

Vendor Guide

Mobile Product Interoperability Testing

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1.0 Introduction

This document summarizes Visa's process and requirements for mobile product interoperability testing (also referred to as cross-testing) and is meant to provide an insight to vendors on how products are tested and the performance requirements to successfully pass testing.

Interoperability testing is performed to ensure the mobile product is capable of communicating with Visa-approved POS terminals at various heights and positions to perform a Visa contactless payment transaction.

1.1 Audience

This document is intended for mobile product providers who submit products to Visa for type approval testing.

1.2 Scope

This document covers a high level summary of the interoperability testing process for mobile products.

For a complete explanation of the mobile product type approval testing process please refer to the Visa Mobile Proximity Payment Testing and Compliance Requirements available at https://technologypartner.visa.com/Testing/TestMaterials.aspx.

All other types of testing and types of product are out of scope of this document.

2.0 Testing Methodology

The testing process is performed in two steps, an initial pre-test to check that all the samples provided are working as expected, followed by interoperability testing. As part of interoperability testing the product's performance is measured to ensure payment transaction times are within an acceptable range.

The number of terminals and the specific terminal models maintained in the pool is confidential and cannot be disclosed to vendors.

2.1 **Product Configuration**

The product being tested must support at least one execution environment, such as a UICC, embedded secure element (eSE) and/or Host-based Card Emulation (HCE). For the purpose of this document, an execution environment is defined as the location where the Visa payment application is installed.

Please refer to Visa Mobile Proximity Payment Testing and Compliance Requirements for information regarding the test requirements and the number of samples needed for testing.

2.2 UICC Execution Environment

For product submissions supporting UICCs, if the vendor has not provided UICCs, Visa will utilize their own UICCs hosting an approved Visa-developed mobile payment application. The product must be provided in a state that allows transaction routing to the UICC.

2.3 Embedded Secure Element Execution Environment

For product submissions supporting embedded secure elements, the vendor is required to provide the samples with a Visa mobile payment application pre-installed and personalized on the embedded secure element. Alternatively the vendor may work with a Visa-recognized laboratory accredited for Visa Mobile Payment Application (VMPA) testing to perform these tasks. The product must be provided in a state that allows transaction routing to the embedded secure element.

2.4 HCE Execution Environment

For product submissions supporting HCE, Visa's HCE test applet will be installed and configured on the product for testing by the laboratory performing the test. The vendor is required to provide the product in a suitable state that allows the laboratory to install and activate HCE applications.

2.5 Multiple Execution Environments

For products submissions supporting more than one execution environment, each environment may require interoperability testing. Please refer to Visa Mobile Proximity Payment Testing and Compliance Requirements for details.

2.6 Test Positions and Product Presentment

Product positioning conventions used in this document are compliant with EMVCo Contactless Communication Protocol Specification Annex C.

An example of a mobile product is shown in below diagram:



Figure 2-1: Reference Mark

The reference mark is indicated by the vendor who is submitting the product for testing and identifies the optimal position of the proximity antenna's performance, typically the center of the antenna.

The presentation plane of the product is parallel to the landing plane of the terminal and the product is presented to the test terminal on the side of the reference mark.







Products are tested at zero to four centimeters above the landing plane of the terminal, and at five test positions per height. Four positions (N, S, E, W) are located 1.5 centimeters from the center (C) of the contactless reader symbol on the terminal's landing plane.

Products are expected to be capable of completing transactions at all test positions.

2.7 Pre-Testing

Pre-testing consists of performing transactions with the product on a limited number of terminals

- A maximum of five transactions are performed at a single test position center position at a height of one centimeter above the landing plane.
- The pass criteria is three successful transactions per terminal, on all terminals.
- All samples provided must pass pre-testing.

If the pass criteria cannot be achieved the samples are rejected and returned to the original sender.

2.8 Interoperability Testing

Testing is performed with all terminals in the pool, typically using one of the samples.

The product is held at each test position approximately one second before being removed.

Each test position is designated with a weighted value, some positions having higher values than others. The pass criteria for a mobile product submitted for testing, per execution environment, is based on the aggregated weighted values of successful test positions. The aggregated value must be over a defined threshold value for the product to pass testing with the terminal.

If the product supports multiple execution environments, the interoperability tests have to be made in accordance with test requirements described in the latest version of the Visa Mobile Proximity Payment Testing and Compliance Requirements.

The overall pass criteria for interoperability testing is determined by evaluating the performance across all terminals tested. The pass criteria and weighted values is subject to change at any time.

2.9 Transaction Timing

Transaction timing is the time is takes for a payment transaction to complete. The pass criteria is an overall time not exceeding 500 milliseconds, with 400 milliseconds allocated for the mobile product's performance and 100 milliseconds reserved for the terminal's performance.

A scope or spy tool is used to record transaction information from each "Terminal Command – PICC" pair (TC Pair) during the transaction. The transaction log generated by the tool is analyzed to calculate the product timing. The log can identify the TC Pairs relevant for calculating the timing. The relevant TC Pairs are identified in Figure 2.4.

Some additional pairs of data blocks must also be included if they occur. They are any data block pairs that start with 'Fx' or 'FA'. These data block pairs are called 'Fx' or 'FA' Block Pairs. The times from these 'Fx' or 'FA' Block Pairs shall be included in the mobile product's total time. Note that these 'Fx' or 'FA' Block Pairs occur between the beginning of the mobile product's response to a terminal command and before the end of that response. They indicate that the mobile product is asking for additional time to complete its response to the terminal command. 'Fx' or 'FA' Block Pairs are described in section 2.9.1.

The log can be used to determine the time used by the mobile product in each of the relevant TC Pairs. The mobile product's time period is measured from the last byte of the terminal command to the last byte of the following mobile product's response. The time period is shown in Figure 2.4. Adding the mobile product's time from each of the relevant TC Pairs gives the total time.

2.9.1 Block Pairs Starting with 'Fx' or 'FA'

If "4-byte block pairs starting with 'Fx'" or "5-byte block pairs starting with 'FA'" occur between the terminal application command and the mobile product application response, these are included in mobile product timing. The examples below show these two types of block pairs.

Table 1: Example of 'Fx' Block Pair

Command Origination	Data Direction	Data
Mobile Product	→	Fx xx xx xx
Terminal	+	Fx xx xx xx

Table 2: Example of 'FA' Block Pair

Command Origination	Data Direction	Data
Mobile Product	→	FA xx xx xx xx
Terminal	+	FA xx xx xx xx

These block pairs may occur multiple times. It usually occurs after a GPO command, but may occur after other commands as well.

If a block starting with 'Fx' or 'FA' occurs alone, or if the blocks are not of the lengths described, then the blocks indicate that the data capture was not successful or there is an error condition.



Figure 2-4: Transaction Timing Command Flow