Tap to Phone Level 2 Testing and Approval Requirements

Visa Approval Services

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Visa Public

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Introduction

This document describes the processes and requirements for testing a Tap to Phone kernel solution developed to the Visa Ready Tap to Phone Kernel Specification (VRTPKS), also referred to as "Level 2 testing". Level 2 testing is a requirement in the overall certification process for a Visa Ready Tap to Phone solution.

Please refer to the Visa Partner Portal for more information: https://partner.visa.com/site/programs/visa-ready/tap-to-phone.html.

Audience

This document is for Visa Ready Tap to Phone solution providers submitting kernels for Level 2 testing seeking Visa's certification and approval.

Key Terms and Acronyms Definition

These key terms and acronyms are included for your reference.

Table 1-1: Key terms, acronyms and definitions

Term	Definition
Application Programming Interface (API)	A set of rules or interface that defines how a Tap to Phone kernel application interacts or communicate with other applications in a Tap to Phone solution.
Android Package (APK)	A package file format used by the Android operating system for distribution and installation of the Tap to Phone application.
Approval Services Testing Agreement (ASTA)	Legal agreement signed by a solution provider to authorize Approval Services to accept, test and review their chip payment solution for a Visa approval. The agreement defines the conditions and warranties of the Approval Services testing and approval process.
Visa Ready Tap to Phone Program qualified device	A connected device (for example, a smartphone or tablet or any Tap to Phone program qualified device) that is available for commercial market distribution and not manufactured solely for payment acceptance. The device can be used for contactless payment acceptance with near field communication (NFC), and

Term	Definition
	does not contain an embedded contact chip and/or magnetic stripe reader. Note: EMV Level 1 testing may be required for certain device categories. Contact TaptoPhone@visa.com for details.
Implementation Conformance Statement (ICS)	A form that is submitted by the solution provider to Visa, to indicate features from an evaluated Visa specification that a product supports.
Letter of Compliance (LoC)	A communication by Approval Services that a specific Tap to Phone kernel has successfully completed testing.
Quick Visa Debit/Credit (qVSDC)	A Visa application for payment transactions over a contactless interface.
Software Development Kit (SDK)	A set of development tools used to develop applications for a specific platform or operating system in an installable package.
Visa Contactless Payment Specification (VCPS)	A specification that defines Visa's requirements for conducting contactless transactions at point-of-sale (POS) devices. Includes requirements for cards. This specification is necessary to comply with globally interoperable Visa contactless programs.
Visa Tap to Phone Kernel Specifications (VRTPKS)	A specification that defines the technical differences between the requirements for a contactless reader kernel in VCPS and the contactless kernel that uses a mobile acceptance device's NFC capabilities to process Visa contactless transactions.
Visa Ready Tap to Phone Program	A Visa Ready partnership program with Tap to Phone solution providers. Benefits include access to Visa's functional and security requirements, application certification, solution lunch and access to approved and ready solutions from around the world. Website: https://partner.visa.com/site/programs/visa-ready/tap-to-phone.html Contact TaptoPhone@visa.com for details.
Visa websites • Visa Partner Portal (VPP) • Visa Digital Partner Services (VDPS)	Secured areas of the sites are only accessible once the applicable Visa agreements have been executed. Visa Partner Portal: https://partner.visa.com/homepage.html Visa Digital Partner Services: https://digitalpartnerservices.visaonline.com/

Contact Information

For questions about the contents of this document, please contact Approval Services at ApprovalServices@visa.com.

For any other questions, please contact the Visa Ready Tap to Phone team at TaptoPhone@visa.com.

1 Overview of Process

The following is a high-level overview of the Level 2 testing and approval process at a Visa accredited test laboratory.

Figure 1–1: Overview of the Tap to Phone Level 2 testing and approval process

The first two stages are a one-time event as part of Visa Ready Tap to Phone Program onboarding process. The subsequent stages are repeated each time a solution is submitted for testing.

VRTPKS testing on a kernel is performed by a Visa accredited test laboratory chosen by the solution provider.

A list of accredited test laboratories and a list of qualified test tools can be found in the Visa Partner Portal library (requires a user account).

The lists are also available at Visa Digital Partner Services (labs and tools).

2 Scope of Testing

The product is a Visa Tap to Phone kernel application or software development kit that would be integrated with a mobile payment application to function as a payment acceptance solution on a Visa Tap to Phone Program qualified device, for example a mobile handset or tablet. The kernel application is developed to VRTPKS, including its associated Visa Contactless Payment Specification (VCPS).

If the kernel application or any of its supported VRTPKS or VCPS functions are split or distributed across several sub-components (a "distributed kernel solution"), for example on a device and in a remote component like a cloud or a physical server; the kernel application and its related libraries on all components are included in the product.

The product is tested and reviewed for compliance with VRTPKS. The product's performance timing (transaction timing) is also measured as part of functional testing.

Figure 2–1: Scope of the product

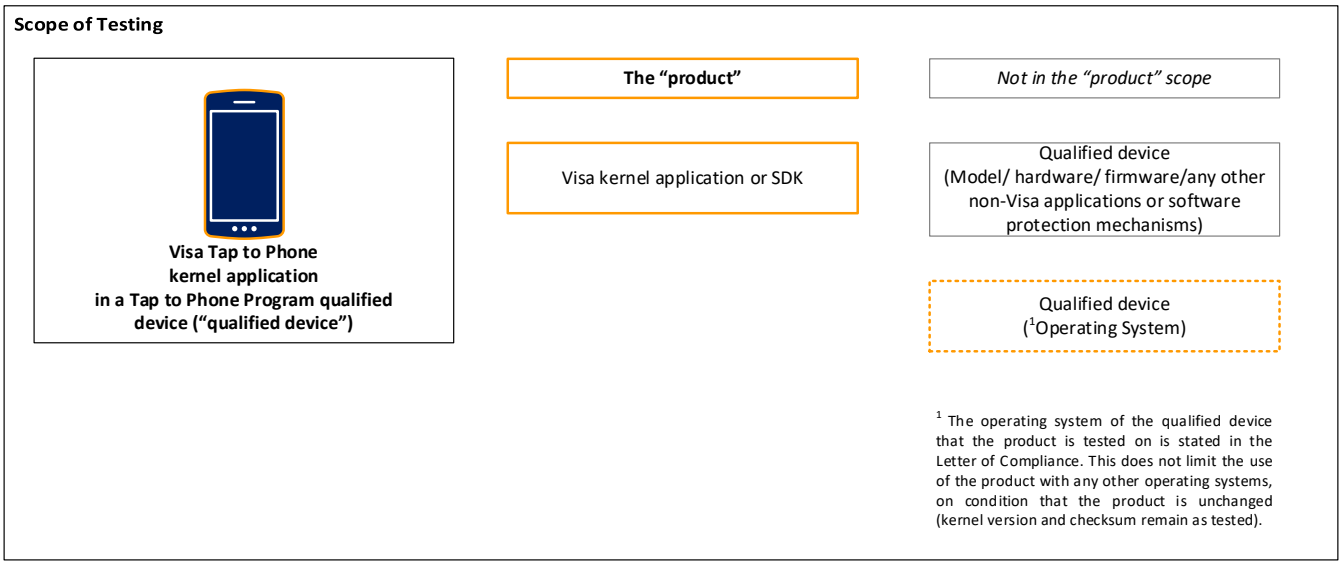
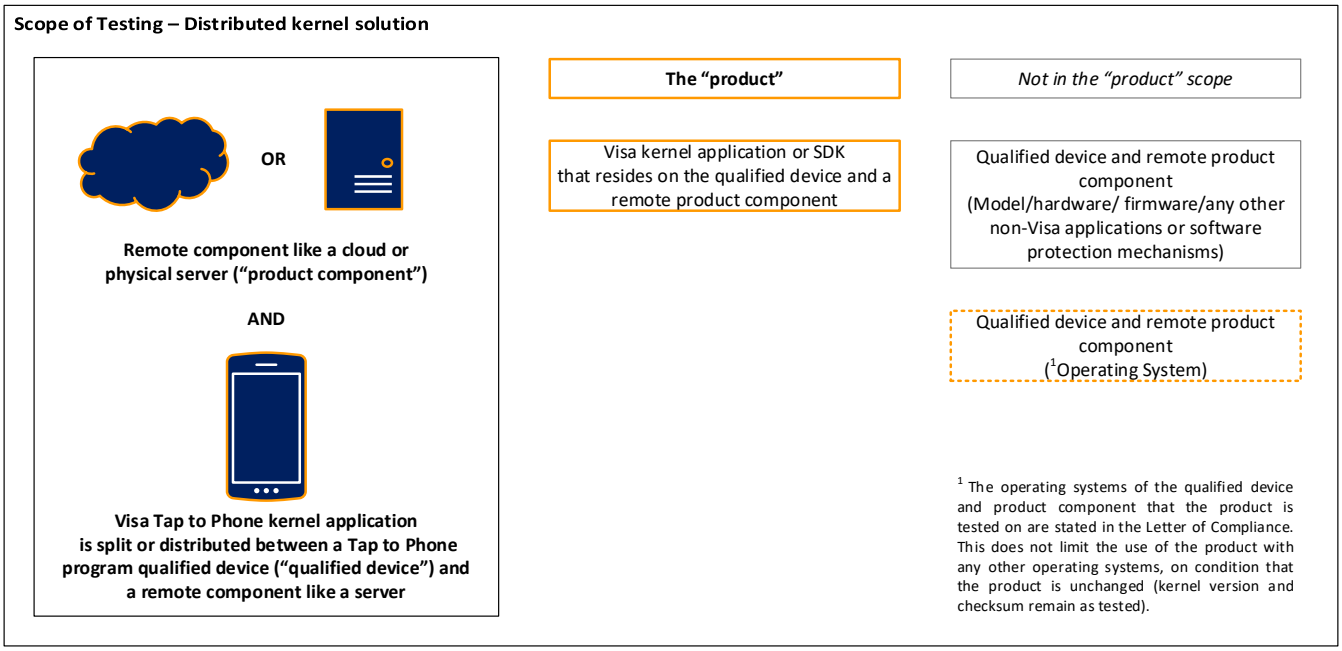


Figure 2–2: Scope of a distributed kernel solution product



3 Registration and Agreements

All solution providers must register on the Visa Partner Portal, request to join the Visa Ready Tap to Phone Program, and execute an Approval Services Testing Agreement.

3.1 Solution Provider Registration

The Visa Ready Tap to Phone team manages the registration process and onboarding for the Tap to Phone Program.

Contact the Visa Ready Tap to Phone team at TaptoPhone@visa.com.

Alternatively, go to the Visa Partner Portal at https://partner.visa.com/site/programs/visa-ready/tap-to-phone.html to register for an account and request to join the Visa Ready Tap to Phone Program.

3.2 Approval Services Testing Agreement

Once the solution provider has completed the Visa Ready Tap to Phone Program registration and onboarding, it is required to sign an Approval Services Testing Agreement.

This agreement governs the testing and approval process. Once the solution provider executes the agreement, it can have access to confidential testing materials like test plans and other related material on Visa websites.

Once a solution provider has submitted its solution on the Visa Partner Portal, Approval Services will initiate the testing agreement (ASTA signing) process.

Contact Approval Services at ApprovalServices@visa.com with any questions about this agreement.

4 Submitting a Product for Laboratory Testing

The following section describes the requirements for submitting a product to start the Level 2 testing process where a test laboratory will perform VRTPKS testing.

4.1 Tap to Phone Questionnaire, and Implementation Conformance Statement (ICS)

The solution provider downloads the Tap to Phone Questionnaire and ICS document from its Visa Partner Portal library (requires a user account).

The questionnaire captures the product details. The ICS captures the optional features, in addition to the mandatory features from the Visa specifications that the product supports.

Once completed, the solution provider uploads the questionnaire and ICS to the Visa Partner Portal to submit its product.

Approval Services will review for completeness and work with the solution provider to address any issues. Any corrections will require the solution provider to re-upload the updated document for its submission.

Once the form is accepted, Approval Services issues a unique Visa reference number for the submission and authorizes the chosen test laboratory to proceed with official testing, attaching a copy of the questionnaire and ICS.

4.2 Test Laboratory Scheduling

Vendors select a test laboratory from the "Accredited Test Laboratories" list located in the Visa Partner Portal library (requires a user account) or at Visa Digital Partner Services.

The solution provider and test laboratory are responsible for scheduling testing.

4.3 Testing Authorization

Official testing cannot begin until the test laboratory has received the testing authorization from Approval Services.

Testing authorization is exclusive to each test cycle.

The solution provider can instruct the test laboratory to perform as many iterations of testing as necessary after each testing authorization.

Once the iterations are completed and the solution provider is ready to start a new test cycle, the solution provider will update the product questionnaire and ICS with details of changes made to the product and submit to the Visa Partner Portal.

Approval Services will review for completeness and work with the solution provider to address any issues. Any corrections will require the solution provider to re-upload the updated document for its submission.

Once the form is accepted, Approval Services issues a unique Visa reference number and authorizes the chosen lab to proceed with a new test cycle, attaching a copy of the updated questionnaire and ICS.

4.4 Testing Materials

The following section describes the requirements for testing materials.

Important: Visa may, at any time, request the solution provider to provide testing materials, including product samples that are identical to the samples tested at the test laboratory, if additional testing is required to investigate product issues or potential non-compliance after a Letter of Compliance is issued.

4.4.1 Number of Samples

The solution provider must submit at least one sample of the product to the test laboratory.

Note: The laboratory may return the sample(s) after Visa issues a verdict.

4.4.2 Visa Ready Tap to Phone Kernel Specification (VRTPKS) Compliance

The kernel application must be compliant with a valid and not yet sunset VRTPKS version, including its associated specifications and references.

4.4.3 Application Versions

The kernel application and operating system versions in the sample must be as stated in the questionnaire.

Important: Visa does not test proprietary or domestic applications as part of the testing process. In particular, the following are outside the scope of testing: Non-Visa applications (for example, mobile client payment applications, loyalty, coupons, other payment brand

kernels etc.), and specific message formats, record layouts, and protocol handling from the product to an acquirer or payment facilitator host system or a mobile communication network.

4.4.4 Host Simulator or Software Development Kit (SDK)

All sample units must be accompanied by a host simulator or SDK software that emulates a host authorization for online qVSDC transactions.

Subject to the architecture of the product, the simulator or SDK must be able to:

- Perform approvals or decline online qVSDC transactions.
- Allow the user to review and evaluate that the data elements captured from the product under test are compliant with Visa specifications.

4.4.5 Operating Manual

The solution provider must provide a soft copy operating manual that describes the requirements and operating procedures to set up the product for testing.

4.5 Quality Assurance Testing

Test laboratories may offer quality assurance (QA testing) or debug testing as part of their testing services. The option enables the solution provider to test their product with the test laboratory's facilities to identify and fix non-compliance issues prior to official testing.

The QA testing process is managed by the test laboratory. Visa is not involved in the process and does not review QA test results or accept the results for official review.

Important: Visa's official testing authorization is not required for the QA testing process.

5 Test Documentation and Tools

Visa's test plans, test scripts and associated documentation are available to assist solution providers with their QA testing prior to official testing.

Successful completion of test scripts execution does not imply an official recognition, until Visa reviews the test results from official testing and issues a verdict.

Visa reserves the right to develop and implement additional tests that are not part of the current test plan. Visa may subject the product tested at the test laboratory to additional physical and situation specific tests as necessary.

5.1 Test Plans

Visa Tap to Phone test plans are available for download from the Visa Partner Portal library (requires a user account) once the Approval Services Testing Agreement has been signed.

5.2 Commercial Test Tools and Test Scripts

Commercial Tap to Phone test tools and test scripts developed to support Visa's test plans are available from Visa qualified test tool providers.

Please refer to the "Approved Test Tools" list in the Visa Partner Portal library and at a public page on Visa Digital Partner Services.

5.3 Enhancements and Modifications

Test plans and test scripts are subject to enhancements and modifications at any time. Test plan revisions are accumulated and made available to solution providers with new releases, as determined by Visa. It is the solution provider's responsibility to ensure that it has the most current test plan. The solution provider should contact its test tool supplier to obtain any test scripts updates.

6 Functional Testing

6.1 Test Cycle

A test cycle is a set of applicable test scripts that are to be executed on any single version of the product during Visa's testing process.

A successful test cycle is defined as completion of all the executed test scripts with no issues or failures.

6.2 Test Scope

A Tap to Phone product is tested according to the VRTPKS version and functionalities declared in the Implementation Conformance Statement (ICS) form. The product is tested with test scripts that are based on the latest version of the VRTPKS test plan.

Testing focuses solely on the Visa kernel application and any of its supporting libraries or APIs that impact the kernel's VRTPKS functionalities.

6.3 Test Scope Exclusions

The following are excluded from the functional testing scope:

- Hardware, firmware or proprietary software, including the qualified device used for testing, mobile client payment application or software protection mechanisms that exist in the product.
- Regional requirements. Please contact the Visa Ready Tap to Phone team for regional requirements.

6.4 Transaction Timing Measurements

Transaction timing measurement enables Visa to evaluate that the Tap to Phone product is compliant with the transaction timing requirements for card and reader interaction, as stated in the Visa Contactless Payment Specification (VCPS) referenced in VRTPKS.

The test laboratory will measure the product's transaction timing and submits the results to Visa for review. The total time used by the reader must not exceed 100 milliseconds.

7 Report Review

The following section describes the process of submitting test results to Approval Services for review.

7.1 Test Laboratory Results

Upon completion of functional testing, the test laboratory will submit an official test report outlining the test results to the solution provider for review. The solution provider is required to authorize the test laboratory to release the test report to Approval Services to review for an official decision.

Important: The test laboratory is required to submit all test results to Approval Services within 180 days from the official testing authorization date.

There are two possible outcome of a Tap to Phone product testing.

7.1.1 Product Fails Testing

The test laboratory sends a report to the solution provider identifying the failed tests from functional testing and the reasons for failure.

The solution provider can choose to resubmit a failed product for a new test cycle with the following steps:

- Rectify the identified failures or issues.
- Complete a new questionnaire and ICS form with details of the changes made for a new test cycle.
- Schedule a new test slot at the chosen test laboratory.
- Provide new testing materials to the test laboratory.

7.1.2 Product Passes Testing

The test laboratory sends a final test report for functional testing to the solution provider for review. The solution provider determines if it wishes to submit the test results to Approval Services for review. The solution provider will then officially authorize the lab to submit an electronic copy of the final test report and all associated testing forms and documents to Approval Services for review.

8 Approval Process

The following section describes the process and rules governing the compliance recognition of a Tap to Phone product.

8.1 Product Compliance Notification

Visa reviews the test reports submitted by the test laboratory to determine if product is compliant with the evaluated Visa specifications. Based on the review outcome, Visa determines if the product passes or fails testing.

A Letter of Compliance (LoC) certifies the product as a Visa compliant product.

Visa will send a product compliance notification email to the person who submitted the questionnaire and ICS form.

A letter is attached to the email if the product passes testing and is recognized as compliant by Visa. The letter is addressed to the solution provider's appointed letter addressee, as registered with Visa.

8.2 Visa Tap to Phone Compliant Kernels List

Upon successful completion of official testing and issuance of Letter of Compliance, the Tap to Phone product will appear on the "Visa Tap to Phone Compliant Kernels" list, unless the solution provider notifies Visa in writing to exclude its product from the list.

The list is published monthly in the Visa Partner Portal library.

8.3 Compliance Recognition Validity

Unless otherwise stated in the Letter of Compliance, the period of time a Tap to Phone product is viewed as "compliant" is typically 3 years from the date of the letter issuance.

If the solution provider wants to extend the life of its product's compliance recognition, it should resubmit the product as a new submission, prior to the expiry date.

9 Changes to a Compliant Product

A retest may be required if the solution provider makes changes to a product that was recognized as compliant. The following are examples of changes that will require a retest.

For changes that are not listed, please contact Approval Services with details to determine the type of testing required.

Table 9–1: Examples of changes to a compliant product that require retest

Type of change	Description
Operating system (OS) changes	Adding, deleting, or modifying codes in the operating system that results in recompilation of the compliant kernel or affects its VRTPKS functionalities.
Kernel application changes	Changes or bug fixes to the compliant kernel and/or its corresponding libraries or its VRTPKS functionalities that result in the recompilation of the kernel.
Non-Visa application changes	Changes or bug fixes to a non-Visa application that the kernel is integrated with, that result in the recompilation or affect the VRTPKS functionalities of the compliant kernel and its corresponding libraries.
Security changes	Changes to the components or elements of the product's security evaluation scope that result in the recompilation of the kernel or affect the VRTPKS functionalities of the compliant kernel and its corresponding libraries.

A Appendix A – Revision History

Table A–1: Document revision history

Version	Date	Description
2.3	March 21, 2022	Updated "Key Terms and Acronyms" • Replaced "COTS device" and its definition with the latest terminology and definition of a "Visa Ready Tap to Phone Program qualified device". • Added definition for "Visa Ready Tap to Phone Program". Updated "Scope of Testing" • Updated the definition of a Tap to Phone kernel product. • Removed references to a COTS device. • Defined the scope of a "distributed kernel solution". • Updated Figure 2-1 and add Figure 2-2 as visuals for the scope of testing. Expanded the definition of the ICS in Section 4.1. Replaced the terminology of "Visa Recognized Testing Laboratories" with "Accredited Test Laboratories" in Section 4.2 and Appendix B. Replaced the terminology of "Visa Test Tool Providers Contact Information" with "Approved Test Tools" in Section 5.2 and Appendix B. Updated "Payment application changes" in Table 9-1 to "Non-Visa application changes". Added "application digital signature" to the checksum definition in Appendix C1.1.
2.2	February 1, 2021	Updated Figure 2-1 include the operating system in the "product" scope. Updated Section 5.1 to remove statements that are already covered in Visa's legal agreements.

Version	Date	Description
		Updated Section 6.3 to remove "operating system" from functional test scope exclusion. Updated Section 8.2 to indicate location of Compliant Kernels List on VPP.
2.1	January 18, 2020	Updates to Visa Ready Tap to Phone program contact email and various sections of the document for language and description clarity.
2.0	December 21, 2020	New document format. Includes process updates for the technology partner workflow on the Visa Partner Portal, removal of the letter of approval (LoA) process for kernel and payment application submissions and incorporated Visa kernel checksum implementation rules in Appendix C.
1.0	August 19, 2020	1st release

B Appendix B – Specification and Requirements

This appendix lists Visa specifications and associated documents, requirements or tools that apply to the testing of a Tap to Phone product and where each can be obtained.

Table B–1: Tap to Phone specification and associated documents

Specification	Description	Available at
Visa Contactless Payment Specification 2.2 and update lists (VCPS)	Defines the requirements for conducting Visa contactless transactions at point-of-sale (POS) devices. Includes requirements for cards, POS devices and chip data messages. Compliance with this specification enables interoperability among Visa's global contactless payment programs.	Visa Partner Portal library. Log in is required.
Visa Ready Tap to Phone Kernel Specification and update lists (VRTPKS)	Defines the technical differences between the contactless kernel defined in VCPS and the contactless kernel for mobile acceptance devices that use the NFC capabilities of the mobile device to process Visa contactless transactions.	Visa Partner Portal library. Log in is required.
Visa Ready Tap to Phone Kernel Specification (VRTPKS) Test Plan	Defines test cases, test configurations, test procedures and expected outcome to evaluate a product's compliance with the requirements of the Visa Ready Tap to Phone Kernel Specification (VRTPKS) and update lists, where applicable.	Visa Partner Portal library. Log in is required.
Reader Controller Development Kit	Guidelines for automated Functional Testing, including a toolkit with companion guide, code snippets, and verifier tool to develop and test a Reader Controller implementation on the solution provider's product.	Visa Partner Portal library. Log in is required.

Specification	Description	Available at
Accredited Test Laboratories	List of Approval Services accredited Functional Test Laboratories for Visa chip payment products testing, including Tap to Phone.	Visa Partner Portal library. Log in is required. Also available from a public page on Visa Digital Partner Services.
Approved Test Tools	List of Visa qualified test tool providers and test tools that are available for Visa test plans.	Visa Partner Portal library. Log in is required. Also available from a public page on Visa Digital Partner Services.

C Appendix C – Visa Kernel Application Checksum Implementation Rules

The kernel application checksum (kernel checksum) is mandatory in each submitted form.

The checksum ensures that the kernel application is stable when submitted for testing and is used to identify changes to the product during testing or after testing has completed.

Important: All sample units must include a mechanism for the user to easily retrieve and view the checksum values.

C.1 Checksum Implementation Guidelines

The kernel application shall have a unique checksum value,

The checksum computation should include:

- Components or elements of the kernel that support all the requirements of the evaluated Visa specification.
- The static bits of the "Terminal Transaction Qualifier" (TTQ).

For a kernel application that is made up of several software modules (for example, external routines, libraries, etc.) :

- Each software module shall have a unique checksum.
- The kernel checksum is computed as an overall checksum of all the software modules' checksum values.
- Any changes in a software module should generate a new unique checksum value of the changed module.
- The checksum generation algorithm shall generate a unique value each time a software module is changed. The method or algorithm for checksum generation is left to the discretion of the solution provider.
- The sample unit(s) for the product under test shall contain a software mechanism that easily retrieves the checksum values of all related software modules when these are loaded into the sample unit.
- When used, this software mechanism shall dynamically compute the kernel checksum.

In addition, the following requirements apply to a Tap to Phone product.

C.1.1 Tap to Phone Kernel Application Checksum

The solution provider should state the kernel checksum or the application digital signature, for example the certificate value of a signed application package (APK), in the questionnaire. The kernel checksum value is the overall checksum of the kernel and its libraries or APIs that support the features of VRPTKS and associated specifications.

The kernel checksum should exclude the checksum of any other applications that exist or is integrated with the kernel. For example, the mobile client payment application and its libraries.

C.2 Checksum Retrieval and Validation

The test laboratory will validate that the kernel checksum value retrieved from the product under test is identical to the kernel checksum value declared in the questionnaire.

The official test report submitted to Visa shall include:

- Validation results for the kernel checksum.
- Validation results for the individual software modules checksums, if the kernel application implementation is made up of several software modules.

C.3 Changes to a Kernel Application Checksum

The kernel application checksum value stated in the questionnaire should not change.

- It is considered a major change if the kernel checksum value is different from what was stated in the questionnaire.
- The solution provider is required to resubmit a new questionnaire to Visa for a new test cycle, with details of the change and the new kernel checksum value.

D Appendix D – Reader Controller Requirements

The solution provider can fully automate functional testing by developing a reader controller software in the submitted product.

The reader controller software interfaces with the product and test tool to automate the test configurations set up and test responses during testing.

Visa's "Reader Controller Development Kit" is available at no cost to the solution provider when the ASTA is executed. The kit contains a companion guide, code snippets, a reader controller verifier tool and a test card personalization XML file for the solution provider to develop and test its reader controller implementation.

The kit can be downloaded from the Visa Partner Portal library (requires a user account).

The solution provider must include the reader controller software in the sample unit(s) that are submitted to the lab if it opts for fully automated functional testing.

Important: Implementation of this requirement is optional.