Visa Kernel Management Guidelines for Contact and Contactless Chip Terminal Implementations

Appropriate kernel management can potentially minimize terminal testing and can minimize when necessary updates/changes to existing terminals are needed for deployed terminals in the market.

An EMV kernel is a set of functions that provides the processing logic and data that is required to perform an EMV contact or contactless transaction. The kernel is a part of the terminal payment application supporting EMV functionality and is included in the EMVCo Level 2 approval process.

There is an extensive EMVCo defined Level 2 approval process which requires every EMV Kernel to have completed laboratory type approval testing before it can be used in terminals to perform EMV transactions. EMVCo also will require this approval to be renewed at defined intervals to retain compliance. To reduce terminal testing requirements, as well as to minimize the impact when necessary updates / changes to existing terminals are deployed in the market, Visa recommends acquirers and merchants are familiar with the kernels being supported in their terminals to assist in proper EMV kernel management. Kernel management promotes terminal vendor communication and standardizing solutions.

Whenever the terminal vendor makes changes to the kernel, acquirers, merchants and value-added resellers should:

- Ensure the EMV terminal has EMVCo approvals for the Interface Module (IFM) and kernel at time of deployment.
- Review EMVCo's renewal policy for IFM and application kernel approvals.

EMV IFM and Kernel changes are defined as major and minor by EMVCo, based on their impacts. Major changes require EMVCo retesting and new approvals, whereas minor changes do not. For minor changes, however, the terminal vendor is responsible for managing documentation and internal test results to align with the original EMVCo approval.

The terminal vendor can request an approval extension upon expiration and EMVCo will evaluate whether the product, IFM or kernel sufficiently conforms to the current EMV specification. IFMs or kernels that do not pass the evaluation will not be granted an extension and their approval will be considered expired.

Approved terminals contain an EMVCo-approved kernel and chip reader IFM. Different models in the same terminal family can share an approved kernel and/or chip reader. EMVCo-approved components are typically portable, meaning an approved application kernel may run on any terminal that has an approved IFM. This assumes the kernel can be used on a terminal without major changes and retains its EMVCo approval.

As a best practice, terminal vendor maintenance changes to an existing kernel are usually incorporated into the next kernel version, which would require Visa terminal testing (i.e., Acquirer Device Validation Toolkit (ADVT) and/or Contactless Device Evaluation Toolkit (CDET). Refer to *Visa U.S. EMV Chip Terminal Testing Requirements* for more details.

Terminal Testing Considerations

Visa Terminal testing (ADVT and/or CDET) can only be performed on EMVCo-approved terminals. Acquirers should ensure new terminal deployments contain IFMs or kernels that have a current EMVCo approval. This will not affect deployed terminals or deployed terminals already tested. However, unapproved EMVCo components will prevent the deployment of new and updated terminal configurations that use expired hardware or software.

On individual terminals that fall within the same terminal family (i.e., payment application, EMV kernel, and chip transaction flows are all the same), consult with your terminal supplier to verify that the terminals fall within the same terminal family. For ADVT, if the terminal is considered a terminal family, ADVT testing would only have to be performed once on a single terminal within the product line. Similar for CDET testing, CDET does not specifically test the performance of the contactless antennae, rather this testing focuses on the integration of the payment application to the Level 2 kernel. While there may be variances of Level 1 and Level 2 letters of

approval for a terminal family the Level 2 kernel is often identical within the family itself. When a deployment supports a Visa payWave terminal family that also shares the same level 2 kernel, then a single Visa payWave reader can be CDET tested to represent the related terminal family. This approach allows a general reduction in the number of test iterations without negligible impact to the scope of testing.

Typically, a minor change to a kernel would not require Visa terminal retesting against ADVT and/or CDET. Visa recommends working with terminal vendors on how kernel changes may impact terminal configuration. Terminal vendors can provide guidance on the whether the changes are major or minor.

Not all kernels changes require an upgrade and can be classified as minor, defined by EMVCo Type Approval Bulletin 11 6th edition, February 2014. Therefore, terminal retesting would not be required for minor changes. However, if these minor changes to the kernel impact chip processing, Visa terminal retesting ADVT and/or CDET would be required.

If an interoperability issue is identified, the acquirer must make the necessary changes, which may include updates to the kernel, and Visa terminal testing ADVT and/or CDET will be required.

Terminal test results for ADVT and/or CDET cannot be submitted into the Chip Compliance Reporting Tool (CCRT) with expired kernels and IFMs.

Implementation of a selectable kernel would require Visa testing ADVT and/or CDET for each unique configuration.

Recommendations

Visa recommends standardizing point-of-sale solutions by using the same kernel configuration, which reduces required testing to only one unique terminal configuration; a kernel can be supported on more than one device (terminal family). Acquirers should consult with their terminal vendor to determine if the terminal is the same family.

EMVCo recommends that expired kernels be replaced within one year after expiration date. If the new kernel contains major changes, then it would require Visa terminal testing ADVT and/or CDET for each unique terminal configuration once the new kernel is integrated into the payment application and prior to deployment. An update of the terminal software may require replacement or upgrade of the expired Level 1 or Level 2 components.

Alternately, the vendor of the EMV kernel or chip reader (Level 1) may be able to renew the EMV Level 1 and Level 2 approvals. Acquirers should evaluate kernel updates when they become available by the terminal vendor.

An EMV terminal (e.g., payment application, Level 2 kernel and Level 1 IFM) can continue deployment beyond the approval expiration of any component, assuming there are no changes to these components nor any reported interoperability issues. While the expired kernel does not affect the EMV liability shift, there is risk it may contain interoperability issues compared to more recently tested kernels. This principle also applies to existing EMV terminal inventory already in the distribution channel. Acquirers should review the section on Usage in the *Acquirer Device Validation Toolkit User Guide* for more details. These requirements are also relevant to CDET testing.

Retesting of offline-capable terminals can increase the duration of testing because of the complexity of debugging issues with these terminals. Refer to *Visa Minimum U.S. Online Only Terminal Configuration* document for more details.

In addition, Visa recommends that acquirers:

- Implement terminal management systems that allow for EMV configurations and parameter updates to be managed remotely and efficiently without requiring onsite visits. The identifiers of kernels with interoperability issues are listed on the EMVCo website. Keeping track of which kernel is loaded into each terminal will allow acquirers to resolve interoperability issues more quickly.
- Establish ongoing communication with terminal vendors. They will be providing requirements on any changes needed to terminals.
- Make the required changes, which may include updates to the kernel, if an interoperability issue is identified. Visa terminal testing will also be required.

Visit the U.S. Payments Forum website to review collective feedback from payment network stakeholders.

Additional Resources

Documents & Publications

"Major and Minor Change Definitions," Type Approval Bulletin #11, 7th Edition, September 2016

Online Resources

Documentation is available for Visa clients on Visa Online at www.VisaOnline.com. Merchants are advised to contact their acquirers for any documentation not available on visachip.com.

- Visa Chip Bytes at visachip.com
- *Chip Vendor Enabled Service (CVES)—Streamline Visa U.S. EMV Chip Testing and Reporting Requirements*
- *Visa Inc. U.S. EMV Chip Terminal Testing Requirements*
- *Visa Minimum U.S. Online Only Terminal Configuration*
- *Visa Transaction Acceptance Device Guide*
- *VSDC and Visa payWave U.S. Acquirer Implementation Guide (AIG)*
- *Visa Smart Debit/Credit ATM U.S. Acquirer Implementation Guide (AIG)*
- *U.S. Quick Chip and Minimum Terminal Configuration ADVT Use Cases*