a merchant is able to accept multiple card brands through a single merchant processor or acquirer. Another example is an integrated disbursement service that allows companies to originate payroll or insurance claim payments via ACH, checks, wire transfers or one of the faster payment services through a single interface. Interbank clearing and settlement for payments on each network is separate.



2. Network to Network

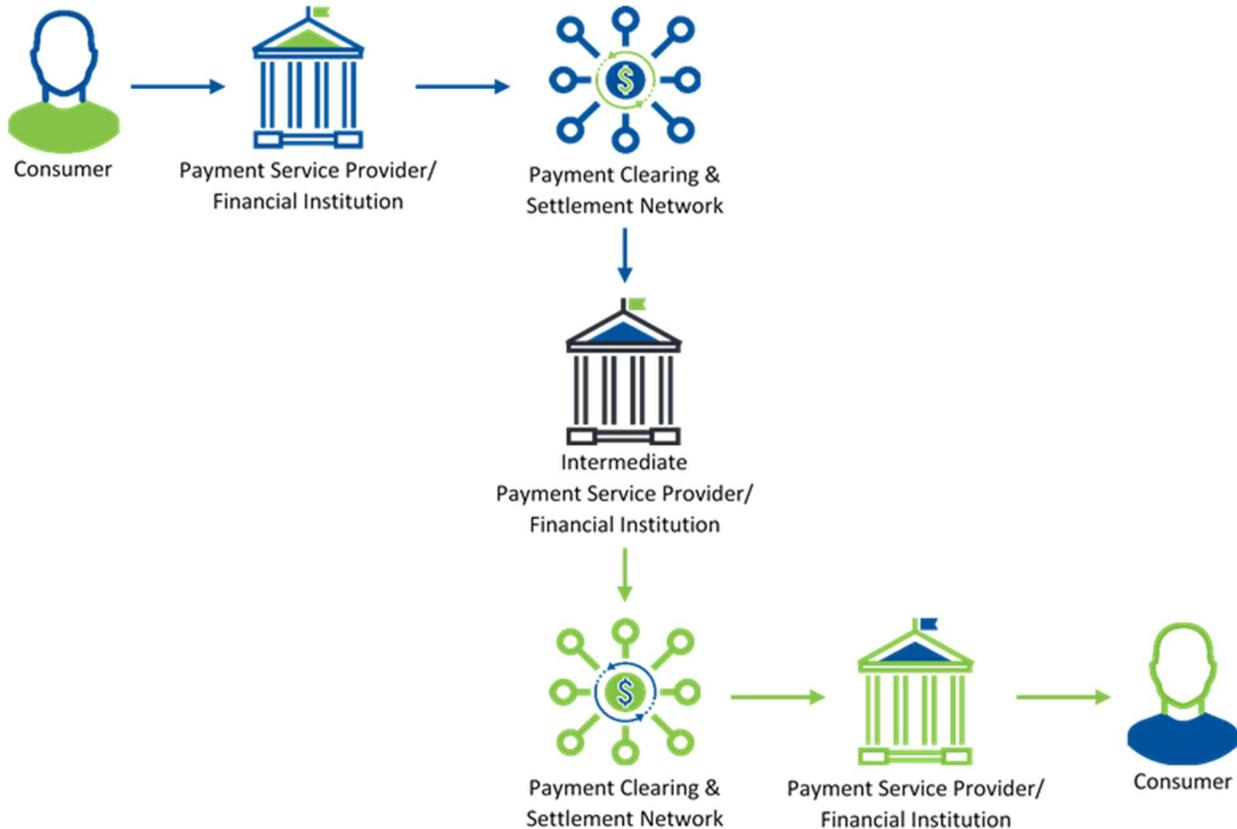
Two clearing and settlement networks exchange transactions so that a payment message initiated on one network can be delivered to a receiver on another network. Payment service providers or financial institutions do not need to connect to both networks; a single connection to the network of their choice can be used to send or receive transactions to endpoints on either one. All participating financial institutions, however, must use the same settlement network for inter-network transactions. Today, this model allows financial institutions to choose between FedACH and EPN to connect to the US ACH.



¹ A clearing and settlement network is a system that provides infrastructure allowing the exchange of payment messages containing information about a payment transaction (clearing) and the transfer of assets to discharge an obligation related to a payment message (settlement). For certain payment services, clearing and settlement can be conducted on separate systems.

3. *Intermediary as Party to the Payment*

An intermediary receives a payment from one party and sends it to another party. The end-to-end process involves a chain of payments through one or more intermediaries. This model has been used for centuries to clear checks, with correspondent banks acting as intermediaries. It is also the way most international wire transfers are cleared and settled through correspondents. Each leg of the transaction is cleared and settled separately. The ultimate payer and payee, as well as their service providers or financial institutions, depend on the intermediaries to execute both sides of each transaction.



The following table compares the three models for payment system interoperability, including which players must be involved to achieve interoperability and the most common uses cases. This table is intended to help industry members answer the three critical questions outlined in the beginning of this section. It is important to note that the descriptions of settlement outlined below are the norm in most cases; however, there may be situations when settlement is achieved in a slightly different manner.

	Origination	Network to Network	Intermediary
<i>Point of Integration</i>	Payment Service Provider/Financial Institution	Network	Intermediary Payment Service Provider/Financial Institution

	Origination	Network to Network	Intermediary
Settlement	Settlement for payments on each network is separate. If the payment originator’s payment service provider is an aggregator for other parties, it may fund payments across multiple networks with a combined “settlement” transaction for each of its clients, but this does not eliminate the need for discrete settlement for each rail.	In most cases, participants in both networks must participate in the same settlement network if they want to send or receive cross-network payments. This could mean that all participants join one of the two networks to use its settlement process for inter-network payments. This is essentially how FedACH and EPN settle for inter-operator ACH entries — EPN participants also join the FedACH network. Alternately, participants in both networks could become part of a third settlement arrangement.	An intermediary payment service provider or intermediary financial institution that is a participant in both networks settles separately with each network for inter-network payments. Each network maintains its existing settlement processes. In some models, there are multiple intermediaries.

Understanding Settlement – A Unique Aspect of Payment Network Interoperability

Settlement is one of the defining characteristics of a payment system because settlement is how the transfer of value from one party to another occurs. Until settlement is completed, there is the risk of loss for one or more parties to a payment; thus, settlement is an essential part of any payment process.

There are a variety of different models for settlement, but overall, they can be defined in terms of two factors: timing and netting. *Note: Further information and examples for how each settlement type works is included in Appendix A.*

- Timing: Deferred or Real-time Settlement**
 Payments can be settled in real-time, (at the same time payments are cleared), or settlement can be deferred until later.
- Netting: Gross or Net Settlement**
 Each payment can be settled individually, what is known as gross settlement, or a group of payments can be netted against each other and settled for the net amount. Net settlement processes can be further divided into bilateral net settlement between two parties, and multi-lateral net settlement among multiple parties.

Based on the timing and netting factors, a settlement process can be defined as one of the following:

1. **Deferred Gross Settlement**

Every payment message is followed later, by a corresponding settlement payment. This can be a single settlement payment, such as a “covering wire” that follows a payment instruction sent on the SWIFT network. It could also be a single settlement payment that covers multiple payment instructions from one party to another, such as a single ACH payment or wire transfer sent by a bill pay service to settle multiple payments to the same biller. In either case, the receiver is at risk until the settlement payment is complete.

2. **Deferred Bilateral Net Settlement**

Multiple payments sent and received between two parties are offset against each other, with the party sending more than they received owing the other party the net amount. This net amount can be settled later by a single settlement payment or by book transfer between accounts held at the same institution. Deferred bilateral net settlement is commonly used in situations where two parties both send and receive many payments to each other, including trade credit, FX trades and “direct send” check or ACH exchanges.

3. **Deferred Multilateral Net Settlement**

Multiple payments sent and received between multiple parties are settled against each other, with the parties sending more than they received owing the other parties the settlement net amount, and net receivers receiving their settlement net value. This is a common form of settlement for batch payments, including check clearing houses, ACH and card networks.

4. **Real-time Gross Settlement (RTGS)**

Each payment is immediately settled as an integral part of the clearing process. RTGS settlement is generally final and irrevocable, so the receiving party can use funds immediately without possibility of reversals or chargebacks. Settlement can be effected either by transfer between accounts at a central bank (e.g. Fedwire) or on a ledger backed by risk-free funds or collateral (e.g. CHIPS). High-value sure transfer systems usually employ RTGS, and it is becoming more common for immediate retail payments (e.g. RTP & FedNow in the US, RT1 & TIPS in the EU).

The form of settlement is an important factor when considering options for interoperability between faster payment systems. Settlement is an essential element of a payment transaction, determining such factors as revocability, access to final funds, and credit risk among participants. These factors have a bearing on both banks participating in a service and their end user customers.

While real-time payment might imply that real-time gross settlement (RTGS) is the logical settlement model to achieve interoperability, for individual faster payment services that are based on RTGS, a question arises about how settlement could be handled if the services were to connect and send payment messages back and forth between or among multiple services. With an RTGS service, settlement is embedded within the service on a payment-by-payment basis, thus inter-service settlement could involve new processes within one or more of the individual services. New processes could impose new costs on the services involved.

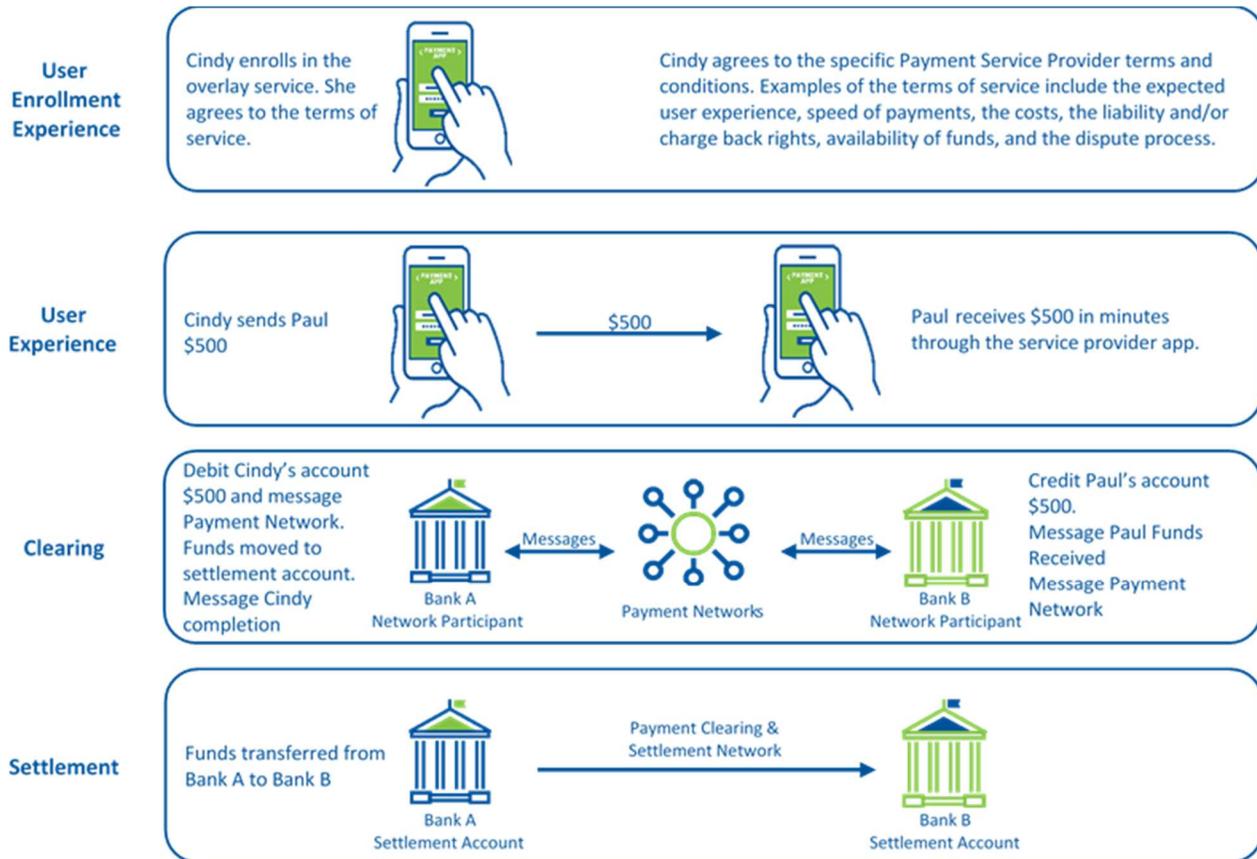
Interoperability for real-time payment services using deferred net settlement would also impose new costs on the services involved. For example, credit risk mitigation arrangements that are put in place to manage counterparty credit risk in deferred net settlement (e.g., collateralization of net exposures and loss sharing arrangements) would also need to be established on an inter-service basis. In addition, an inter-service net settlement agent would likely need to be established.

Differences between RTGS and deferred net settlement offer a distinct contrast as reflected in the table below:

	Deferred Net Settlement	Real-time Gross Settlement
Timing of settlement	Sometime after clearing, which could be hours later	Simultaneous with clearing
When is settlement final?	Occurs at a scheduled time after clearing	Immediately upon clearing
What can cause settlement to fail?	A participant does not fulfill its settlement obligation (e.g. bank failure, operational problems, other issues that prevent funding of settlement position)	Insufficient funds in settlement account or position at the time of payment clearing
When can settlement fail?	After payment is cleared, at time of net settlement	Immediately after initiation
What happens if settlement fails?	Payments are reversed or settlement is recast without defaulting participant	Payment is rejected
Are any participants at risk of losing funds due to settlement failure?	Yes, unless net debit positions are fully pre-funded or collateralized	No, participants are not allowed to accrue inter-participant net debit or credit positions
How can settlement risk between participants be mitigated?	Pre-funding or collateralization of net debit positions enforced by net debit limits	N/A
Can payment clearing continue if the settlement system is unavailable?	Typically, yes. The exception is if the payment system cannot enforce net debit limits without access to the settlement system.	Usually, no. Some payment systems allow participants to receive payments if they choose to accept risk of loss due to unsettled payments, but this is uncommon

Overlay Services

Overlay services are not models for interoperability. However, they are an important element in the faster payments ecosystem. In an overlay service, the sender and the receiver of a payment are users of the same payment service (e.g. Zelle, Venmo) and therefore have common expectations regarding user experience, rights, and obligations, regardless of the underlying clearing and settlement networks used. An overlay can add a layer of value to a single underlying payment network. When more than one network is involved, overlay services can be thought of as an enhancement of the Point of Origination payment interoperability model, designed to ensure that the end-user experience is consistent and seamless.





Conclusion

As digital modernization occurs in the world around us, consumer behavior has shifted to expect digital-first experiences. Consumers and businesses alike are embracing this digital transformation and increasingly depend on the ability to pay, and be paid, in a fast, seamless and secure manner. Payments interoperability, which can take a variety of forms as outlined above, is an approach to extend the reach and ubiquity in the faster payments ecosystem.

Defining the different ways to deliver payments interoperability and exploring business considerations and underlying technical complexity is a necessary first step in creating a thoughtful discussion. We hope that by providing a thorough description of the models for payments interoperability, outlining the distinct settlement options, and describing how overlay services affect interoperability, we will be able to have an industry-wide conversation on the various approaches the US market could take to achieve ubiquity. In a market, like the US, when there are many diverse faster payments networks and overlay services, there will be multiple approaches to achieve ubiquity. While this paper unpacks many of the important aspects for payments interoperability, the Network Committee will continue to develop materials that drive the conversation forward, including other whitepapers that define risks and considerations.

Appendix A: More Information on Each Type of Settlement

While each type of settlement provides for a change in financial position of each participating financial institution, the timing and netting also factor into how the settlement itself occurs. The following examples reflect how the different types of settlement are applied across a financial system containing three fictitious financial institutions: FPC Credit Union, Rock Creek Bank, and Autumn Leaf Bank.

The following reflects the starting balances of each financial institution:

	Balance
<i>FPC Credit Union</i>	\$63
<i>Rock Creek Bank</i>	\$147
<i>Autumn Leaf Bank</i>	\$130
Total	\$340

Day 1

The three financial institutions initiate the following transactions to each other (also reflected in the diagram):

FPC Credit Union

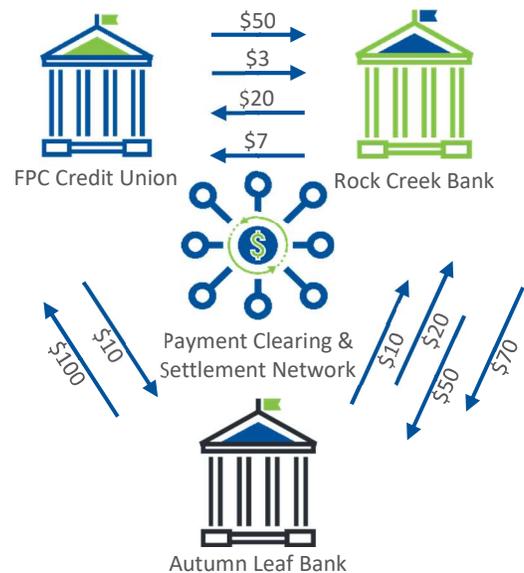
1. Sends Rock Creek Bank a \$50 transfer
2. Sends Rock Creek Bank a \$3 transfer
3. Sends Autumn Leaf Bank a \$10 transfer

Rock Creek Bank

1. Sends FPC Credit Union a \$20 transfer
2. Sends FPC Credit Union a \$7 transfer
3. Sends Autumn Leaf Bank a \$50 transfer
4. Sends Autumn Leaf Bank a \$70 transfer

Autumn Leaf Bank

1. Sends FPC Credit Union a \$100 transfer
2. Sends Rock Creek Bank a \$10 transfer
3. Sends Rock Creek Bank a \$20 transfer



The following table reflects the ending Day 1 balances of each financial institution:

	Balance
<i>FPC Credit Union</i>	\$127
<i>Rock Creek Bank</i>	\$83
<i>Autumn Leaf Bank</i>	\$130
Total	\$340

Although the balances would be the same after Day 1, settlement could have occurred in different ways depending upon the type of settlement used for the underlying payments.

1. **Deferred Gross Settlement**

Deferred means that each financial institution participant settles what it owes to another financial institution at predetermined times.

Gross Settlement means individual payments or the aggregate of what is owed is charged against the settlement account for each participant.

Applying the Day 1 transactions, the underlying settlement transactions are recorded in each participant’s settlement ledger as follows at settlement time:

FPC Credit Union

	Debits	Credits	Running Balance
Day 1 Opening Balance			\$63
Rock Creek Bank	\$53		\$10
		\$27	\$37
Autumn Leaf Bank	\$10		\$27
		\$100	\$127
Day 1 Ending Balance			\$127

Rock Creek Bank

	Debits	Credits	Running Balance
Day 1 Opening Balance			\$147
FPC Credit Union	\$27		\$120
		\$53	\$173
Autumn Leaf Bank	\$120		\$53
		\$30	\$83
Day 1 Ending Balance			\$83

Autumn Leaf Bank

	Debits	Credits	Running Balance
Day 1 Opening Balance			\$130
FPC Credit Union	\$100		\$30
		\$10	\$40
Rock Creek Bank	\$30		\$10
		\$120	\$130
Day 1 Ending Balance			\$130

Note: Each participating financial institution must have the full amount available for the transactions they are sending.

2. **Deferred Bilateral Net Settlement**

Deferred means that each financial institution participant settles what it owes to other financial institutions at predetermined times.

Bilateral Net Settlement means that each financial institution participant charges only the net amount of what is owed against the settlement account for each participant 1 to 1.

Applying the Day 1 transactions, the underlying settlement transactions are netted together across participant pairs as follows:

- FPC Credit Union and Rock Creek Bank
 - FPC Credit Union to Rock Creek Bank: \$53
 - Rock Creek Bank to FPC Credit Union: \$27
 - **Net Transaction is FPC Credit Union to Rock Creek Bank: \$26**
- FPC Credit Union and Autumn Leaf Bank
 - FPC Credit Union to Autumn Leaf Bank: \$10
 - Autumn Leaf Bank to FPC Credit Union: \$100
 - **Net Transaction is Autumn Leaf Bank to FPC Credit Union: \$90**
- Rock Creek Bank and Autumn Leaf Bank
 - Rock Creek Bank to Autumn Leaf Bank: \$120
 - Autumn Leaf Bank to Rock Creek Bank: \$30
 - **Net Transaction is Rock Creek Bank to Autumn Leaf Bank: \$90**

The netted amounts are recorded in each participant’s settlement ledger as follows at settlement time:

FPC Credit Union

Netted			
	Debits	Credits	Running Balance
Day 1 Opening Balance			\$63
Rock Creek Bank	\$26		\$37
Autumn Leaf Bank		\$90	\$127
Day 1 Ending Balance			\$127

Rock Creek Bank

Netted			
	Debits	Credits	Running Balance
Day 1 Opening Balance			\$147
FPC Credit Union		\$26	\$173
Autumn Leaf Bank	\$90		\$83
Day 1 Ending Balance			\$83

Autumn Leaf Bank

Netted			
	Debits	Credits	Running Balance
Day 1 Opening Balance			\$130
FPC Credit Union	\$90		\$140
Rock Creek Bank		\$90	\$130
Day 1 Ending Balance			\$130

Note: Each participating financial institution does not need to have the full amount available for all the transactions they are sending, and only the net amount is recorded in the settlement accounts.

3. **Deferred Multilateral Net Settlement**

Deferred means that each financial institution participant settles what it owes to other financial institutions at predetermined times.

Multilateral Net Settlement means that each financial institution participant charges only the net amount of what is owed against the settlement account across all participants.

Applying the Day 1 transactions, the underlying settlement transactions are netted together across all participants as follows:

- FPC Credit Union, Rock Creek Bank, and Autumn Leaf Bank
 - FPC Credit Union to Rock Creek Bank: \$53
 - Rock Creek Bank to FPC Credit Union: \$27
 - FPC Credit Union to Autumn Leaf Bank: \$10
 - Autumn Leaf Bank to FPC Credit Union: \$100
 - Rock Creek Bank to Autumn Leaf Bank: \$120
 - Autumn Leaf Bank to Rock Creek Bank: \$30
 - **Net Transaction is Rock Creek Bank to FPC Credit Union: \$64**

The netted amounts are recorded in each participant’s settlement ledger as follows at settlement time:

FPC Credit Union

Netted			
	Debits	Credits	Running Balance
Day 1 Opening Balance			\$63
Rock Creek Bank		\$64	\$127
Autumn Leaf Bank	No settlement transaction required		
Day 1 Ending Balance			\$127

Rock Creek Bank

Netted			
	Debits	Credits	Running Balance
Day 1 Opening Balance			\$147
FPC Credit Union	\$64		\$83
Autumn Leaf Bank	No settlement transaction required		
Day 1 Ending Balance			\$83

Autumn Leaf Bank

Netted			
	Debits	Credits	Running Balance
Day 1 Opening Balance			\$130
FPC Credit Union	No settlement transaction required		
Rock Creek Bank	No settlement transaction required		
Day 1 Ending Balance			\$130

Note: Each participating financial institution does not need to have the full amount available for all the transactions they are sending, and only the net amount across all participants is recorded in applicable settlement accounts.

Deferred Multilateral Net Settlement is used in most payment systems around the world. While this settlement type provides the best financial leverage for financial institutions, it is the method with the highest systemic risk so appropriate safety mechanisms need to complement this approach.



4. **Real-time Gross Settlement (RTGS)**

Real-time means that each financial institution participant settles what it owes to another financial institution at the same time as the underlying payment is cleared.

Gross Settlement means individual payments of what is owed is charged against the settlement account for each participant.

Applying the Day 1 transactions, the underlying settlement transactions are recorded in each participant’s settlement ledger as follows as the payment is cleared:

All RTGS Participants

	Payment Amount	FPC Credit Union Running Balance	Rock Creek Bank Running Balance	Autumn Leaf Bank Running Balance
Day 1 Opening Balance		\$63	\$147	\$130
<i>FPC Credit Union to Rock Creek Bank</i>	\$50	\$13	\$197	
<i>FPC Credit Union to Rock Creek Bank</i>	\$3	\$10	\$200	
<i>Rock Creek Bank to FPC Credit Union</i>	\$20	\$30	\$180	
<i>Rock Creek Bank to FPC Credit Union</i>	\$7	\$37	\$173	
<i>Autumn Leaf Bank to FPC Credit Union</i>	\$100	\$137		\$30
<i>FPC Credit Union to Autumn Leaf Bank</i>	\$10	\$127		\$40
<i>Rock Creek Bank to Autumn Leaf Bank</i>	\$50		\$123	\$90
<i>Rock Creek Bank to Autumn Leaf Bank</i>	\$70		\$53	\$160
<i>Autumn Leaf Bank to Rock Creek Bank</i>	\$10		\$63	\$150
<i>Autumn Leaf Bank to Rock Creek Bank</i>	\$20		\$83	\$130
Day 1 Ending Balance		\$127	\$83	\$130

Note: Each participating financial institution must have the full amount available for the transactions they are sending.

FPC Network Committee Members:

- Steve Ledford – The Clearing House (Chair)
- Jonathan Gwynn – American Express
- Ashley Roberts – American Express
- Laura Weinflash – Early Warning
- Susan Foley – Federal Reserve System
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