



# FPS

## FINTEQ PAYMENT SIMULATOR



### About Finteq

Finteq develops payment solutions used by banks and financial services utilities in Africa. We enable financial institutions to address the challenge of interoperability between proprietary and legacy systems as well as payment management and processing, together with tracking and auditing functionality.



# WHAT IS THE FINTEQ PAYMENT SIMULATOR?

The Finteq Payment Simulator (FPS or PaySim) is an automated test system developed by Finteq to respond to the challenges experienced by both participants and the clearing house during industry testing.

The product includes both a bank simulator as well as an FCH simulator and can be deployed to simulate various steps in the end-to-end process to remove dependencies and evolve the test methodology.

Passive Bank Simulator	Active Bank Simulator	Passive ACH Simulator	Active ACH Simulator
<ul style="list-style-type: none"><li>Receives/responds to transactions without the need for another test partner bank</li></ul>	<ul style="list-style-type: none"><li>Originates/sends transactions without the need for another test partner bank</li></ul>	<ul style="list-style-type: none"><li>Receives/responds without the need for an ACH</li></ul>	<ul style="list-style-type: none"><li>Originates/sends transactions without the need for an ACH</li></ul>

There is a difference between the ACH and Bank simulator. The Bank simulator (passive or active) can simulate the overall clearing and settlement process; however, the ACH simulator (passive or active) is only able to complete integration and functional testing. Each of these simulators have different uses and should be applied based on customer needs.

## BANK SIMULATOR

Banks form part of National Payment Systems which are mutually dependent environments that ensure the stability of clearing and settlement processes. This means that all banks are required to test with other banks to certify their systems, complete industry-wide projects, regression test for internal project or maintenance updates or even implement regulations. A challenge exists where banks do not have mechanisms to simulate test data, workflows or volumes that will support quality assurance prior to engagement in industry testing cycles. This results in expensive, ineffective, and arduous testing periods between banks and clearing house(s) which utilise key resources across participants.

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The bank simulator would normally be installed at the ACH, allowing transactions to be routed to and from the ACH, using the infrastructure already established between the bank and the ACH. As such, transactions received from a testing bank would be validated and processed by the ACH as if they were normal transactions destined for another bank. Only when the transactions would normally be forwarded to the other bank would the ACH send the transactions to the Bank Simulator instead. This means that the transactions received would be archived at the ACH and recorded for billing and settlement, allowing all these processes to be included in testing.

# ACH SIMULATOR

The ACH is a critical part of any National Payment System where it plays a central role in ensuring the integrity of regulatory, industry and system processes. The ACH needs to be able to provide the transactional processing, clearing and settlement rules to participants such that the agreed test methodology is enforced and maintained. This is particularly challenging with industry-wide changes, where the ACH is an active participant that needs to make their own changes. This results in high-cost overheads and major dependencies, where other participants need the ACH to deliver before they can test. Depending on the design principles, changes often require the ACH to implement larger deliverables to reduce overall industry costs, but this can lead to delays where participants have completed their changes before the ACH has.

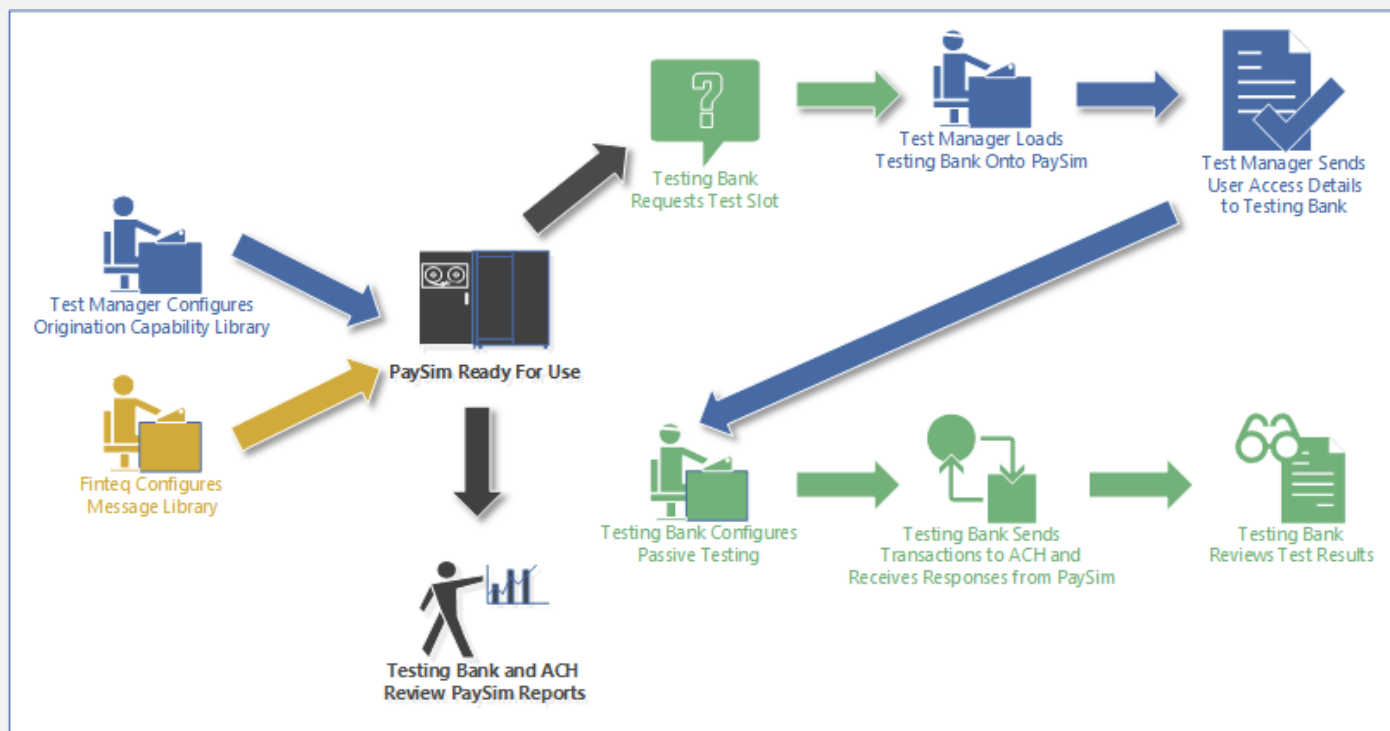
By simulating the ACH as either a passive (response-based) or active (submitter) participant, the Bank can test without requesting both the ACH and other banks to be involved. This reduces the overall effort for testing, removes dependencies and reduces costs. A major benefit is in enabling Banks to test their own changes (whether industry or local) without requesting resources from the ACH, which reduces costs and improves quality. It is key to note that only a portion of the testing will be possible given that there is no actual clearing and settlement.

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The ACH simulator is installed directly at the bank. Installation at a bank enables connection to PaySim over a local area network, so no connectivity testing to the ACH can be performed with this model. However, this enables the bank to simulate the SIT phase as a method of meeting entry criteria prior to engaging other participants.

# PASSIVE SIMULATOR

This feature of the PaySim product will simulate a “Bank B”, passively processing incoming transactions originated at Bank A. Based on the scenarios configured by a Business Analyst, Quality Assurance Officer, or other designated person, PaySim will respond to Bank A with the configured responses.

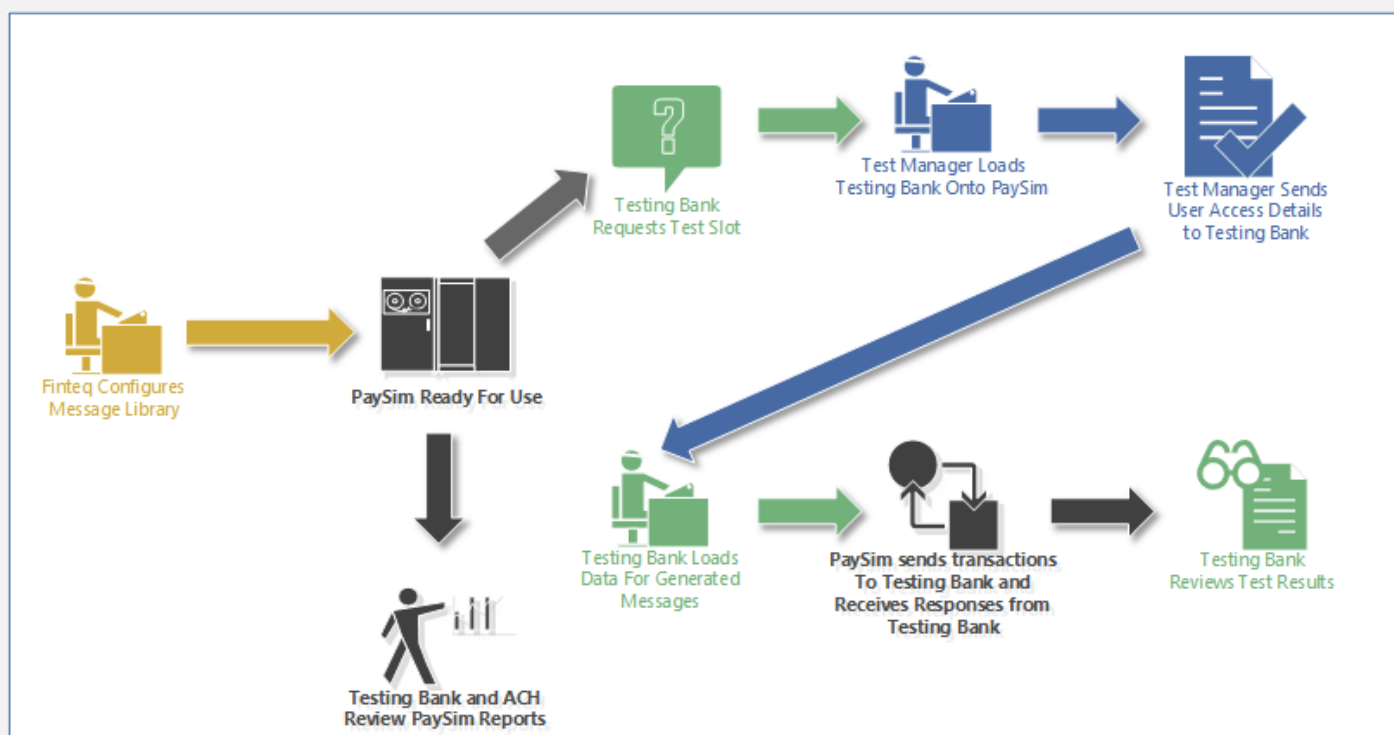


These scenarios are achieved using pre-defined and pre-loaded references in transactions based on the standard or customized test suite (test scenario ID, test case ID, etc.), such that the testing bank does not need to rely on either the ACH or another bank's resources or test data. This standard data set will enable full coverage without the risk of human error or another participant's internal constraints that normally result in delays to the testing bank.

## ACTIVE SIMULATOR

This feature of the FPS solution will simulate a "Bank A", actively originating transaction/s. Based on the scenarios configured by a Business Analyst, Quality Assurance Officer, or other designated person, PaySim will send the transaction/s to Bank A.

These scenarios are achieved using pre-defined and pre-loaded references in transactions based on the standard or customized test suite (test scenario ID, test case ID, etc.), such that the testing bank does not need to rely on the ACH or another bank's resources or test data. This standard data set will enable full coverage without the risk of human error or another bank's internal constraints that normally result in delays to the testing bank.



# PAYSIM COMPONENTS

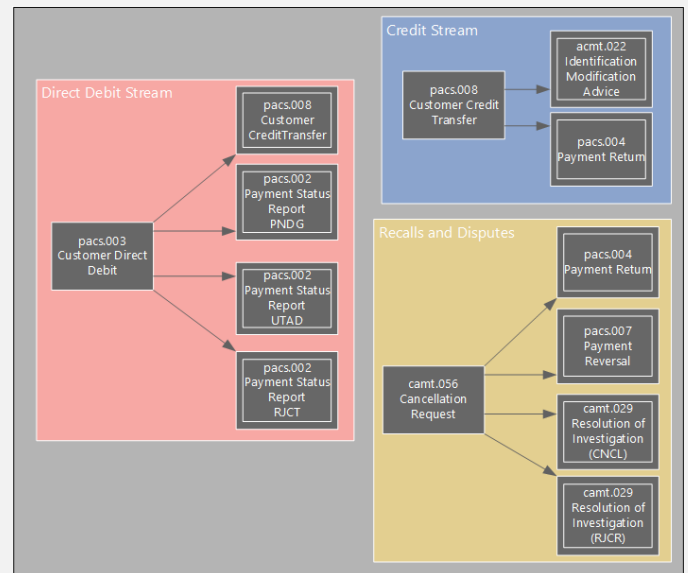
## Message Library

The message library is configured by Finteq and defines all messages which can be received or sent by PaySim. This configuration is required per message before PaySim can be used by any participant for testing that message.

Each message may be a request message and/or a response message. Requests are service and sub-service specific, for example, allowing for pacs.008 messages to be either configured as responses to pacs.003 messages in debit scenarios, or as request messages in credit transfer scenarios.

Within the context of the passive simulator, the possible relationships between request and response messages are defined in the message library. Multiple response messages can be configured per request. The mapping of data from the request to the response, as well as the enrichment of additional information required in the response is configured in the message mapping within the library.

The Message Library also contains information required for the automatic generation of messages within the Active Simulators.



## Origination Capability Library (Passive Simulators Only)

The Origination Capability Library is configured by the industry test manager or another authorized user at the ACH or Finteq and specifies the various test scenarios and test cases which can be automated in the Passive Simulator available in PaySim. This configuration is also required before PaySim can be used to test a message.

Each test case is configured to indicate the request message received at the start of the test case as well as the response messages generated. Owing to the tracking requirement in some debit scenarios, interim responses are also catered for. In addition, the time intervals for generating responses are also specified in this library.

Direct Debit Test Scenario	Request	Interim Response	After Cut-Off	Final Response	After Cut-Off
TC01	pacs.003	-	<input type="checkbox"/>	pacs.008	<input type="checkbox"/>
TC02	pacs.003	-	<input type="checkbox"/>	pacs.002 UTAD	<input type="checkbox"/>
⋮					
TC07	pacs.003	pacs.002 PNDG	<input type="checkbox"/>	pacs.008	<input checked="" type="checkbox"/>
⋮					
TC13	pacs.003	pacs.002 PNDG	<input checked="" type="checkbox"/>	pacs.002 RJCT	<input checked="" type="checkbox"/>

## User Interface

The user interface for PaySim is a web-based front-end. Users will be required to log onto the system using a password, and access to the various components of the system will be restricted based on the authorisation rights assigned to each user.



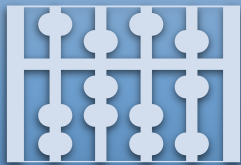
### Message Library Configuration

- Add, change or delete messages from the library
- Assign defaults



### Message Relationship Pattern Configuration

- Define relationships between messages
- Define data mappings between messages



### Test Scenario and Test Case Configuration

- Define test scenarios and test cases for use in passive simulators
- Define request and responses (interim and final)
- Define missing response and after cut-off scenarios



### Test Program Configuration

- Define test programs per testing bank
- Define start and end date of testing period



### Account Number Configuration

- Define account numbers for banks
- Used by Passive Simulator for determining test cases
- Used by Active Simulators to generate messages



### Passive Test Plan Configuration

- Define parameters to determine test cases to be run based on input data
- Define default test cases (where no matching parameters are found)



### Active Test Plan Configuration

- Generate new request
- Generate as a copy of a previous request
- Generate from an existing request e.g. cancellation request from existing credit transfer

# HOW THE SIMULATORS WORK

For both passive and active simulators, the Testing Bank is responsible for defining a test plan to be executed. The latest test plan configured is always used when a message is received by the Passive Simulator or when a message is generated by the Active Simulator.

## Passive Simulator

Before submitting messages to the Passive Simulator, the Testing Bank configures the test plan. This entails selecting the test cases to be included, which in turn defines the responses to be produced by the FPS.

After the test plan is configured, the Testing Bank submits a message (request) to the ACH or directly to the FPS containing transactions which include the various account numbers or reason codes defined in the test plan. If the message is sent to the ACH, the test program configured in the simulator user interface will ensure that all “outward” messages generated by the ACH are sent to FPS and not to the other bank.

On receipt of a message from a Testing Bank, FPS uses the test plan configuration to determine the responses to be created and generates these responses using the message configuration and message relationship mapping configuration. These responses are returned to the Testing Bank at the correct time intervals, depending on the test case configuration.

FPS will always save the test plan associated with each transaction in all messages received during the test program.

If the data in the test plan does not match the message type in the message received by the Passive Simulator, responses will always be generated as per the first test case defined for the message type (which must always be the “positive” test case).

## Active Simulator

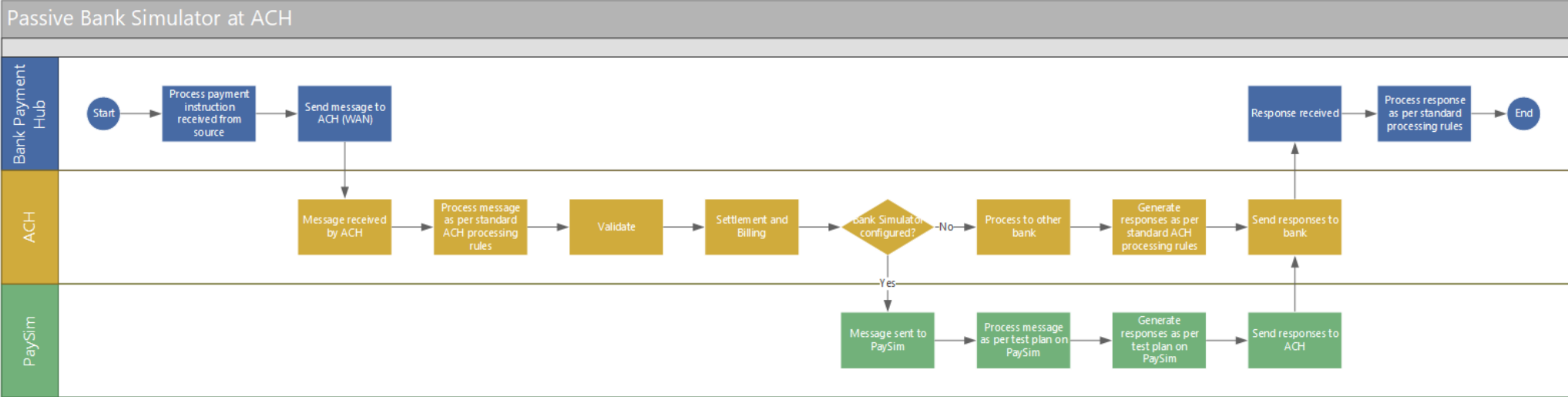
For the Active Simulators to create the request messages to be sent to Testing Banks, the Testing Bank is required to specify the type of message to be generated. The specific information to be included for each field in the request can be specified or uploaded. Alternatively, a previous request file can be re-used, or the FPS can generate requests automatically. The latter option allows Testing Banks to do volume and performance testing easily. The Testing Bank can select the data to be included, and for pacs.003 ENDOREQ and pacs.008 ENCRPAY requests, the FPS system will generate the required number of transactions in a message, using the parameters defined in the test plan, default values defined in the message configuration, and randomly assigning the BIC and account number of the instructed bank as well as the amount to each transaction. For recalls, disputes, payment returns and claim non-receipts, FPS will generate the request message using the original message ID and original end-to-end-id and all associated information.

Once the message has been generated, it is sent to the Testing Bank by the FPS for processing in their system. It remains the responsibility of the Testing Bank to ensure that the data defined for the generated message fulfills the testing requirements.

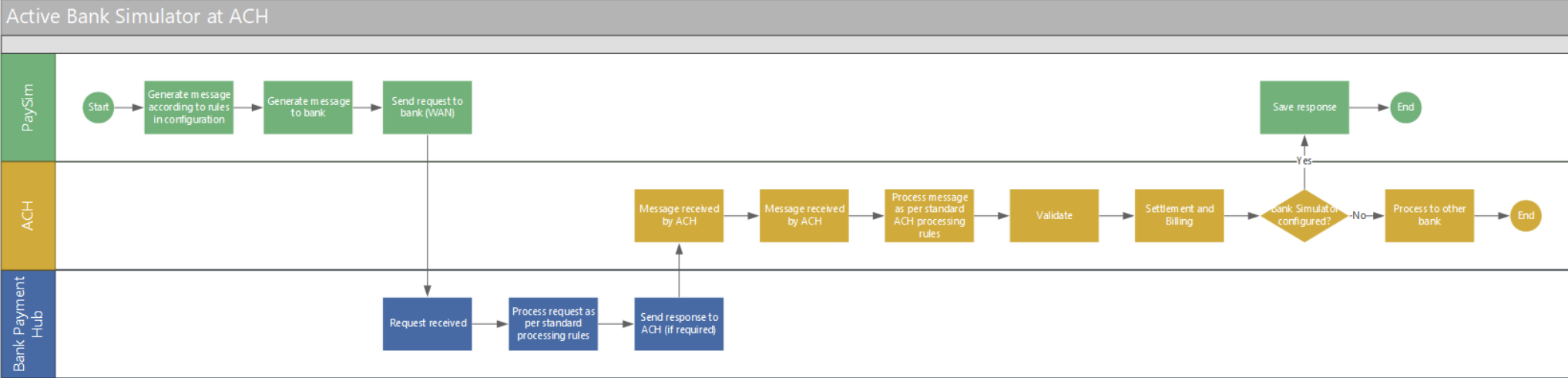
Responses generated by the Testing Bank are then sent to the ACH or directly to the FPS. If the message is sent to the ACH, the test program configured in the simulator user interface will ensure that all “outward” messages generated by the ACH from these responses are sent to FPS and not to the other bank.

# DEPLOYMENT OPTIONS

## Passive Bank Simulator at ACH

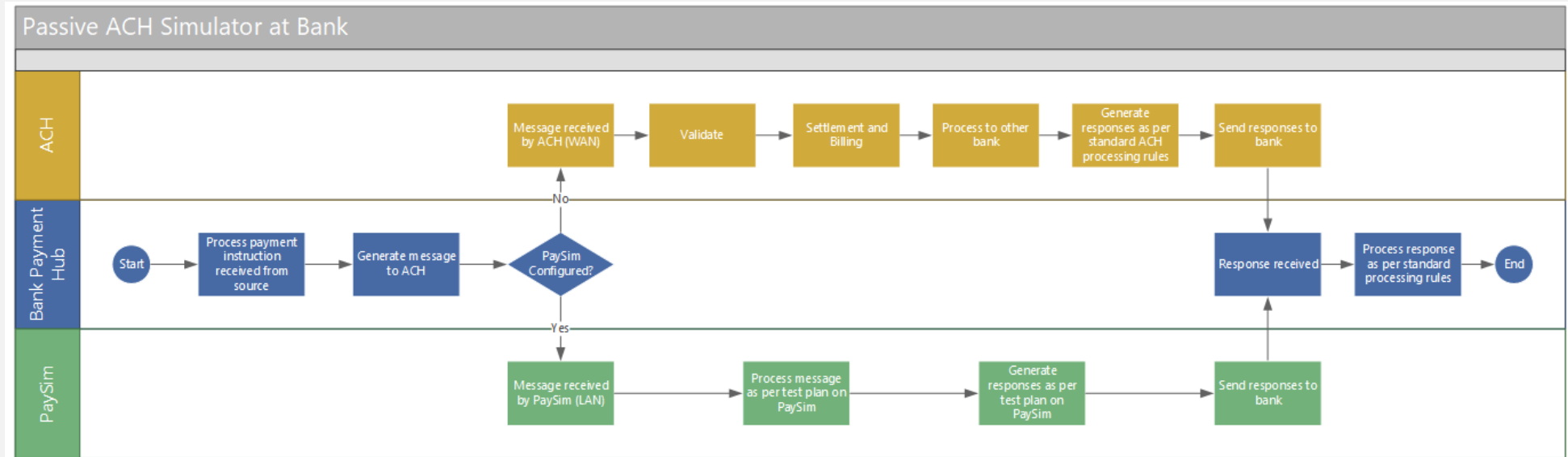


## Active Bank Simulator at ACH

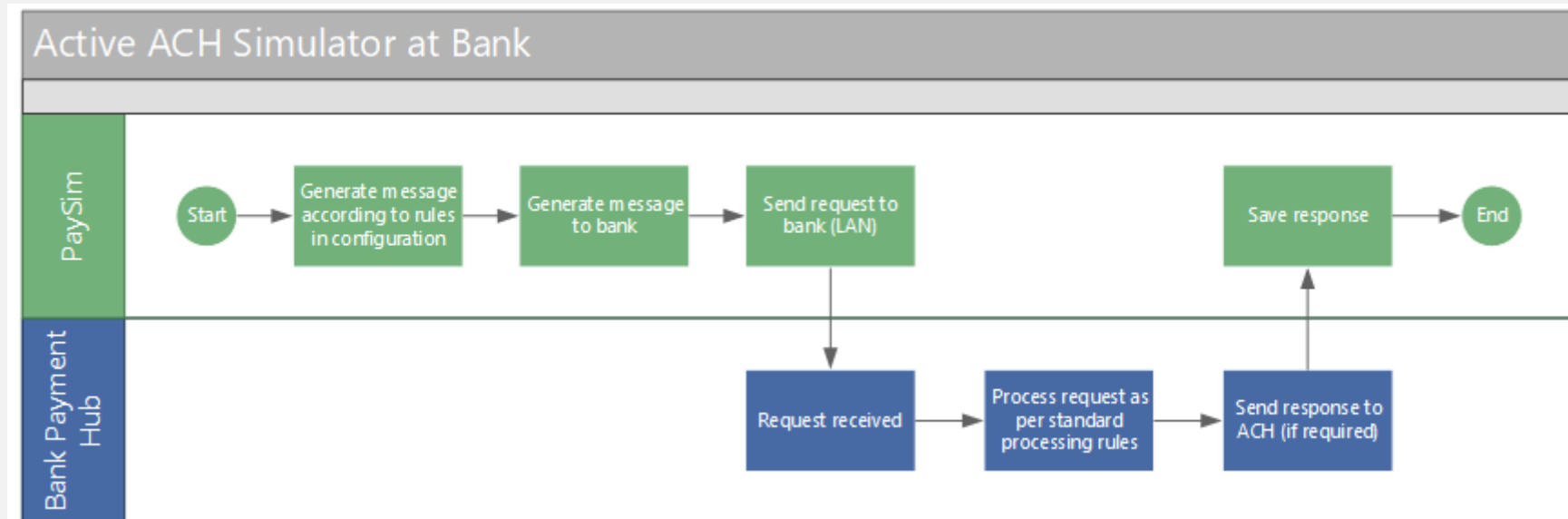




## Passive ACH Simulator at Bank



## Active ACH Simulator at Bank





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