Mojaloop Transactions, Risk and the Flow of Money

To understand how Mojaloop achieves its objectives of inclusive interoperability and risk management, it's important to first understand how a Mojaloop transaction is carried out, how that is reflected in the flow of money between participating Financial Service Providers (FSPs), and what measures are in place to manage risk, for the Mojaloop Hub and for all participants.

> *We will focus on the most basic use case of a push payment from a customer of one FSP to a customer of another FSP.*

How is a Transaction Addressed?

All Mojaloop transactions are sent to an alias; so a customer making a payment doesn't need to know the details of the payee's account, or even which institution is hosting it. Instead the payer might choose to send the payment to the payee's mobile phone number, or an email address, or even - if the payment is actually a shop purchase - a merchant ID.

In the Mojaloop ecosystem, aliases are stored in repositories known as oracles. A particular Mojaloop-based service may use several oracles, and the Mojaloop Hub will consult each of them to resolve an alias.

Decisions around the aliases to be supported are made by the operator of a specific Mojaloop-based service. A Mojaloop deployment includes a number of standard oracles, ready to be populated. It is not uncommon for a particular deployment to add its own oracle, to meet local needs.

What Does a Transaction Look Like?

Every Mojaloop transaction goes through three phases:

1. **Discovery**, when the Payer's FSP works with the Mojaloop Hub to discover where the payment should be sent.

   During this phase an alias is resolved to a particular Payee FSP. The Mojaloop Hub then verifies with the Payee FSP that they do indeed host the Payee's account, and where (to which account) the funds should be sent.

2. **Agreement**, when the two participating FSPs agree the terms and costs of the transaction;

3. **Transfer**, when the transaction is finalized between the two FSPs, and the payee receives the money.

It's important to remember that Mojaloop does not actually move the money. Instead, the culmination of a transaction is a cryptographically-protected, irrevocable transaction agreement between the two FSPs, delivered to both. Once they have received this, at the end of the **Transfer**

phase, the Payee FSP knows beyond doubt that the money is on the way; the Payer FSP has agreed to it, the Mojaloop Hub has recorded it, and the Scheme Owner will stand behind that assurance. So there is no reason not to pay the funds to the Payee immediately. This principle - of immediate payment to the payee - is a cornerstone of Mojaloop, and enables the achievement of "instant" payments.

How Does the Money Move?

Naturally, the Payee FSP will not wait forever for their funds to arrive, not least because they've already paid out to the Payee and need the funds for their core business. So at some point after a transaction has completed, the funds will be moved from the payer's FSP to the payee's, in a process called settlement.

Mojaloop is flexible when it comes to settlement, supporting a range of models according to the needs of a particular scheme, including:

- **Immediate, or Continuous Gross Settlement (CGS).** In this model, funds are transferred on a per-transaction basis from one FSP to the other, reaching the payee FSP a short time after the transaction has been completed.

- **(Deferred) Net Settlement**, where transactions are netted over an agreed period of time (known as the **settlement window**), and the net position between two FSPs is transferred in a single transaction between them. Each FSP performs net settlement with every other FSP they have transacted with.

- **Multi-Lateral Net Settlement (MLNS)**, a refinement of deferred net settlement, sees each FSP's overall net position in a settlement window against all other FSPs – and so the service as a whole – settled in a single transaction with the service itself. In this model, the settlement service plays an active role in moving money from debtor FSPs to a single settlement account, and from there to creditor FSPs.

Settlement proceeds between FSP-owned accounts, commonly known as liquidity accounts, in which the FSP deposits sufficient funds to meet all of its commitments to other participants. No matter what the model, the Mojaloop Hub plays a central role in orchestrating settlement between these accounts.

The settlement models offered by Mojaloop are under continuous development.

Mojaloop and the Management of Risk

Mojaloop adopts a number of measures to manage the financial risk to participating FSPs, and to the service itself. There are technical risks to individual transactions, but there are bigger, systemic risks as well; for example, participation may impose a strain on a small FSP as it needs to deposit sufficient funds in the liquidity account; and a large FSP may be concerned that it has received a large sum from a small FSP, which may in the extreme case lead to default.

In addition to technological mechanisms such as the cryptographic binding of transactions, a range of procedural measures are in place to manage these risks:

- Settlement windows are tailored to limit each FSP's exposure, by making the window short enough that the liabilities it represents are manageable by all participants. Generally a Mojaloop deployment will seek to launch with a relatively long window - say, 24 hours - and gradually reduce it as the volume of transactions increases, aiming to keep the value of transactions in an individual window at a manageable level.

- Liquidity checks are built into the Mojaloop Hub, so that a transaction only proceeds if there are sufficient funds to cover it in the settlement liquidity account of the Payer FSP.

- Supplementing the liquidity checks, the Mojaloop Hub has implemented a Net Debit Cap for each participant, which allows the operator to make an assessment of the risk an FSP's participation represents, independent of the liquidity they have lodged.

- Finally, if the Scheme Operator feels that an individual FSP is presenting an unusual risk; or a notification is received from, for example, a regulatory authority that the FSP might be close to default; or from the settlement bank that unusual funds movements have taken place; then the operator can disable all of that FSP's transactions through the Mojaloop Hub using the Business Portal.

These measures taken together provide an appropriate set of risk management controls. They are under continuous review, and may be extended in the future if a need is identified.

To learn more about the Mojaloop Foundation, visit http://mojaloop.io

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