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MERCATOR ADVISORY GROUP

MODOPAYMENTS:

ORCHESTRATING PARTNERS AND PAYMENTS ACROSS ANY PAYMENT NETWORK

A Mercator Advisory Group Research Brief Sponsored by ModoPayments

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Introduction

Perhaps the most common point of friction between commercial partners is the effort associated with keeping the books balanced between the two entities, which typically have very different perspectives. This friction is most often addressed using trusted third parties that provide arbitration and occasionally escrow services at no small cost in labor and fees. The most frequently stated application of the blockchain is to establish a shared ledger between trading partners that eliminates this point of friction, but this solution is practical only if the commercial partners make substantial changes. There are several reasons such an application is impractical:

First, the partners must agree to work with a cryptocurrency, or at least another ledger, rather than existing payment and communications networks; otherwise, exchanges and exchange rates remain an ongoing point of risk, cost, and yet another set of books.

Second, partners must understand regulatory issues associated with blockchain and Bitcoin solutions and address regulators' concerns.

Third, all parties need to understand and deploy the blockchain technology and integrate it into their existing systems. Because the blockchain is a distributed solution, making changes to the shared software implementation, for example simply to add a field, requires that all parties agree and that the ledger "fork," an event that occurs when a new ledger instance is created.

Last, the blockchain inherently makes all transactions between parties visible to each participant (even if they are not direct parties). Even though the identities of participants in a given transaction are protected by encryption, this means that other participants in the blockchain learn about the existence of a transaction, which is often still a strategic insight. For instance, seeing a number of high-value transactions between new participants might hint that a new business partnership is in the works before its public disclosure.

These issues represent major inhibitors to rapid deployment and adoption of blockchain in business-to-business, or B2B, environments.

There is, however, a solution that doesn't require a new legal framework, trust in untrusted software, or even the deployment of a new payment network. It is possible today to utilize a trusted third-party arbiter to assure that every transaction is recognized and properly logged and all parties accounted for. (This means accounting for all perspectives of each cooperating party are accounted for no matter how many parties or how complex the transaction). Doing this requires an automated rules-based double-entry ledger system that includes connectors to public and private payment networks, which can be modified easily from a central, cloud-based location. Enter ModoPayments, or just "Modo" to its friends, which has already implemented this solution for multiple business partners.

Orchestrating Payments Using Modo's COIN® Platform

Evaluation of the ability of the Modo platform to orchestrate payments and partners across any payment network depends on understanding its two most important characteristics. First, the platform normalizes multiple networks and payment systems. Second, the platform shares the state of any set of interlocked payment transactions with all of the partners participating in that set of transactions.

Normalizing Multiple Payment Networks and Payment Systems

The Modo platform normalizes the full life cycle of all underlying payment networks. Every network has its own complex set of methods that enable it to operate. These include sending and receiving messages, timing the initiation of a payment instruction, clearing a payment request, finalizing settlement between accounts, and managing potential disputes. The Modo platform integrates to every network or payment system, recognizes each difference, and maps each network's operation to an internal Modo finite-state machine that is implemented and managed by the platform. This finite-state machine enables Modo to manage accounts and funds as the network process transitions from payment initiation to funds movement to settlement and then to payment finality, which guarantees nonrepudiation.

Because the Modo platform automates and records all state machine transitions associated with each payments system, it also greatly increases the automation of payments and reduces errors. If an error does occur, the platform can automate many exceptions. The normalization and bookkeeping functions are extremely beneficial in themselves, for instance simplifying reconciliation for just one side of the transaction. They become even more functional when these network-specific finite-state machines are combined with transaction-specific finite-state machines into a set of interlocking state machines. Funds movement can be tracked across multiple accounts and multiple networks, with guarantees of status and state, unlocking the opportunity to automate next steps and responses along the way. The normalization of these diverse systems allows better insight into the condition of transactions that are in process with other partners. The state of every external payment system and transaction as well as the aggregate state of all of the networks and all of the transactions taken as a whole is tracked and balanced within the Modo platform state machine, which is described next.

Sharing the State of Interlocked Transactions

The Modo platform becomes even more valuable when used to establish a shared perspective between payment partners across multiple payment networks. That is because the interlocking state machines can automate the payments and workflows to implement unique new business functions (some examples are discussed later in this research brief). Because payment instructions are automated and tightly coupled to the associated accounting and validation rules, Modo facilitates not only the movement of value between diverse sources and destinations connected through the platform but also the double-entry bookkeeping ledger that provides each partner its own unique interlocking perspective of transactions that is properly balanced and rationalized. As an example, when fees or taxes are associated with a transaction between partners, then the

workflow associated with the state machine recognizes how and when the values are determined, in which denomination the fees will be extracted from which account, and where the fees will ultimately be deposited.

When a complex set of activities such as these is conducted manually, or even automated by a system that manages the transaction from only one perspective, the books kept by the different parties often fall out of sync, necessitating a costly and time-consuming reconciliation and sometimes even an audit to uncover the problem. Modo's platform automates the generation of the connections between transactions, it incorporates complex rules that can manage fees, taxes, or any other calculations associated with a transaction, and then it can manage the settlement to all parties in any currency via the payment network each prefers. The platform does this while clearly representing the state and status of the transaction to all parties so everyone authorized can see the transaction and see the timing from all perspectives.

Equally important, the Modo platform can also unwind a transaction, in part or in whole, should any aspect of the interlocked state machines detect an error or unacceptable delay. As a simple example, imagine that two partners have agreed that if partner A accepts a transaction it will pay partner B a fee. The Modo finite-state machine will require that these instructions be more explicit. Will the fee sent to partner B be initiated after the payment instruction is issued, after the clearing records are accepted, or after settlement is received? Unwinding a transaction because of an error or reversal depends on this level of detail. For each step of that transaction, rules are defined for error conditions and state transitions. Perhaps the fee is placed into an escrow account until settlement. If that settlement record is not received within a specific time frame, then the fee can be removed from the escrow account back to partner A until the transaction is re-sent and eventually settled. This workflow structure is described in greater detail later in this research brief.

Modo and the Network Effect

As Modo's COIN® platform is deployed into more environments and connects to more networks and payment partners, the cost and the effort of adding new solutions over the already established networks decrease. Once established, the platform's connections to ACH, SWIFT, Visa, Mastercard, clearXchange (soon to be Zelle), PayPal, or Alipay, as well as store gift cards and proprietary lending, offer, and loyalty platforms can be easily re-used by all other applications. When the platform is connected to a merchant's prepaid store card network, that network can be used by any other partner if permission is granted. For example, one merchant might decide to let its customers redeem points at another merchant's point of sale at an exchange rate agreed by both merchants. Once this exchange rate is established on the Modo platform, a consumer entering the second merchant's premises will be able to generate a bar code, or even an open-loop virtual card, representing the balance agreed to through the exchange rate. When the purchase is made, the settlement is done via the specified network and both parties can view the transaction from their own perspective. Manual exceptions become a thing of the past.

As more merchants are added, the network effect grows and the cost of establishing partners decreases. Note that this is possible only because connections and rules are automated, tracked, and managed on a peer-to-

peer basis. Each peer can view each transaction and identify exactly how the rules executed and what the books look like on its own side of the equation. It is impossible for the two books to veer off at any point without an alarm sounding and the transaction processing stopping, but there is no reason for the alarm to sound when the books are maintained by a peer-reviewed automation engine.

Modo: Managing Complexity So You Don't Need To

Managing payments across multiple partners and multiple networks, each with different rules and settlement times, is no simple matter. It requires recognizing that transactions may be cascaded across partners and networks, perhaps based on exceptions or limits reached within the transaction. This Mercator Advisory Group research brief is not intended to document the technical details of how Modo manages such complexity, but we would be remiss if we didn't briefly describe the components that make it possible.

The aspect of the Modo platform most responsible for managing this complexity is called COIN®. It is a transaction service that is both patented and trademarked. COIN utilizes a real-time accounting engine to assure a reliable and managed transition of value between arbitrary sources and destinations. It manages the full life cycle of the underlying payments transactions, from initiation through compliance checks, instructions for funds movement and settlement, and finally past the point of repudiation utilizing interlocking state machines. COIN also recognizes exceptions and situations likely to generate a dispute (when ledgers are out of balance), and because it recognizes the accounting perspectives of all partners involved in the transaction, it can also implement defined workflow steps either to correct or to back out of error conditions accordingly.

The components of the Modo platform are as follows:

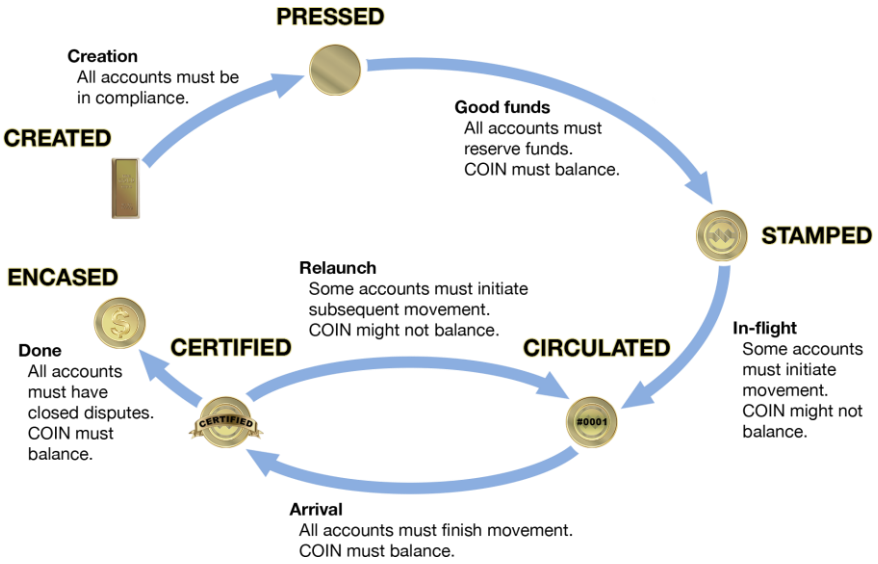
1. *The core of the Modo platform is COIN,* which provides the primary functional services of the system as well as the formal finite-state machines that control the functional behavior of any given COIN transaction. COIN comprises a set of ledgers (COIN Accounts) that reflect the financial balance of each participant during the course of the transaction.
2. *Representational State Transfer (RESTful) application programming interface, or API, services that enable the platform to be accessed by customers.*
3. *The Vault is where secure credentials and other secure information associated with transaction processing or user requests are stored***.** It includes all cryptography functions to avoid cryptographic support in multiple places throughout the system which accommodates change management. The Vault leverages hardware security modules (HSMs) to ensure the highest levels of encryption and security.
4. *Connectors that are used to access all external payments systems or accounting systems.* This is only from the perspective of Modo, of course. A Modo customer may have its own payment system, such as an interbank settlement system, also integrated into the platform using a Connector. All payments systems are required to utilize a Connector to interact with the Modo platform.

These components are integrated to enable COIN to map the application-required payment instructions to a common set of semantics recognized by all of the payment networks in the Connector Pool, map all the external payment networks to specific phases identified within the finite-state machine managed by COIN, and of course monitor and control all the disparate payment systems to keep them synchronized.

The payment semantics of COIN force all transactions, regardless of the number of steps and number of networks involved, to abide by a strict set of double-entry accounting rules. These rules are enforced within a well-defined map of finite-state transitions that enable COIN to be decoupled from all participating systems while enabling its internal state to have a one-to-one mapping to all external systems.

As a result, all transactions always meet certain criteria in order to transition between states. The transaction must balance, it must represent good funds, it must not allow any credit risk, and it must represent the same state across all associated external payments systems participating in the transaction set. Figure 1 identifies the platform's basic state model for a simple transaction.

Figure 1: Example of a Simple Transaction Executed by Modo COIN® Finite-State Machine



Source: Modo

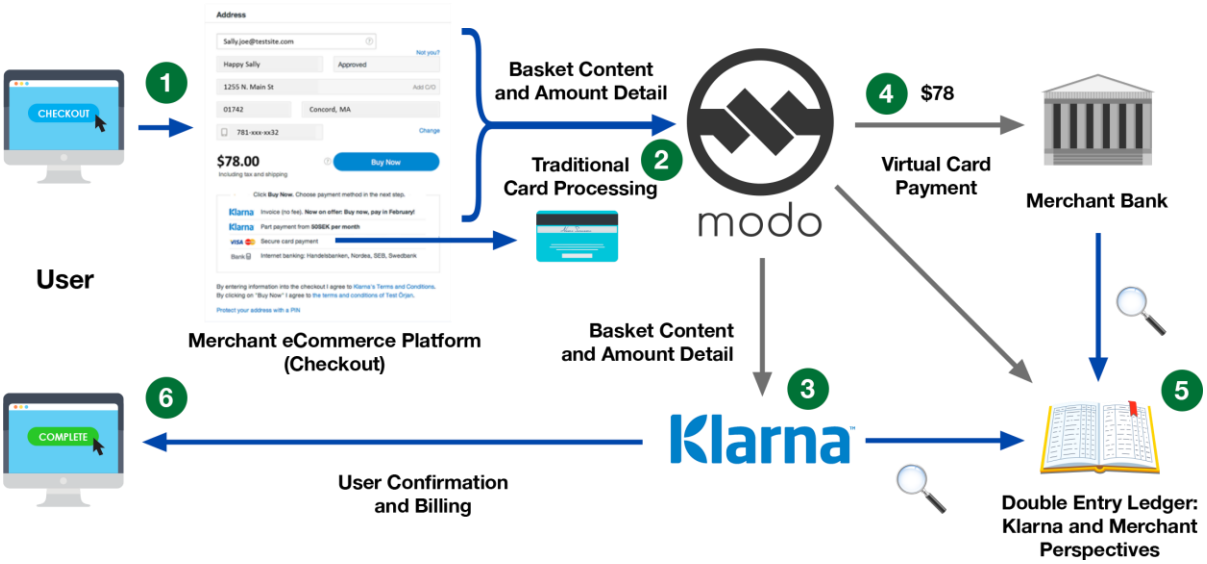
Klarna: Using Modo to Make Merchant Integration Easy

The Modo platform is used by Klarna, a Swedish company that offers safe and easy-to-use payment solutions to online merchants that enable consumers to pay for items after they have received them, or to pay in easy

installments if they so desire. To provide this service to merchants, Klarna assumes the credit and fraud risk from the retailer and pays the retailer immediately at checkout minus the fee agreed for the service. Central to enabling this service between Klarna and new merchants who are not ready, or perhaps not able, to do Klarna's standard integration is the Modo platform.

As seen in Figure 2, Modo connects to, and integrates, the virtual card used at a merchant's e-commerce checkout page, the Klarna platform, and the merchant's bank, and provides a shared set of books for reconciliation. The steps are as follows: ❶ A consumer making a purchase on the merchant's e-commerce site is presented with the typical payment options along with the Klarna payment option. ❷ When the Klarna option is selected, the Klarna-supplied app collects the shopping basket information and the payment details and supplies a virtual card for use by the merchant to pay for checkout. ❸ Modo creates an order in the Klarna Order Management system, registers the transaction in the shared ledger, and then ❹ monitors a payment to the merchant for the full amount using a virtual card payment platform. The Modo platform maintains ❺ the shared ledger that identifies all consumer transactions that were paid for by Klarna, the transaction details for the payments made to the merchant, as well as fees removed for the services that Klarna delivered to the merchant's customers. In step ❻, Klarna provides the user confirmation of the transaction and begins the appropriate billing process after the product is delivered.

Figure 2: The Klarna Solution Enabled by Modo



Source: Modo and Mercator Advisory Group

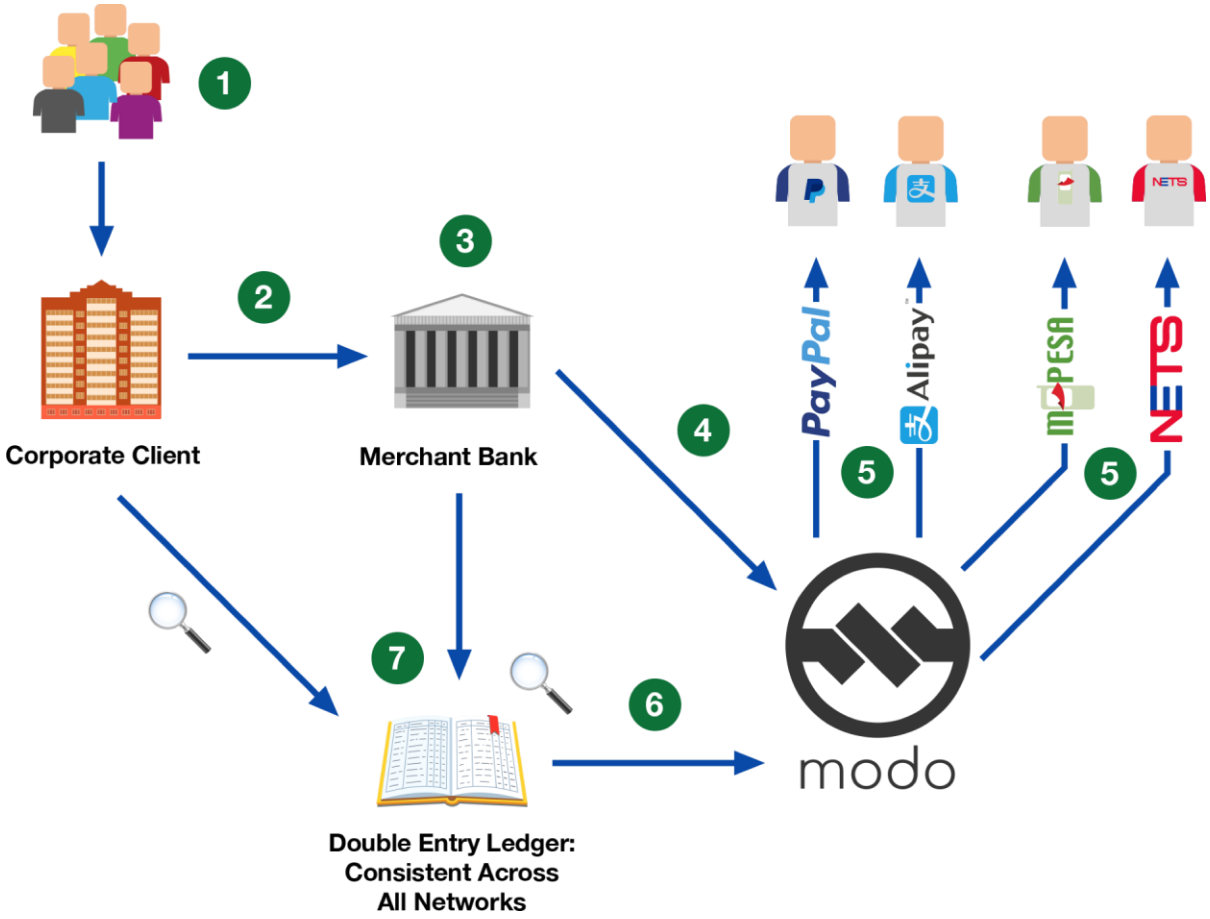
Banks Delivering a Mass Payment Disbursement Solution

Klarna utilized Modo to power consumer payment transactions at merchants who weren't otherwise integrated with the Klarna platform by replacing the payment instrument used in checkout with a virtual card operated by Modo. Banks, such as Bank of America, are using Modo to push funds out to individuals using digital payments networks on behalf of the banks' corporate clients. This supports the trend toward freelance and contract work around the world. In the U.S., more individuals are earning income on a freelance basis. More businesses of every size contract with workers domestically and overseas seeking specific talent to fill gaps in their own employee talent base for short-term tasks or finite projects. The incentives and online advertising industries also transact billions of dollars every year globally to reward employees, customers, and web page owners.

These scenarios necessitate that a business to be able to make payments to individuals, often to hundreds or even thousands of individuals, on an irregular basis in multiple currencies. Often a business has such a brief relationship with the individual to be paid that it may know very little about the person's banking details or whether the person does in fact have a bank account at all. From Uber and Lyft to Google and Yahoo, businesses need a payment partner that can disburse funds to a broad range of individuals and deliver funds on time and reliably, using digital networks such as PayPal, Alipay, and M-Pesa, no matter in what country the individual resides.

Although banks are connected to many different payment networks, no single payment network is appropriate for all situations because each network charges a different price, has different notification and settlement windows, and supports different endpoints. Modo solves this problem for Bank of America (for example) by connecting to all of the digital payments networks that the bank wants to support, standardizing the interface, and exposing timing issues so that the bank can be assured that funds will be delivered on the appropriate day. Figure 3 illustrates.

Figure 3: Modo Simplifies Mass Payments for Banks with a Single Interface to All Networks



Source: Modo and Mercator Advisory Group

Shown in Figure 3 are ❶ individuals performing work or services for the company that is a corporate client of a bank. The company ❷ communicates to the bank the names and email addresses or mobile numbers of the individuals who must be paid, the amount to be paid, and the date on which the funds should be made available. Of course the company and the bank have agreed on specific fees, which might be a per-transaction fee, a percentage of value sent, or any other arrangement agreed by the company and the bank.

To increase efficiency, the company may use a bank-provided application programming interface (API) to initiate the payments. The bank collects the required data from the company using the API and ❸ validates the data and adds necessary data elements such as the individuals' specific account information.

This consolidated set of data is communicated to Modo ❹ utilizing the Modo API. Modo evaluates the information received and then evaluates the efficiency of delivery across all of the networks to which it has

connections and determines the most appropriate network based on the bank's criteria, such as moving funds at both the lowest cost and the time required for funds availability. At the appropriate time, ❺ Modo initiates the payment instructions to the selected network and tracks all network interactions to assure the funds are successfully delivered or takes appropriate recovery or failure actions.

During and after the payments sequence ❻ Modo provides the bank and the corporate client a view into the status that reflects the activity in a shared ledger on a transaction-by-transaction basis. All entries on the ledger reflect the rules that were entered by the bank into the Modo platform, so that every dollar transfer, every network fee, and every bank fee are accurately reflected and associated with the specific individual paid and the network used to conduct the transaction. Both the bank and the company ❼ can see details at the transactional level and see a running balance that reflects all agreed fees and perhaps taxes.

The same solution can be used in reverse, as a means to collect payments, perhaps for financial services, utilities, or other regularly occurring invoices and bills.

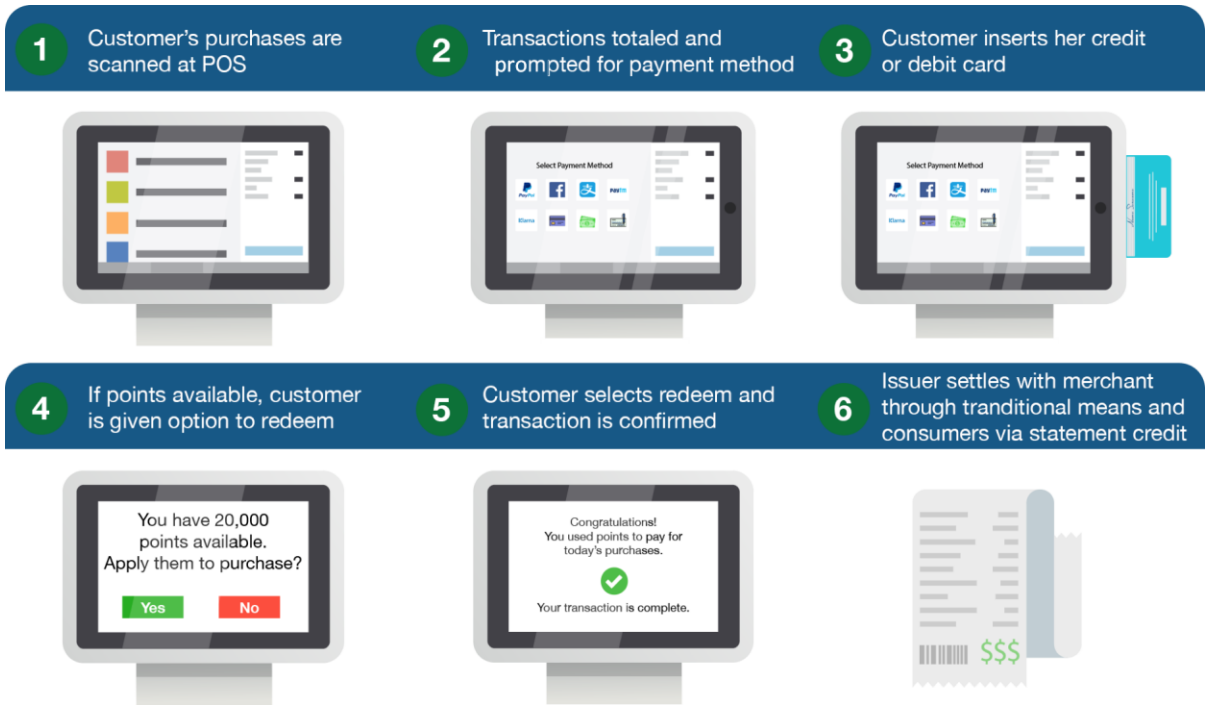
It Doesn't Need to Be Dollars: Think Loyalty Rewards as Currency

The examples cited above demonstrate how Modo can implement new business processes on top of the existing payment networks while supporting the transfer of any fungible value. This capability expands the concept of payments well beyond what the traditional payment networks can accomplish. Modo can transact and exchange value associated with loyalty points, gift cards, promotions, and cryptocurrencies and can enable these to interact with the existing payment networks if so desired.

Merchants often want to accept loyalty points, rewards, or incentives from other providers of the same types of currencies, whether other merchants, banks, travel companies or others. Modo has implemented the COIN Platform to power a value exchange platform for FIS that does exactly this, which is being deployed by Verifone as depicted in Figure 4. Merchant participants agree to the value of their closed-loop loyalty point or rewards, which can vary depending on the two participating merchants. For example, an airline will almost certainly provide the greatest redemption value when the points are redeemed in-house but may wish to provide a similarly high value when the points are used at partner hotels and rental car agencies, perhaps based on a bilateral agreement to accept each other's point-based value.

For participants that have no significant point-based programs, the value assigned to points may be substantially less. The value assigned may also be less if the other participants are not core to the value proposition the point giver is trying to establish. Modo enables as many bilateral relationships as required by the merchants and will initiate these value transfers using the native closed-loop networks and traditional payment networks to move the funds at those defined values, all the while maintaining the double, triple, or more books that prove that every transaction was conducted according to the rules entered, to make the need for a reconciliation process between parties a rarity.

Figure 4: Experience Using the Verifone Pay with Points



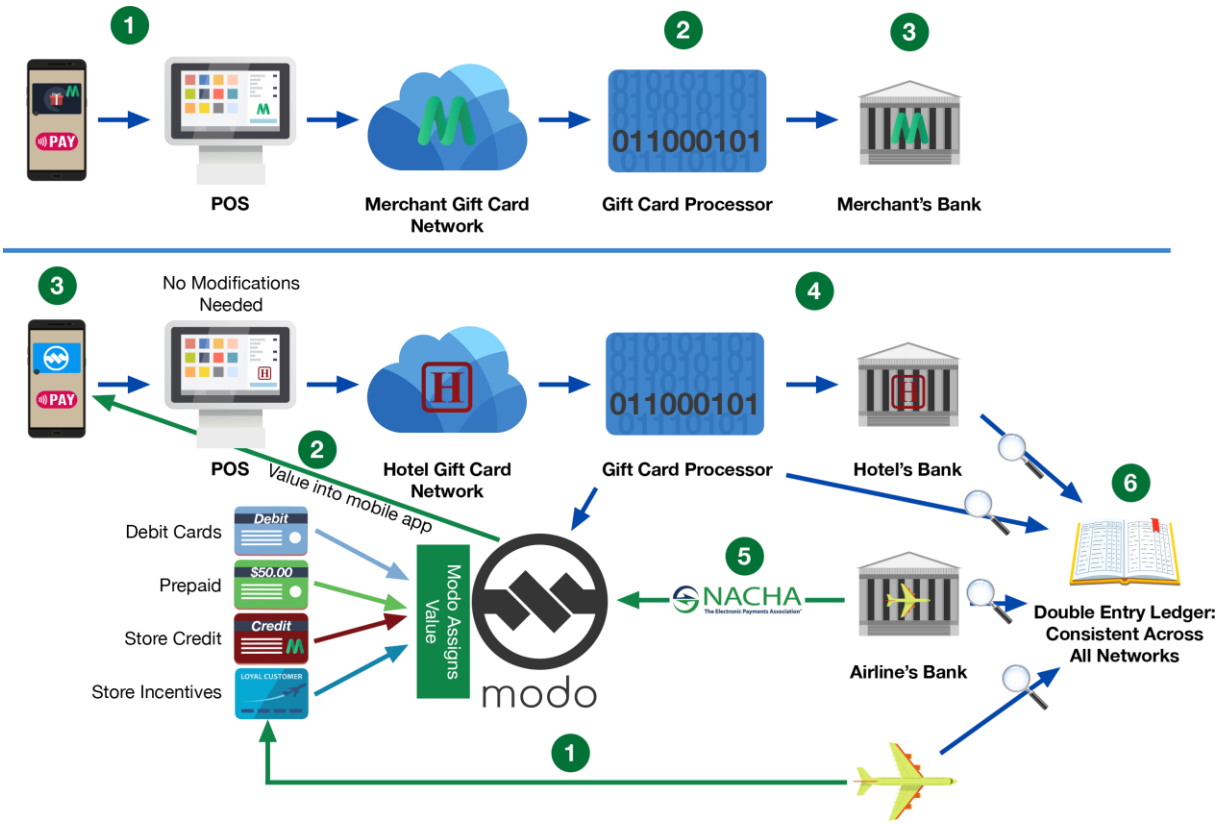
Source: Verifone and ModoPayments

To better describe how Modo enables the exchange of information about payments and business transactions among participants who are not all using the same payments or business systems, we present a hypothetical example that identifies how a boutique shoe company, Tim's Tennis Shoes. does business with a supplier, Tandy Corinthian Leather.

Tim's Tennis Shoes needs to place a sizable order for supplies fromTandy Corinthian Leather to make this season's collection. However, Tandy only accepts credit or debit card payments on its website, and Tim only pays from invoices, using a simplified bill payment service that's integrated with his cloud-based accounting platform. How can the two firms do business and have their accounting systems updated with Tim's payment?

In Figure 5, When Tim goes to check out online at Tandy, he's given the option to ❶ pay on invoice. He may not know that although Tandy only accepts credit and debit cards for orders, a partner like Klarna may be willing to ❷ pay Tandy using a card now and ❸ collect from Tim later via invoice. When Tim is ❹ presented with this invoice by email, he can ❺ use his bill-pay service to initiate payment (which is actually going to Klarna) and ❻ update his cloud-based accounting system. Klarna then ❼ updates Tim's account as being paid.

Figure 5: Conducting Business Across Multiple Payments Systems



Source: ModoPayments and Mercator Advisory Group

Conclusions

Modo has built and deployed a sophisticated platform that automates the exchange of payments transaction information across multiple payment systems and networks while maintaining the integrity of the transaction processes utilizing finite-state machines, which dramatically reduces human errors. Critical systems such as the software that manages flight control systems in aircraft, and software that transitions calls between cell towers, typically utilize finite-state machines to make sure no coding errors that may have crept into the system due to human error can violate the principles of the system (its states). This is why Modo decided to apply this technique to payments. But error-free operation is only one benefit of a finite-state machine. Another is a perfect log of events that eliminates any equivocation regarding what transpired and when.

When a command is issued to start a transition between states, the command is recorded. As the system executes the command, it will likely drive new commands to other state machines, all of which are also recorded. The success or failure for every state transition is logged, and these success or failures can also trigger additional commands. This is how Modo is able to create ledgers that perfectly represent all of the relevant actions and transfers the platform executed for every user. If a user has any questions about the ledger, there is always an even more detailed event log available that provides an impeccable source for documenting the actions the system and the payment networks took to create that ledger.

Modo is not a blockchain. It does not implement distributed software that can only execute one set of transactions every 10 minutes on a good day, nor does it require consensus among all of the entities operating a node to make a change. Perhaps most important, Modo does not require a new currency or system of record (read ledger). It can integrate to, and utilize, any payments or business system that has a software API. But Modo never touches or moves money. Instead, it only initiates payments across existing payment networks—and this is its beauty. Modo is available now, provides high reliability via Amazon AWS, operates within the existing regulatory framework of every current network and bank, and has a revenue model that leaves participants no doubt that the system will continue to be managed and advanced well into the future.

About Mercator Advisory Group

Mercator Advisory Group is the leading independent research and advisory services firm exclusively focused on the payments and banking industries. We deliver pragmatic and timely research and advice designed to help our clients uncover the most lucrative opportunities to maximize revenue growth and contain costs. Our clients range from the world's largest payment issuers, acquirers, processors, merchants and associations to leading technology providers and investors. *Advisory services* include *Credit, Debit, Prepaid, Customer Interaction, Commercial and Enterprise Payments, Emerging Technologies, and Global Payments practices*, which provide research documents and advice. *Primary data services* include the *CustomerMonitor Survey Series*, which report and analyze data collected in our biannual consumer surveys, and the *Small Business Payments and Banking Survey. Consulting services* enable clients to gain actionable insights, implement more effective strategies, and accelerate go-to-market plans; offerings include tailored project-based expertise, customized primary research, go-to-market collateral, market sizing, competitive intelligence, and payments industry training. Mercator Advisory Group is also the publisher of the online payments and banking news and information portal PaymentsJournal.com. Visit www.mercatoradvisorygroup.com.

About Modo

Modo provides a COIN® operated platform that connects new digital experiences to payments systems worldwide. Modo's patented COIN® transaction takes monetary value from just about any source, and can deliver it to just about any destination, without requiring partners to modify their systems. Truly a 'shipping container for global payments', the Modo COIN® simplifies the complex world of payments in the digital era. Visit https://modopayments.com .