

EMV MIGRATION AND CERTIFICATION IN THE U.S.

UL'S VIEW ON OPTIMIZING EMV BRAND CERTIFICATION PROCESSES





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The introduction of EMV technology in the U.S. requires substantial changes to the existing payment acceptance infrastructure. These changes need to be tested and certified to be proven secure, interoperable and compliant with brand policies and regulations. Due to the large number of POI device types in the field and the upcoming deadline for liability shift per October 2015 the estimated effort for test and certification is huge and urgent for all stakeholders. Besides, the brand certification of POI device implementations for the various card Brands – e.g. Amex AEIPS, Discover Acquirer E2E, MasterCard M-TIP and Visa ADVT testing – is perceived as a massive and costly operation.

For this reason the EMV Migration Forum and EMVCo working groups have started to address the topics of volumes, decreasing process complexity and redundancy of testing.

The objective of this white paper is to provide UL's view on these topics, in order to take effective measures to optimize EMV brand certifications and acquirer/processor testing when taking EMV capable POI devices to market in the U.S. These certifications should be as cost and time efficient as possible without compromising interoperability and customer experience at the merchant's counter.

The U.S. EMV migration differs from other regions, especially because of the construct of the payment landscape consisting of vendors, ISOs (Independent Sales Organizations), ISVs (Independent Software Vendors, VARs (Value Added Resellers), acquirers, processors and brands.

EMV migrations require brand certifications of device implementations to prove that the acceptance of EMV cards is ensured in a secure and interoperable way. The current discussion on the work load of certifications as such is driven by the perception that the processes for certifications can be simplified and that some of the testing required by the brands is redundant. UL recognizes this, however from UL's perspective this discussion should not only be focused on test and certification, but on the complete deployment process where test and certification as an integral part.

All parties involved in EMV migrations will consider the changes in their deployment model. Lessons learned from the EMV migrations in Europe and Asia showed that EMV as such will lead to a decrease in terminal models and standardization of





interfaces. We expect that U.S. EMV deployment will also lead to a decrease in the number of available EMV terminal models and simplify protocols (acquiring interfaces). These two possible effects will have a massive impact on the current payment landscape. As a result, the number of expected brand certifications will drop substantially compared to the existing calculations based on today's magnetic stripe payment landscape. It should be stressed that these effects are a result of market drivers, and do not occur because of any strategic process to restrict this.

Moreover the current discussions tend to focus on brand certifications as such and how they can be optimized. From UL's perspective this is not the full story. The amount of testing on acquirer/processor level is substantially more than the amount of testing required for all major brands together. On the other hand UL understands that the setup of brand certification can be more complex than the acquirer/processor testing. We will address this in more detail in this white paper.

Nevertheless from a test and certification perspective, efficiencies can be gained. Optimizing and simplifying the test processes without compromising quality is possible. UL believes that the capability to capture test results and provide these to stakeholders in a highly automated way enables this. UL is convinced that maximizing test automation by acquirers, processors and brands is the way to go in order to deploy EMV solutions that are interoperable and compliant to the brands' requirements and ensure secure and reliable payments.

UL's advice consists of five major improvement areas that will be explained in this white paper:

1. Simplify the test base and certification
2. Streamline the certification process
3. Align test plans
4. Enable test automation
5. Ensure quality of testing by validation

In this white paper we will first present an analysis of the challenges that certifications for an EMV migration will bring. We will describe the key parts of the brand certification process, as we see them and which of these parts put

pressure on cost and resourcing. This will lead us to the main topic of the white paper that contains our advice to the U.S. market.

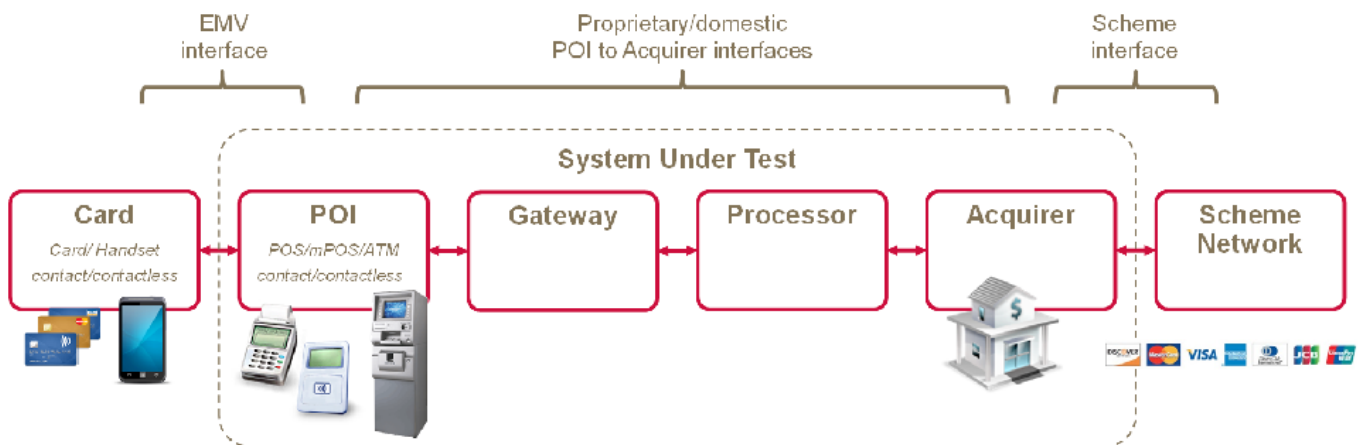
Problem Analysis

Brand certification is the last step of an acquirer's EMV migration and POI development process. The brand certification generally consists of three major steps: Test Preparation (scoping and preparation), Test Execution and Test Validation. When challenging the assumption that certification is a massively costly exercise the following questions arise:

1. What are the key parts of a certification process?
2. What are U.S. specifics?
3. How many certifications are required?

The following pages will elaborate on these questions before explaining UL's advice.

A typical picture of the System Under Test – POI implementation – is displayed below, including the adjacent interfaces:



* POI device = Point-of-Interaction device, such as POS (Point Of Sale) terminal, mPOS (mobile Point of Sale) terminal, BBT (Bank Branch Terminals), CAT (Cardholder Attended Terminals) or ATM (Automated Teller Machines).



What Are U.S. Specifics?

Specific for U.S. market is the split between Class A and Class B certifications:

- Class A devices are certified as POI only according to the brand requirements.
- Class B devices are certified as a POI including acquiring interface protocol, where the POI is certified as integrated solution according to the Brand and Acquirer requirements (including hundreds of test on performance, user interface, destructive testing, transaction sets and a lot of other acquirer or processor specific test cases).

As a result of the Durbin discussions, we see that the market is requesting acquirer independent terminal testing (because one and the same transaction can follow different routes). From a brand perspective the System Under Test is the combination of the POI and the acquirer (including the protocol/interface which is used). It is easy to conclude that because of this, acquirer independent brand testing can't be achieved. However in other markets we see that standardization of the protocol (interface) can lead to simplifying brand certifications where one POI certification can be applicable for multiple VARs and acquirers using the same interface protocol. Whether this can be achieved in U.S. needs to be discussed with the brands, acquirers and processors. For now we at least need to conclude that testing on processor/acquirer level needs

to be taken in account for the whole U.S. EMV certification discussion and that further standardization can limit the amount of certifications.

Moreover EMV is new to the U.S. market. Good preparation and knowledge are key success factors. Unsuccessful certification means going back to the drawing table and applying for recertification. This consumes time and resources. It seems obvious to look at the brand network's certification as a congesting last step in the certification process, but we may not disregard the POI's quality and the involved test analyst's knowledge and experience and diligence.

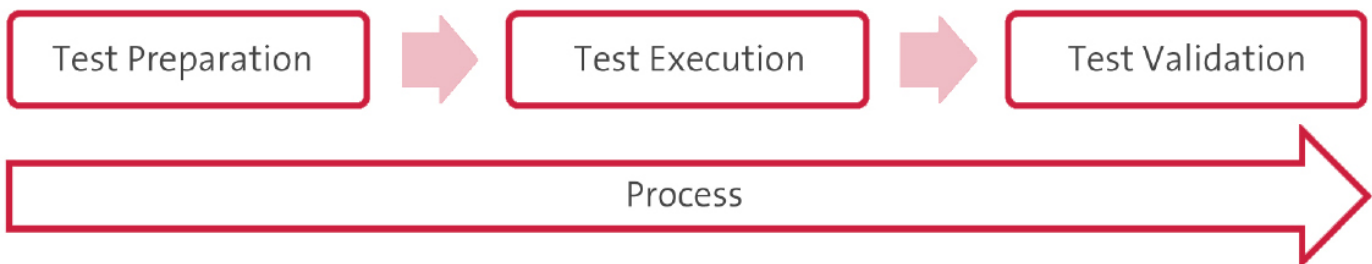
What Are the Key Parts of the Brand Certification Process?

The **Test Process** of the brand certifications is the basis and defines the rules, scoping, stakeholders, interactions, process steps and documents and evidence applicable to the certification process of a scheme. Schemes explain this in their customer guides.

The **Test Preparation** consists of **Test Base** and **Test Plan** required for executing the brand certification properly. It's hard to give a generic applicable lead time, but based on the experience of UL this part can easily add up to several weeks. It includes the following activities:

- After the system testing of the POI (as part of the development life cycle) pre-certification testing is done. This is very specific testing with focus ensuring system's quality and readiness for certification.
- Fulfill all test intake criteria, gather evidence, and fill out intake forms/questionnaires to define the test scope.
- Arrange and configure an accredited test tool, test card simulator or physical test cards.
- Configure the connectivity of the test environment:
 - Configure terminal, Terminal Management System, Acquiring Host and the brand's network host simulator (if applicable) or connection to the brand's network, e.g. to make sure the correct parameters and keys sets are loaded;
 - In case of online testing, arrange time slots with acquirer/processor (if applicable) and with the brand;
 - Mobilize all involved parties – e.g. via SLAs – to respond quickly in case of issues;
 - The acquiring host is EMV compliant and has passed the brands' network interface testing.

The **Test Execution** for the main brands— America Express, Discover, MasterCard and Visa - varies between 10 and 60 test cases required per brand, and sums up to approximately 150 test cases in total





for contact interface. A similar amount of test cases apply for contactless interface. Please note that acquirers/processors add hundreds of additional test cases required to execute to verify and validate compliance with their requirements.

Test execution as such is not the main challenge; but finding your way through the processes, the delivery requirements of the various networks and manage the process dependencies across brands requires a lot of handholding. The process becomes truly complex when tests fail and you have to rely on the experience of scarce subject-matter expertise for analysis to discuss applicability/waiver and advise on how to change the POI software in order to meet criteria:

- Is the issue caused by the software of the System Under Test? Or by the configuration of the System Under Test? Or even the configuration of or connectivity to the acquirer host? Maybe by how the test case was executed? Or is the issue related to the test tool/simulator?
- If the issue is due to a malfunction in the POI device software the cycle(s) of “testing -> debugging -> testing” start. This cycle must be repeated between developers and testers until all tests in scope are approved.

If the issue is due to host configuration or connectivity, the (third) parties responsible must be mobilized.

Test Validation is performed by the brands or by brand-accredited third parties. From

an acquirer’s perspective this takes little time, especially when using test tools that capture test results and automate reports for the brands and the tester has consciously executed the tests. However:

- Test evidences need to be provided diligently according to brand rules; card-terminal logs, (labeled) receipts, terminal-host logs and, if required, the screen texts.
- Requesting waivers (if applicable) may be a process that can heavily delay roll-out.

How Many Certifications Are Required?

The specific rules for formal certification per payment brand are elaborate. These rules are clarified in the EMV Migration Forum’s publication [EMV Testing and Certification White Paper: *Current U.S. Payment Brand Requirements for the Acquiring Community*, v1.0, EMV Migration Forum - Testing and Certification Working Committee].

In general certification is required in case of:

- New or updated hardware interface module
- New or updated EMV application kernel
- New brand acceptance and configuration on POI
- Deploying a POI over a new acquiring network chain
- Material changes to the payment modules or application

POI certification is required for every POI as System Under Test, defined as a EMV Level 2 certified device including the payment application. The responsibility for the developed payment application including the front-end interface protocol to the gateway or processing host is not just an acquirer responsibility, because in the U.S. VARs, ISOs and processors are equally involved providing different POI gateways and multiple acquirer interfaces.

For each payment brand, this means that for every POI or change to the acquiring network chain, a certification process needs to be completed. The duration of the certification process heavily depends on diligence of preparation and troubleshooting.

As stated before, the right calculation of the amount of certifications required needs to be seen from a deployment perspective defining the amount of terminals, applicable gateways, processors and acquirer interfaces. High variety of interfaces will increase the demand for certifications. Major variances in acquiring network chains require new brand certifications. In case of 2 POIs, 2 gateways, 2 processors, 2 acquirers and 6 schemes the total amount of certifications can easily grow to 96 in total.

The next step is to define how to optimize these certification processes.

POI	Gateway	Processor	Acquirer	Schemes	Total Certifications
2	2	2	2	6	96

Current Scenario



Solutions to Optimize the Brand Certifications Processes

Given the current certification processes as mandated by the different payment Brands, UL sees opportunities for optimization, and reducing resources required to complete test and certification. Scenarios which increase efficiency of the brand certification process are summarized below.

1. Simplify the Test Base and Certification

If it comes to EMV UL considers three important interfaces which are impacted and are subject to certification:

- Card to POI Interface
- POI to acquirer interface
- Acquirer to scheme interface

EMV interoperability should be guaranteed by validating the card to terminal interface, the processing network and the acquirer to scheme interface. In this white paper the focus is on the POI to acquirer interface. The POI to acquirer interface is not standardized and therefore creating the largest add on to the complexity in the U.S. market.

Therefore UL’s view is to simplify the interfaces and making sure that every interface is certified with full EMV functionality.

In UL’s view the **standardization should be driven by the market** on all the existing interfaces. Both the payment brands as well as the acquirer processors can standardize the terminal-to-acquirer interface protocols. If these protocols are standardized the POI device certification could be decoupled from the acquirer certification. A certified device can be implemented over different certified hosts using the same protocol: this only requires registration of the device implementation. This seems quite a difficult goal to achieve in the current U.S. market setup, on the other hand other markets showed how successful this standardization can be. Moreover, standardization of the deployed POI models leads to less variety in systems configuration to test and consequently in less certification efforts.

To simplify and reduce the complexity of EMV brand testing, UL advises to

split the certification of the different POI to acquirer interfaces from the POI certification itself. This can be achieved by introducing a separate Level 3 certification for the POI to acquirer interfaces. At the deployment of a new POI device just one POI certification may suffice to allow for the use of this POI via all certified networks of gateways, processors and acquirers, just one certification can already prove brand compliance. Although U.S. acquirers might have complex infrastructure with multiple hosts, still efficiency will be gained by splitting certification of the network path apart from the POI. The need for certifying the same “device + acquirer” combination for various intermediate gateways and processors is no longer needed. Please note that in quite some cases the acquirer and the processor can be the same organization if the processor is doing on behalf acquiring. So if a certain acquirer can integrate the gateway, processor and acquirer into one certified channel/ interface it will minimize the certifications to 20 in total:

1. 2 x 2 x 2 Level 3 POI to Acquirer Certifications

POI	Gateway	Processor	Acquirer	Schemes	Total Certifications
-	2	2	2	-	8

Network Certifications

2. 2 x 6 POI Certifications

POI	Gateway	Processor	Acquirer	Schemes	Total Certifications
2	-	-	-	6	12

Terminal Certifications

The Level 3 POI to acquirer certifications should happen with a reference terminal and should be a combined effort for all brands, preferably owned and supervised by a body such as EMVCo or by a common specification which is accepted by all brands.

Of course, if the payment device is being deployed within a particular integrated merchant solution with new payment and/or EMV functionality a new Brand certification remains required. POI as System Under Test is defined as a EMV Level 2 certified device including the payment application.

2. Streamline the Certification Process

According to UL's experience, understanding and executing administrative procedures is the biggest challenge within brand certification. Test case execution as such is not very time consuming (of course depending on level of automation). Therefore UL's view is that reducing test cases only will be a minor efficiency improvement.

The six major brands currently all have their own processes and procedures that might confuse an acquirer. Unifying these processes will decrease the complexity of brand certifications:

- Uniform rules on which configurations need to be certified and how to do this
- One ICS form for all schemes
- Unified process steps across all brands
- Align documents and evidence (e.g. log formats)

Current certification processes could be evaluated and modified to develop leaner or easier processes, as they leave room to decrease the lead time. This can

be done by analyzing and improving the current processes, through automation and by improving the input into the current certification process:

- Pre-certification testing can be done using test tools and simulators qualified by the payment brands. Once test execution is successfully completed with qualified test tools, the quality of your system is satisfactory for validation by the brand (no bug fixing or trouble shooting during formal certification).
- Acquirers and/or processors benefit from resources with experience in test and certification processes. Their core business is not about certifications as such, hence third party support helps making the process more efficient for them.
- The acquirer can set up a lean and experienced internal test organization or outsource the complete test organization to acquirer or third party vendor which is already experienced with EMV.
- Ensure that dependencies on POI vendors, host systems vendors and switching parties are properly planned and organized and that available time slots for testing in the whole chain are optimal utilized by scheduling ahead as much and good as possible.
- The payment brands can develop or accredit self-test platforms that provide automated validation.

Solutions can also be found in making (parts of) the certification processes obsolete or less strict. This of course may increase the risk of having issues in production after deployment, which may increase costs in the long run. Production issues can result in loss of income, loss of brand value and other losses with severe





impact on costs.

- The certification effort could be transferred to other parties, e.g. the vendor industry. This model is applied in various other countries, and is very effective in combination with protocol standardization. Using a device which has been certified before by the vendor reduces the chances of issues during the certification after customizing it for the implementation on the specific acquiring network. This doesn't avoid certification but simply moves it to a third party.
- Rules and regulations for re-certification could become more flexible. This would reduce the overall certification effort but obviously increases the risk of non-compliance and brand damage. One specific rule to review is when deploying a device over a new acquiring chain, recertification is required. However, when the exact same device is deployed via different gateways to one acquirer host, one could argue that a single end-to-end certification of the device is enough to demonstrate correct brand acceptance. In order to assure interoperability, the acquirer could perform sanity checks of the device over the different gateways with network simulators, but without formal brand certification.

3. Align Test Plans

Brand certification is testing brand specific requirements and products; UL believes that separate test plans per brand will stay to exist. Current test cases specification for brand certification can be analyzed and reviewed to see what the common ground is. This should result in a reduction of the number of test cases, for instance by eliminating overlapping test cases. But according to UL's analysis this will gain

some efficiency and improvement in lead time but not major. Much more can be obtained by introducing the EMV Level 3 POI to Acquirer Interface Certification as explained above.

UL's view is to minimize the amount of acquirer and processor testing and collect overlapping test cases for all acquirers to perform them in combination with EMV Level 3 POI to acquirer certification testing or brand certification testing. Topics to address in these test cases are: vulnerability, user guidance, performance, destructive testing, as part of POI brand certification testing. Transaction type tests and a lot of other acquirer or processor specific test cases as part of the EMV Level 3 POI to Acquirer Interface Certification testing. This will lead to standardization and minimize the amount of certification work once the acquirer interfaces are tested once.

4. Enable Test Automation

Existing test tools should support the (streamlined) processes for all brands and guide the testers. Test automation will improve test productivity and quality. Test tools should offer unification by hiding the remaining schemes' differences on the process and technical level.

In case of test automation UL distinguishes three different options:

1. Stand-alone test platform supporting all schemes and used to provide evidence to the schemes.
2. Scheme online test platform provided per scheme to enable 24 x 7 testing and collecting evidence for the scheme.
3. Processor online test platform to enable a processor or acquirer to self-certify (for POI and interfaces).

As for the modification of the certification processes by allowing self-certification, the following items need to be considered:

- Self-certification by the acquirer or processor should be restricted to testing only against a scheme or processor online test platform. As part of certification validation of the evidence should remain the responsibility of the scheme/EMVCo or an accredited test lab, in order to ensure the quality independently.
- In this case the acquirer or processor is still responsible for delivering the certification evidence to the brands. Automation of capturing test results and providing the evidence can facilitate this.
- Self-certification using a scheme or processor online test platform will reduce the overhead in dependencies with brand and across brands, e.g. network connectivity.
- Process automation by the platform will reduce the efforts of dealing with the brands' validation processes and allows the acquirer to focus on managing the brand certification.
- Payment brands mandate the usage of officially qualified test tools for testing and validation. Therefore a central registration of certified solutions by brands is advised.
- Only in cases of new POI devices (with a newly certified kernel or payment application) a full end-to-end brand certification is performed in cooperation with the brand.

5. Ensure Quality of Testing by Validation

All efficiency improvements should not lower the quality of the certification testing. For that reason measures are



required to ensure the quality of the test validation. UL suggests automating the validation as much as possible. The management of these tests can be handled by an accredited test lab (third party service provider), who's accreditation should happen by EMVCo and/or the schemes. Thoroughness of validation required, depends on the platform used and type of party executing the test, e.g. large processor. In case of automated validation, the Brands perform sanity checks and quality control on the test results.

Conclusion

There are opportunities to optimize the process without compromising quality. All solutions mentioned contribute to reducing efforts and costs in an EMV migration. However in order to successfully reduce the expected costs and workload a mix of solutions is recommended. Each solution has its own characteristics with regard to **impact and cost and time**, but needs to be focused on:

1. Simplify the test base and certification, reducing the amount of test effort needed.
2. Streamline the certification process, preventing duplication of effort.
3. Align test plans to enable brand

independent POI to Acquirer Interface Certification, and smoothen acquirer specific tests.

4. Enable test automation, therewith improving the speed and the quality of the test execution, preferably with real-time validation.
5. Ensure quality of testing by validation, to make sure that all improvement will not lower the quality and the interoperability.

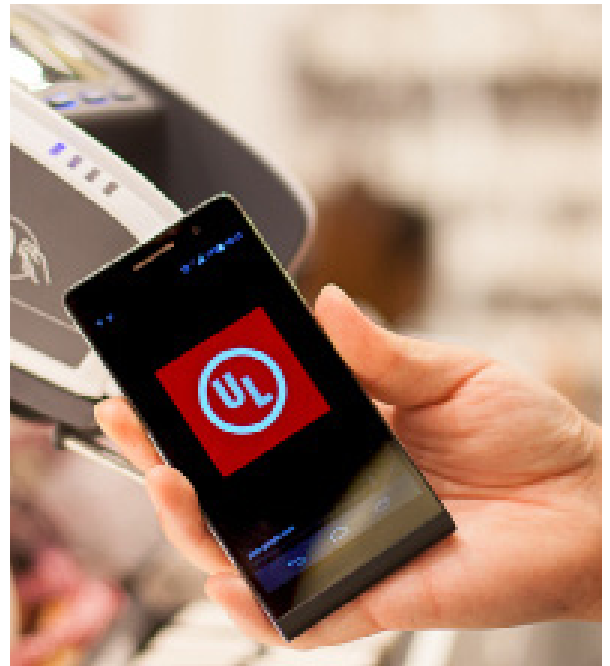
For the U.S. market the biggest challenges are to cope with the complexity of the market and the lack of standardization. Lowering the amount of test cases is not a solution as such, but a broader perspective and a combination of solutions.

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