EMV® Specification Bulletin No.287

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Update to Kernel C-4

This Specification Bulletin describes latest changes and corrections to the EMV® Contactless Specifications for Payment Systems Book C-4 Version 2.10.

Applicability

This Specification Bulletin applies to:

- *EMV® Contactless Specifications for Payment Systems, Book C-4 Kernel 4 Specification, Version 2.10, March 2021*

Related Documents

- *None*

Effective Date

- *June 1st, 2023*

Description

The purpose of this bulletin is to update C-4 Specification Version 2.10 to introduce formal requirements for mPOS implementations, remove Magstripe Mode and Dynamic Reader Limits. Also, there have been some corrections to minor errors and additional clarifications.

Revision Log

Updated various sections to include the formal requirements for mPOS implementations.

Added 1.6, that describes the different architectures.

Added Annex C, that describes the requirements for the mPOS architectures defined in section 1.6.

Updated section 12.2.1.2 to add clarity on the outcome when the reader checks the CID and an ARQC is not returned, the transaction must be declined and returned to entry point with a final outcome of End of application.

Added clarification comment in section 4 for the configuration of *Terminal Type – Modified* and *Enhanced Contactless Reader Capabilities*, as they should not be set with conflicting values.

Removed Dynamic Reader Limits.

Removed Magstripe Mode.

Added requirement 4.3.1.4 for Online Only reader Unable to go Online

8.2.6.1. correction of reference to Bit 6 instead of Bit 8 in *"*TVR *Byte 1 Bit 6 to 1b, 'ICC Data Missing'.*

Added requirement 11.2.1.5.for when the response to GENERATE AC the response is in the incorrect format or the Cryptogram Information Data (CID) is not a TC, ARQC or AAC.

Deleted requirements 12.1.1 and 12.1.3 in Online processing.

Added requirement 12.2.3.1.

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1 Introduction

Kernel 4 is a contactless Reader kernel designed for interoperability with a suitable contactless payment application including American Express Contactless Payment Products.

1.1 Scope

This document, the *EMV Contactless Specifications for Payment Systems, Kernel 4 Specification*, defines the mandatory and optional functionality required when implementing Kernel 4.

1.2 Audience

This specification is intended for use by system designers in payment systems and financial institution staff responsible for implementing financial applications.

1.3 Volumes of Contactless Specifications

This specification is part of a ten-volume set:

Book A: Architecture and General Requirements

Book B: Entry Point Specification

Book C-1: Kernel 1 Specification

Book C-2: Kernel 2 Specification

Book C-3: Kernel 3 Specification

Book C-4: Kernel 4 Specification

Book C-5: Kernel 5 Specification

Book C-6: Kernel 6 Specification

Book C-7: Kernel 7 Specification

EMV Level 1 Specifications for Payment Systems – EMV Contactless Interface Specification

1.4 Reference Material

The following specifications and standards contain provisions that are referenced in this specification. The latest version shall apply unless a publication date is explicitly stated.

If any provision or definition in this specification differs from those in the listed specifications and standards, the provision or definition herein shall take precedence.

[EMV 4.3]	*EMV® Integrated Circuit Card Specifications for Payment Systems*, Version 4.3, November 2011, including:
[EMV 4.3 Book 1]	*EMV Integrated Circuit Card Specifications for Payment Systems*, Book 1, Application Independent ICC to Terminal Interface Requirements
[EMV 4.3 Book 2]	*EMV Integrated Circuit Card Specifications for Payment Systems*, Book 2, Security and Key Management
[EMV 4.3 Book 3]	*EMV Integrated Circuit Card Specifications for Payment Systems*, Book 3, Application Specification
[EMV 4.3 Book 4]	*EMV Integrated Circuit Card Specifications for Payment Systems*, Book 4, Cardholder, Attendant, and Acquirer Interface Requirements
[PTOKS2.0]	*EMV Payment Tokenisation Specification Technical Framework, v2.0*
[ISO 3166]	Codes for the representation of names of countries and their subdivisions
[ISO 4217]	Codes for the representation of currencies and funds
[ISO 7813]	Identification cards – Financial transaction cards
[ISO 7816-5]	Identification cards – Integrated circuit cards – Part 5: Registration of application providers
[ISO 7816-4]	Identification cards – Integrated circuit cards – Part 4: Organization, security and commands for interchange
[ISO 8583]	Bank card originated messages – Interchange message specifications – Content for financial transactions

[ISO 8859]	8-bit character encodings.
[ISO 639]	Language codes
[PCI-CPoC]	Contactless Payment on COTS (CpoC™), Version 1.0, December 2019

1.5 Notational Conventions

1.5.1 Use of Terms

Terms and definitions are described in *Book A: Architecture and General Requirements*, with the addition of the following.

Delayed Authorisation	In cases where a reader has been deployed in an environment where a real time online transaction authorisation is never possible, a delayed authorisation may be performed. A "Delayed Authorisation" as referred to in this specification is processed by the reader as a Partial Online contactless transaction, with mandatory Offline Data Authentication. Separately from the initial reader and card interaction, a later authorisation request may be made to an Issuer's system for the purposes of account verification or reservation of funds against an account.
Partial Online	A Partial Online contactless transaction is one where the card may be removed from the operating field of the reader after the first GENERATE AC response has been received. The result of the transaction is based on the response from the Issuer's authorisation system.
mPOS	The term "mPOS" is used to refer to a mobile point of sale where a commercial off-the-shelf (COTS) device, such as a mobile phone or tablet, is used either standalone, to form contactless only mPOS system using the devices NFC interface, or in conjunction with a hardware accessory to form a contact and contactless mPOS system. The functions performed within the "Terminal" or "Reader" definitions may be provided by a mPOS device.

1.5.2 Reserved for Future Use (RFU)

A bit specified as Reserved for Future Use (RFU) shall be set as specified, or to 0b if no indication is given. An entity receiving a bit specified as RFU shall ignore such a bit and shall not change its behaviour, unless explicitly stated otherwise.

A data field having a value coded on multiple bits or bytes shall not be set to a value specified as RFU. An entity receiving a data field having a value specified as RFU, shall behave as defined by a requirement that specifically addresses the situation, or shall consider it a protocol error if no specific behaviour is defined.

1.6 mPOS Architectures

This section describes the mPOS architectures that differ from the traditional POS systems that use specific devices designed for the purpose of acting as part or all of a card payment acceptance system.

mPOS systems use commercial off-the-shelf (COTS) devices, such as mobile phones and tablets, as part or all of the card payment acceptance system.

The following terms are used in the mPOS architecture:

- mPOS (mobile Point Of Sale) – where a consumer mobile device forms part of a portable card acceptance system.
- COTS (Commercial Off-The-Shelf) – a commercial off-the-shelf consumer mobile device such as a phone or tablet.
- CPoC (Contactless Payment on COTS) – contactless payment using the NFC interface of a consumer mobile device. Where contactless transactions are performed directly with the NFC contactless interface of a COTS device, this is known as Contactless Payment on COTS (CPoC), also known as Tap on Phone.
- SPoC (Software PIN on COTS) – PIN entry via a consumer mobile device. Where PIN entry is performed directly on to a COTS device, this is known as Software PIN on COTS (SPoC), also known as PIN on Glass.
- Accessories – an additional hardware device or dongle that may provide card interfaces, PIN entry, amount entry, or display, that is to be used in conjunction with a COTS device to form an mPOS card acceptance system.

An mPOS system will either:

- comprise entirely of a COTS device only, or
- may include additional devices to provide features such as card interfaces or PIN entry.

The possible POS architectures are based on PIN entry and card interface locations and capabilities, as shown in Table 1-1: Terminal and mPOS Architectures

Table 1-1: Terminal and mPOS Architectures

Architecture Reference	Terminal Architecture	PIN Entry Location	Contact Interface Location	Contactless Interface Location
Not applicable	Traditional POS	POS	POS	POS
A (Accessory)	COTS device and accessory [1]	Accessory	Accessory	Accessory
ASP (Accessory, Software PIN)	COTS device and accessory[1] supporting SPoC	COTS device	Accessory	Accessory
C Contactless	COTS device supporting CPoC	N/A	N/A	COTS device
CSP Contactless, Software PIN	COTS device supporting CPoC and SPoC [2]	COTS device	N/A	COTS device

Notes:

[1] If an accessory device is being used, it will provide a contact and contactless interface.
[2] The mPOS-CSP architecture is mentioned in this document for completeness. However, at the time of writing, this architecture is prohibited by [PCI-CPoC]. Therefore, solutions using this architecture can only be deployed after obtaining prior approval. Permission may be granted, based on bespoke functional and security approvals, and will state any restrictions applicable to the deployment, such as number, geographic or duration.

The mandated and optional requirements, throughout this specification, are described in generic terms based on traditional POS systems. However, unless otherwise stated, any requirement in this specification is applicable to both traditional POS systems and mPOS systems. Where additional direction is needed for mPOS systems, clauses to include or exclude mPOS architectures are added using phrases such as applicable/not applicable, supported/not supported or including/excluding. References to requirements and functions specific to mPOS architectures are indicated by the prefix "mPOS-".

The mPOS Requirements for the various architectures are detailed in Annex C.

Note: Security and functional approvals are determined based on whether mPOS functionality is provided by a dedicated accessory device or by software on the COTS device directly.

1.7 Overview

This volume includes the following sections and annexes:

Section 1 contains general information that helps the reader understand and use this specification.

Section 2 describes the Contactless EMV Mode in which a contactless card and reader can operate, and details the different flows that a contactless transaction can take.

Section 3 provides a high-level overview of processing according to this specification.

Section 4 – 13 detail the different steps that occur in a contactless transaction and specify the command and processing requirements for each step of the transaction.

Annex A details the data elements used in contactless transaction processing using Kernel 4.

Annex B details the Configuration Data that is provided to the kernel by the Terminal and by Entry Point.

Annex C details the mPOS requirements

Annex D - Glossary is a glossary of terms and abbreviations used in this specification.

2 Contactless EMV Mode and Transaction Flows

This section describes the mode in which a contactless card and reader can operate. It also details the different flows that a contactless transaction can take.

2.1 Contactless EMV Mode of Operation

This specification supports only EMV Mode in which the Card and Terminal can operate. This specification no longer supports Magstripe Mode:

- EMV mode – This mode of operation is designed for Issuers and Acquirers supporting EMV data in the authorisation and clearing messages.

2.1.1 Transaction support for Contactless EMV Mode

All Readers (including all mPOS architectures) must implement and support only EMV mode, and must not implement and support Magstripe Mode (as per requirements in section 4.3.7).

Whether a transaction is capable of proceeding in EMV mode is determined by the ability of the Card and the Terminal to both support EMV mode, as shown in Table 2-1.

Table 2-1: Contactless Mode Selection

	Reader Configured to Support EMV Mode Only
Card Supports Mag-Stripe Mode only	Not supported. Cardholder is instructed to try another interface, if supported, or try another means of payment. For mPOS-C, mPOS-CSP - Not supported. Cardholder is instructed to try another means of payment.
Card Supports Both Mag-Stripe and EMV Modes	EMV mode transaction
Card Supports EMV mode only	EMV Mode transaction

In this version of the specification Bit 7 and Bit 8 in *Contactless Reader Capabilities* (Tag '9F6D') will always be set, resulting in *Terminal Type – Modified* (shown in Table 4-3) Bit 7 and Bit 8 also set. Similarly, Byte 1 Bit 4 to Bit 7 in the *Enhanced Contactless Reader Capabilities* (shown in Table 4-4) are set to '1100'. This data is usually provided to the Card during the GET PROCESSING OPTIONS command. The configuration of *Terminal Type – Modified* and *Enhanced Contactless Reader Capabilities* should not be set with conflicting values.

If the card requests *Terminal Type* via the *Processing Options Data Object List (PDOL)* in the GET PROCESSING OPTIONS command, the reader instead returns *Terminal Type – Modified* (as described in section 4.3). If the card requests the *Enhanced Contactless Reader Capabilities* via the *Processing Options Data Object List (PDOL)* in the GET PROCESSING OPTIONS command the reader shall return the *Enhanced Contactless Reader Capabilities*.

The resulting *Terminal Type – Modified* and/or the *Enhanced Contactless Reader Capabilities* data element is requested by the Card via the PDOL to enable the Card to determine its transaction mode. The Card indicates which mode it supports for the transaction in the *Application Interchange Profile (AIP)* Byte 2 Bit 8 – it is set to 1b to indicate that the Card and Issuer support both EMV and Magstripe Mode, and to 0b to indicate that only Magstripe Mode is supported.

The reader shall follow requirements 4.3.7.1 to 4.3.7.3 in order to determine transaction support for EMV Mode.

2.1.2 [Section removed]

The content in this section has been purposely removed from this specification, as Expresspay Magstripe Mode is no longer supported.

2.1.3 [Section removed]

The content in this section has been purposely removed from this specification, as Expresspay Magstripe Mode is no longer supported.

2.1.4 Contactless EMV Mode Transactions

When a contactless transaction is performed in EMV mode, the reader is capable of sending the standard EMV data elements and there are no restrictions.

2.1.5 Contactless Mobile Transaction

When a transaction is performed as Contactless Mobile the reader may prompt for an action to be performed on the Mobile device by exiting the transaction with a ***Try Again*** Outcome.

A Contactless Mobile:

- Follows the Contactless EMV Mode of Operation requirements as per section 4.3.7.
- May support Mobile CVM (typically, a four-digit code stored in the Card, entered by the user via the phone device keypad and verified by the Card).

2.1.5.1 Mobile CVM

Contactless Mobile supports the Mobile CVM. This permits cardholder authentication on the Card using one of the mobile based authentication methods available. The reader manages the requirements for Cardholder Verification and processes the CVM List as for EMV. However, the reader performs no part in the Mobile CVM verification process – the Mobile CVM is captured and verified by an application on the Card, prior to the transaction. The results are passed to the reader as *Mobile CVM Results* in the response to the GET PROCESSING OPTIONS command or as an exception code in the response to the GENERATE AC command.

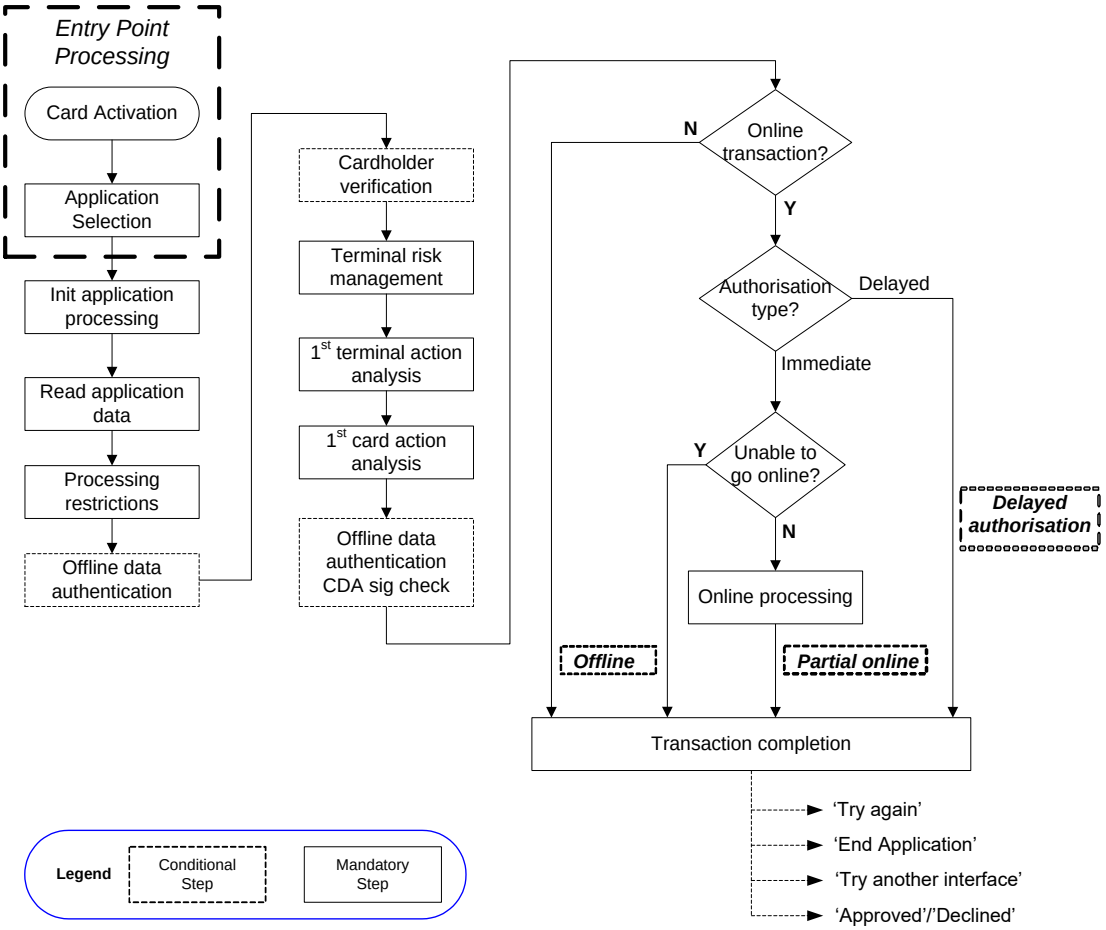
2.2 Contactless Transaction Processing

A contactless transaction can be performed in the following ways:

- Offline (not supported for mPOS-C, mPOS-CSP terminals)
- Partial Online with either:
  - Immediate authorisation or
  - Delayed authorisation (a “Delayed Authorisation” transaction). This shall not be supported for mPOS-C, mPOS-CSP terminals.

Figure 2-1 shows the transaction flow for a contactless transaction and highlights the different processes performed for each of these options.

Figure 2-1: Transaction Flow Overview



2.2.1 Premature card removal

If the cardholder removes the card from the operating field without being prompted to do so, then the kernel returns control to Entry Point, passing an Outcome of ***Try Again*** with the following parameter settings:

Start	B
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '21' (“Present Card Again”) • **Status:** Processing Error • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	Yes • **Message Identifier:** '21' (“Present Card Again”) • **Status:** Ready to Read. • **Hold Time:** 0 • **Language Preference**
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

Requirements – Card Early Removal

2.2.1.1 **If** the card leaves the operating field before the cardholder is prompted to remove it from the field,
then the reader shall invoke the User Interface Request Message to display Message Identifier: '21' (“Present Card Again”)
and return control to Entry Point.

2.2.2 Offline Transaction

During an offline transaction, the card and reader either approve or decline a transaction without further online processing. The enablement of Offline Data Authentication is mandatory for the deployment of terminals in offline environments. Only 1st Terminal Action Analysis and 1st Card Action Analysis are performed.

mPOS-C, mPOS-CSP terminals do not support offline transactions and shall be online only readers.

Requirements – Offline Transaction	
2.2.2.1	**If** a reader indicates that it is offline capable (by setting bits 3-1 of *Terminal Type* (Tag '9F35') appropriately), **then** the reader shall be able to perform an offline transaction.

2.2.3 Partial Online Transaction

In a Partial Online transaction, the interaction between the card and the reader ends after 1st Card Action Analysis has completed. The enablement of Offline Data Authentication is mandatory for the deployment of terminals in online capable environments where offline transactions are also possible. The result of the transaction is based on the response from the Issuer's authorisation system.

Requirements – Partial Online Transaction	
2.2.3.1	**If** a reader indicates that it is online capable (by setting bits 3-1 of *Terminal Type* (Tag '9F35') appropriately), **then** the reader shall be able to perform a Partial Online transaction (i.e. without a second GENERATE AC being sent to the card).

A reader performing a Partial Online transaction shall prompt the cardholder to remove the card from the field immediately after the completion of 1st Card Action Analysis.

The card should be removed from the operating field only when the reader indicates that it is time to do so. Once the reader has indicated that the card can be removed, whether the card is actually removed or not, the reader will continue to process the transaction as planned.

Requirements – Partial Online Transaction Completion	
2.2.3.2	**If** a reader is online capable, **and** the reader is conducting a Partial Online transaction, **then** the reader shall complete the transaction as a Partial Online transaction whether the user leaves the card in the field or removes the card when instructed to do so.

2.2.4 Delayed Authorisation

In cases where a reader has been deployed in an environment where a real time online transaction authorisation is not possible, a delayed authorisation may be performed. A reader indicates it supports Delayed Authorisations by setting the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 to 1b.

A "Delayed Authorisation" as referred to in this specification is processed by the reader as a partial online transaction, with the interaction between the Card and reader being completed after the 1st Card Action Analysis. Offline Data Authentication support is mandatory for all readers supporting Delayed Authorisations. The enablement of Offline Data Authentication is mandatory for the deployment of terminals in delayed authorization environments. If it is determined that the transaction is to be sent online, the transaction shall be approved at the Terminal and a subsequent delayed authorisation request is made to an Issuer's authorisation system for the purposes of account verification or reservation of funds against an account.

mPOS-C and mPOS-CSP terminals shall not support delayed authorization.

Requirements – Delayed Authorisation	
2.2.4.1	**If** the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 to 1b, **and** Offline Data Authentication has been performed successfully, **then** the reader shall be able to approve the transaction **and** perform a Partial Online with delayed authorisation transaction.
2.2.4.2	**If** the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 to 1b, **and** the Card returns an AAC in response to the first GENERATE AC, **then** the reader shall not perform Offline Data Authentication and the transaction shall be declined.

2.3 Contactless Transaction Configurations

The options for all possible combinations of processing a contactless transaction are shown in Table 2-2.

Table 2-2: Contactless Transaction Combinations

Contactless Terminal Configuration	Card Supports either EMV Mode only or Card Supports Both Mag-Stripe and EMV Modes
EMV Mode supported Partial Online with delayed authorisation (Not applicable for mPOS-C, mPOS-CSP)	The EMV transaction flow is performed until 1st Card Action Analysis is completed. Offline Data Authentication is mandatory. A card that supports EMV Mode will present a CDOL for Cryptogram Version '01'. An online authorisation is performed at a later time.
EMV Mode supported Offline (Not applicable for mPOS-C, mPOS-CSP)	An offline transaction is performed, if offline is allowed by Issuer configuration settings and Card Risk Management. Offline Data Authentication is mandatory. A card that supports EMV Mode will present a CDOL for Cryptogram Version '01'.
EMV Mode supported Partial Online with immediate authorization	The EMV transaction flow is performed until 1st Card Action Analysis is completed. A Card that supports Expresspay EMV Mode will present a CDOL for Cryptogram Version '01'. After going online, the transaction result will be based on the Issuer authorization response. In case of mPOS-C or CSP, if an online connection is not possible prior to the transaction, then the transaction shall not be started.

This specification supports the terminal configurations listed in Table 2-3.

Table 2-3: Reader Configurations

Reader Configuration	Definition
Offline only (Not applicable for mPOS-C, mPOS-CSP)	Offline only readers do not have the ability to obtain a real time online authorisation nor do they have the ability to connect online for an authorisation at a later date. Offline Only readers must perform Offline Data Authentication on all transactions.
Online only	Online only readers require all transactions to be sent online for authorisation and do not have the ability to approve transactions offline. Readers configured in this way do not need to enable Offline Data Authentication. The reader must decline the transaction if it is unable to go online to obtain an authorisation.
Offline with Online Capability (Not applicable for mPOS-C, mPOS-CSP)	Readers configured in this way are able to process transactions offline or send the transaction online for authorisation if required. Readers configured in this way must enable Offline Data Authentication. Readers of this type shall be capable of being configured to operate as Online Only readers.

Reader Configuration	Definition
Delayed Authorisations (Not applicable for mPOS-C, mPOS-CSP)	In cases where a reader has been deployed in an environment where real time online transaction authorisation is never possible, a delayed authorisation may be performed. Readers configured in this way must enable Offline Data Authentication. A "Delayed Authorisation" as referred to in this specification is processed by the reader as a Partial Online contactless transaction, with mandatory Offline Data Authentication (unless the card has returned an AAC in response to the first GENERATE AC command, in which case ODA does not need to be performed). Separately from the initial reader and card interaction, a later authorisation request may be made to an Issuer's system for the purposes of account verification or reservation of funds against an account.

Requirements – Transaction Combinations	
2.3.1.1	**If** the terminal is performing a Partial Online transaction in EMV mode with an EMV card, **then** the card may be removed after the 1st Card Action Analysis **and** the terminal shall complete the Partial Online transaction in EMV mode.
2.3.1.2	**If** an offline terminal is EMV capable, **and** the terminal is performing a transaction satisfying risk management requirements with an EMV card, **then** the card may be removed after the 1st Card Action Analysis and Offline Data Authentication is performed, and the terminal shall complete the transaction in EMV mode.

3 Processing Overview

The following sections provide detailed information about the interaction between the contactless card and reader during a transaction. All functions mentioned in the following sections are performed as described in this specification where detailed or otherwise as described within *[EMV 4.3 Book 1] – [EMV 4.3 Book 3]*. Some functionality supported by EMV is not permitted or is restricted for contactless transactions.

Card Activation and Application Selection shall be performed as in *Book B: Entry Point Specification*, with new transactions being initiated at Start A or Start B as described in *Book B*.

Figure 2-1 shows an overview of the contactless transaction flow from the point at which a contactless card is introduced into the operating field of a reader to the point when the reader completes the transaction.

After processing a contactless transaction, the kernel returns control to Entry Point by passing an Outcome that specifies required actions from Entry Point or the terminal (POS System). Control may subsequently return to the kernel via *Book B* Start B. This 'restart' mechanism enables the kernel to process a retry for failed Mobile CVM processing.

The FCI data made available to the kernel by Entry Point may contain *Language Preference Code* (Tag '5F2D'), which may be supplied as one of the Outcome parameters in order to indicate a preferred language for the display of User Interface Messages.

According to *Book A, Figure 5-2: Logical Architecture,* the Terminal is responsible for any Additional processing (including Online Authorisation) and other services during a transaction. Hence, it may need to retrieve Kernel/Reader data (static and dynamic) and/or Card public data (read from the Card, but not stored in the Kernel after the transaction is finished). As per the description of the Outcome Parameters in *Book A, section 6.2,* the Data Record and Discretionary Data parameters are the mechanisms the Kernel has to provide data to the Entry Point, Reader and consequently, the Terminal.

Data Record minimum data elements are defined in Annex A.4 for Online Authorisation and Clearing. For the Terminal to retrieve any data it needs from the Kernel, for additional processing and services, it must use the *Discretionary Data Object List* Configuration Data (see Annex B.1 for details). The data elements present in this data object list will, if available, be included in the Discretionary Data Outcome Parameter and the Discretionary Data Present parameter will be set to Yes for the following Outcomes: Approved, Declined, Online Request and Request Online PIN.

4 Initiate Application Processing

4.1 Overview

During Application Initiation, the reader signals to the card that processing of the transaction is beginning. Initiate Application Processing is performed as described in *[EMV 4.3 Book 3]* and *[EMV 4.3 Book 4]*. Upon receipt of the *Application File Locator (AFL)* and *Application Interchange Profile (AIP)*, the reader proceeds to read the application data records from the card.

The *AFL* is a list of parameters identifying the files and records to be read from the card used in processing the transaction. The *AIP* indicates the capabilities of the card to support specific functions of the application to be taken into consideration by the reader when determining how to process the transaction.

4.2 Commands

- GET PROCESSING OPTIONS

To support Initiate Application Processing as described in *[EMV 4.3 Book 3]*, section 10.1, the card must support the GET PROCESSING OPTIONS command as described in the following section.

If the transaction is taking place as Contactless Mobile, then *Mobile CVM Results* shall be returned in the GET PROCESSING OPTIONS response. (See on Table 8-1: Mobile CVM Results – Tag '9F71')

Requirements – GET PROCESSING OPTIONS	
4.2.1.1	A reader shall send the GET PROCESSING OPTIONS command to the card following Application Selection.

4.3 Processing Requirements

4.3.1 Pre-PDOL Processing

The reader must reset *Contactless Reader Capabilities* Byte 1 Bit 4 to 0b, 'CVM Not Required' and *Enhanced Contactless Reader Capabilities* Byte 3 to 00, since these are specific only to the context of the current transaction. All other *Enhanced Contactless Reader Capabilities* settings (bytes 1, 2 and 4) are defined at Terminal configuration.

If the reader CVM Required Limit Exceeded indicator is set, then the reader shall set:

- *Contactless Reader Capabilities* Byte 1 Bit 4 to 1b, 'CVM Required'
- *Enhanced Contactless Reader Capabilities* Byte 3 Bit 7 to 1b, 'CVM Required'

If the reader is an offline-only reader (i.e. if the Terminal Type is 'x3' or 'x6') or the reader can determine that it is currently unable to go online for authorisation, (excluding mPOS-C, mPOS-CSP), then it will set *Enhanced Contactless Reader Capabilities* Byte 3 Bit 8 to 1b, 'Terminal is offline only'.

For Online Only Terminal (for example mPOS-C or mPOS-CSP terminal), **if** the terminal can determine that it is currently Unable to go Online for authorization, **then** the kernel returns control to Entry Point, passing a Final Outcome of ***End Transaction.***

Requirements – Pre-PDOL Processing	
4.3.1.1	The reader shall reset *Contactless Reader Capabilities* Byte 1 Bit 4 to 0b, 'CVM Not Required' and *Enhanced Contactless Reader Capabilities* Byte 3 to 00.
4.3.1.2	**If** the *Reader CVM Required Limit Exceeded indicator* is set **then** the reader shall set *Contactless Reader Capabilities* Byte 1 Bit 4 to 1b, 'CVM Required', and shall set *Enhanced Contactless Reader Capabilities* Byte 3 Bit 7 to 1b, 'CVM Required'.
4.3.1.3	**If** the reader is an offline-only reader (Reader type 'x3' or 'x6') **or** the reader has determined that it is unable to go online, **then** the reader shall set *Enhanced Contactless Reader Capabilities* Byte 3 Bit 8 to 1b, 'Reader is Offline Only'.
4.3.1.4	**If** the reader is an Online Only reader, (e.g. mPOS-C or mPOS-CSP), and Unable to go Online **then** the terminal shall decline the transaction, returning control to Entry Point as defined in 13.3.

4.3.2 PDOL Processing

The reader determines whether the optional *PDOL* was supplied by the card application in response to Application Selection.

If the *PDOL* is not present, then the reader formats the GET PROCESSING OPTIONS command with the command data field of '8300'.

Requirements – GPO Without PDOL Data	
4.3.2.1	**If** the card did not specify a PDOL in the response to Application Selection, **then** the reader shall send the GET PROCESSING OPTIONS command with the command data field set to '8300'.

If the *PDOL* was received, the reader formats the GET PROCESSING OPTIONS command to include the data elements requested in the *PDOL* to be sent to the card with this command. The data elements for the *PDOL* must be formatted as defined by *[EMV 4.3 Book 3]*, section 5.4.

Requirements – PDOL Data in GPO	
4.3.2.2	**If** the card specified a PDOL in response to Application Selection, **then** the reader shall send the GET PROCESSING OPTIONS command with the requested PDOL data, except as described in requirement 4.3.3.1.

4.3.3 Terminal Type – Modified

If the *PDOL* requested *Terminal Type* (Tag '9F35') and does not contain the *Enhanced Contactless Reader Capabilities* (Tag '9F6E'), the reader returns *Terminal Type – Modified* (as shown in Table 4-3) instead of *Terminal Type*. These values are set by the reader based on the *Terminal Type* combined (OR'd) with a proprietary data element, *Contactless Reader Capabilities* (Tag '9F6D'), that is stored in the reader. See Table 4-1 and Table 4-2 for the values of these data elements.

Note that the *Terminal Type – Modified* value is transient and valid only for the purpose of determining whether contactless EMV mode is supported by both the Terminal and the Card for the current transaction being processed.

The value of the (unmodified) *Terminal Type* (Tag '9F35') as defined in the configuration data for the Terminal must remain unchanged and only this unmodified Terminal Type should be present in any authorisation and financial submission messages that are sent to the acquirer.

For example:

If Terminal Type (Tag '9F35') in Terminal Configuration data	= '22',
and Contactless Reader Capabilities (Tag '9F6D')	= 'C8',
then Terminal Type – Modified	= 'EA'.

In the above example, the value of the *Terminal Type – Modified* that is provided to the Card in the GET PROCESSING OPTIONS command would be 'EA', however the value of the *Terminal Type* (Tag '9F35') that would be sent in any authorisation or submission messages to an acquirer would remain as '22'.

Table 4-1: Terminal Type – EMV Tag '9F35'

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
		0	1					Financial Institution
		1	0					Merchant
		1	1					Cardholder
					0	0	1	Attended – Online Only
					0	1	0	Attended – Offline with Online Capability
					0	1	1	Attended – Offline Only
					1	0	0	Unattended – Online Only
					1	0	1	Unattended – Offline with Online Capability
					1	1	0	Unattended – Offline Only

Note: The Terminal Type for mPOS-C, mPOS-CSP shall be Merchant, Attended – Online only, which is XX10X001.

Table 4-2: Contactless Reader Capabilities – Tag '9F6D'

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	0			0				Deprecated
0	0			1				Not Available for Use
0	1			0				Deprecated
0	1			1				Deprecated
1	0			0				Deprecated
1	0			1				Not Available for Use
1	1			0				Contactless: EMV - CVM Not Required (C-4 Version ≥ 2.2)
1	1			1				Contactless: EMV - CVM Required (C-4 Version ≥ 2.2)

Note: Bits 6 and 5 and Bits 3 to 1 are reserved and must be set to zero. In *Terminal Type – Modified*, these bits will correspond to the values defined in EMV *Terminal Type*, Tag '9F35'.

Note: The Contactless Reader Capabilities for a Terminal implementing this specification shall be 11XX0XXX for CVM Not Required or 11XX1XXX for CVM Required. .

Table 4-3 defines *Terminal Type – Modified*, which is returned from a contactless capable reader and consists of EMV *Terminal Type*, Tag '9F35' (Table 4-1) OR'd with *Contactless Reader Capabilities*, Tag '9F6D' (Table 4-2).

Table 4-3: Terminal Type – Modified

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
		0	1					Financial Institution
		1	0					Merchant
		1	1					Cardholder
					0	0	1	Attended – Online Only
					0	1	0	Attended – Offline with Online Capability
					0	1	1	Attended – Offline Only
					1	0	0	Unattended – Online Only
					1	0	1	Unattended – Offline with Online Capability
					1	1	0	Unattended – Offline Only
0	0			0				Deprecated
0	0			1				Not Available for Use
0	1			0				Deprecated
0	1			1				Deprecated
1	0			0				Deprecated – Contactless: EMV and Mag-Stripe (C-4 Version 2.1)
1	0			1				Not Available for Use
1	1			0				Contactless: EMV - CVM Not Required (C-4 Version ≥ 2.2)
1	1			1				Contactless: EMV - CVM Required (C-4 Version ≥ 2.2)

Deprecated values are for backward compatibility only and are not used/referred to in this version of the specification.

The configuration of *Terminal Type – Modified* and *Enhanced Contactless Reader Capabilities* should not be set with conflicting values.

Requirements – GPO Includes Modified Terminal Type

4.3.3.1 **If** the card requests *Terminal Type*, Tag '9F35'
and does not request *Enhanced Contactless Reader Capabilities*, Tag '9F6E' in the PDOL,
then the reader shall send the GET PROCESSING OPTIONS command with the modified *Terminal Type* value which is the *Terminal Type* (Tag '9F35') OR'd with the *Contactless Reader Capabilities* (Tag '9F6D').

4.3.4 Enhanced Contactless Reader Capabilities

If the PDOL contains the *Enhanced Contactless Reader Capabilities*, then it should be returned as defined in Table 4-4.

Table 4-4: Enhanced Contactless Reader Capabilities - Tag '9F6E'

Terminal Capabilities Byte 1								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
x[1]								1 = Contact mode supported[1]
	0							0 = Contactless Mag-Stripe Mode not supported
		0[2]						0 = Contactless EMV full online mode not supported (full online mode is a legacy feature and is no longer supported)
			1					1 = Contactless EMV partial online mode supported
				1				1 = Contactless Mobile Supported
					x			1 = Try Another Interface after a decline.
						0		RFU
							0	RFU
Terminal CVM Capabilities Byte 2								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
x								1 = Mobile CVM supported
	x							1 = Online PIN supported
		x						1 = Signature
			x					1 = Plaintext Offline PIN
				0				RFU
					0			RFU
						0		RFU
							0	RFU
Transaction Capabilities Byte 3								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**

x								1 = Reader is offline only
	x							1 = CVM Required
		0						RFU
			0					RFU
				0				RFU
					0			RFU
						0		RFU
							0	RFU
Transaction Capabilities Byte 4								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
x								1 = Terminal exempt from No CVM checks
	x							1 = Delayed Authorisation Terminal
		x						1 = Transit Terminal
			0	0				RFU
					X	X	X	C-4 Kernel Version:
					0	0	1	2.2 - 2.3
					0	1	0	2.4 - 2.6
					0	1	1	2.7 or later
					1	x	x	RFU – other values

Notes:

[1] Tag 9F6E Byte 1 Bit 3 If set, Try Another Interface after a decline ***shall*** be set as well.

[2] Tag 9F6E Byte 1 Bit 6 (Contactless EMV full online mode not supported) is present for backward compatibility with previous versions of C4, but does not have any associated logic in determining the operating mode of the transaction. As such, any incorrect value of this bit setting must be ignored by the reader and not impact the transaction processing.

The configuration of Terminal Type, Terminal Type – Modified and Enhanced Contactless Reader Capabilities should not be set with conflicting values.

The *Enhanced Contactless Reader Capabilities* (Tag '9F6E') for mPOS-C, mPOS-CSP shall be

Byte 1 – 00011000

Byte 2 – 1XX00000

Byte 3 – 0X000000

Byte 4 – 00000011

Requirements – GPO Includes Enhanced Contactless Reader Capabilities	
4.3.4.1	**If** the card requested *Enhanced Contactless Reader Capabilities*, Tag '9F6E', in the PDOL, **then** the reader shall send the GET PROCESSING OPTIONS command with the *Enhanced Contactless Reader Capabilities* value.

4.3.5 Terminal Type

If the *PDOL* requests *Terminal Type* (Tag '9F35') and also requests *Enhanced Contactless Reader Capabilities* (Tag '9F6E'), then the reader returns the (unmodified) *Terminal Type* as well as the *Enhanced Contactless Reader Capabilities* (Tag '9F6E').

Requirements – GPO Includes (unmodified) Terminal Type	
4.3.5.1	**If** the card requested, in the PDOL, *Terminal Type*, Tag '9F35' **and** *Enhanced Contactless Reader Capabilities*, Tag '9F6E', **then** the reader shall send the GET PROCESSING OPTIONS command with the unmodified *Terminal Type* value as well as the *Enhanced Contactless Reader Capabilities*.

4.3.6 GPO Response Check

The reader must check that the format of the response data from the card is compliant to Format 1 or Format 2 as defined by *[EMV 4.3 Book 3]*, section 6.5.8.4.

Requirements – GPO Response Check	
4.3.6.1	A reader shall check the GPO response data is formed as per *[EMV 4.3 Book 3]*, section 6.5.8.4.

If the response from the card returns the *AFL* and *AIP*, the reader must determine support for EMV Mode and support for Mobile (see section 4.3.7 and section 4.34), then proceed to Read Application Data.

4.3.7 Determination of Transaction support for EMV Mode

The support for EMV Mode is described in section 2.1.1.

All Readers (including all mPOS architectures) must implement and support only EMV mode and must not implement and support Magstripe Mode.
Whether a transaction is capable of proceeding in EMV mode is determined by the ability of the Card and the Terminal to both support EMV mode (as shown in Table 2-1).

Requirements – Transaction support for Contactless EMV Mode

4.3.7.1 **If** a card indicates (by setting *AIP* Byte 2 Bit 8 to 1b) that magstripe or EMV mode is to be performed,
then the reader shall be able to successfully complete an EMV mode transaction.

4.3.7.2 **If** a card indicates (by setting *AIP* Byte 2 Bit 8 to 0b) that magstripe mode is to be performed,
and the *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 is set to 1b,
and all of the following conditions are true:

- *AIP* Byte 2 Bit 7 is set to 0b
- *AIP* Byte 2 Bit 6 is set to 0b

then the kernel returns control to Entry Point with a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1

4.3.7.3 **If** a card indicates (by setting *AIP* Byte 2 Bit 8 to 0b) that mag-stripe mode is to be performed,
and the *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 is set to 0b
or any of the following conditions is true:

- *AIP* Byte 2 Bit 7 is set to 1b
- *AIP* Byte 2 Bit 6 is set to 1b

then the card and/or the reader **do not** support an alternative interface, and the transaction shall be terminated. The kernel returns control to Entry Point with a Final Outcome of ***End Application*** and parameters set as per Table 11-2

4.3.8 Determination of Transaction Support for Contactless Mobile

The reader must determine whether the transaction is to be processed as Contactless Mobile. If *AIP* Byte 2 Bit 7 is 1b, 'Contactless Mobile supported', then the transaction is to be processed as Contactless Mobile.

If the *Mobile CVM Results* data item is present in the Card response and Byte 3, CVM Result, is '03', 'Mobile CVM Blocked', then the reader shall set *TVR* Byte 3 Bit 6 to 1b, 'Mobile CVM Try Limit Exceeded'.

The *Mobile CVM Results* is to be retained by the reader for processing during Cardholder Verification, see section 8.

Requirements – Determination of Transaction Support for Contactless Mobile

4.3.8.1 **If** the Card indicates that it supports Contactless Mobile (*AIP* Byte 2 Bit 7 is 1b)
and *Mobile CVM Results* was present in the Card response to the GET PROCESSING OPTIONS command,
then:

If Byte 3, CVM Result, is '03', 'Mobile CVM Blocked',
then the reader shall set *TVR* Byte 3 Bit 6 to 1b, 'Mobile CVM Try Limit Exceeded'.

5 Read Application Data

5.1 Overview

The reader reads any card data necessary for completing the transaction using the READ RECORD command. The *AFL* is a list identifying the files and records that must be used in the processing of a transaction. The files that are read may be used for application purposes or as authentication data used during Offline Data Authentication.

5.2 Commands

- READ RECORD

The application must support the READ RECORD command as described in *[EMV 4.3 Book 3]*, section 6.5.11.

5.3 Processing Requirements

The reader must read all data records specified in the *AFL*. If a processing error occurs during this READ RECORD phase, the transaction must be aborted. All recognized data read successfully from the card must be stored by the reader and used when required during the transaction.

The *AFL* must be processed according to *[EMV 4.3 Book 3]*, section 10.2. The encoding of the *AIP* is specified in

Table 5-2.

During Read Application Data the card may also return the Card Interface and Payment Capabilities data element as defined in Table 5-1. The reader uses specifically the Card Interface and Payment Capabilities Byte 1 Bit 6, 'Contact EMV Interface Supported', in order to determine whether a request to use an alternative interface can be made.

If the reader supports Delayed Authorisations (not supported for mPOS-C, mPOS-CSP), then it uses the *Card Interface and Payment Capabilities* data element to determine the usage settings for Delayed Authorisations. *Processing Restrictions*, gives further information on the application of Delayed Authorisation Usage Control to determine the validity of the transaction.

If the card does not return *Card Interface and Payment Capabilities* data element, then the reader shall assume that:

- Alternative interface is supported by the card,
- Delayed Authorisations are supported by the card.

Table 5-1: Card Interface and Payment Capabilities – Tag '9F70'

Card Interface and Payment Capabilities Byte 1								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
X								1 = Keyed Data Entry Supported (Embossed or Printed PAN)
	X							1 = Physical Magnetic Stripe Supported
		X						1 = Contact EMV Interface Supported
			X					1 = Contactless EMV Interface Supported
				X				1 = Mobile Interface Supported
					X			1 = Magstripe Mode Not Supported
						0		RFU
							0	RFU
Card Interface and Payment Capabilities Byte 2								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
X								1 = Delayed authorisation usage information present
	X							1 = Valid at domestic terminals performing contactless delayed authorisation
		X						1 = Valid at international terminals performing contactless delayed authorisation
			0					RFU
				0	0	0	0	RFU

For mPOS-C, mPOS-CSP use only Byte 1 bits 4 and 5 of the Card Interface and Payment Capabilities returned from the card or cardholder mobile device. Other bits will be ignored.

It is not the reader's responsibility to ensure the integrity of the data read from the card, unless it is a specific requirement of the EMV specifications. As long as the data retrieved within a READ RECORD command correctly breaks down into valid Tag/Length/Value (TLV) data elements, the reader can assume it is valid, and the integrity of the data element placed in a card is the responsibility of the Issuer.

Unless processing a DOL, if a data object is read from the card that is not recognised then the unrecognised data object shall be ignored and the transaction shall continue as if the data object had not been present (except if the data is required and shall be retained for kernel processing[1]).

It is important to ensure that an invalid data element value does not cause the reader to become unusable or lock up.

If any data element in Table 14-3 is missing, then the transaction must be terminated.

Processing rules governing data validation (missing or erroneous data on the card) are detailed in *[EMV 4.3 Book 3]*, section 7.5.

Requirements – READ RECORDs	
5.3.1	The reader shall successfully read all records indicated by the ***AFL***.
5.3.2	The reader shall successfully read all data elements within all records and capture the correct values for recognized data elements.
5.3.3	**If** any mandatory data element is missing, **then** the reader shall terminate processing with a suitable error.
5.3.4	**Unless** processing a DOL, **if** a data object is read from the card that is not recognised, **then** the unrecognised data object shall be ignored and the transaction shall continue as if the data object had not been present.
5.3.5	**If** a processing error occurs during the READ RECORD stage, **then** the reader shall abort the transaction with suitable indication and logging.

[1] For example, for Offline Data Authentication as stated in *[EMV 4.3 Book 3]*, section 10.2.

Table 5-2: Application Interchange Profile (*AIP*)

***AIP* Byte 1 (Leftmost)**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
0								RFU (Reserved for future use)
	x							1b = SDA supported 0b = SDA not supported
		0						0b = DDA not supported
			x					1b = Cardholder verification supported 0b = Cardholder verification not supported
				1				Terminal Risk Management is to be performed
					x			1b= Issuer Authentication is supported 0b = Issuer Authentication is not supported
						0		Reserved for use by EMV Contactless Specifications
							x	1b = CDA supported 0b = CDA not supported
***AIP* Byte 2 (Rightmost)**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
x								0b = MagStripe Mode Only Supported. 1b = EMV and Mag-Stripe Modes Supported
	x							0b = Contactless Mobile is not supported 1b = Contactless Mobile supported
		x						0b = Host Card Emulation (HCE) is not supported 1b = HCE is supported
			0					RFU
				0				RFU
					0			RFU
						0		RFU
							0	RFU

5.4 [Section Removed]

The content in this section has been purposely removed from this specification, as Expresspay Magstripe Mode is no longer supported.

6 Offline Data Authentication

6.1 Overview

All Contactless readers must support the following two forms of Offline Data Authentication, as described in the *[EMV 4.3]* specifications:

- SDA
- CDA

The enablement of Offline Data Authentication must be configurable for deployment.

Requirements – Offline Data Authentication	
6.1.1	All Readers shall support Static Data Authentication.
6.1.2	All Readers shall support Combined DDA/Application Cryptogram Generation (CDA).
6.1.3	The enablement of Offline Data Authentication in all Readers must be configurable for deployment.

6.2 Processing Requirements

If the reader has Offline Data Authentication enabled, then Offline Data Authentication must be performed as described in *[EMV 4.3 Book 2]*, sections 5 and 6, and *[EMV 4.3 Book 3]*, section 10.3.

The reader determines whether the card should be authenticated using either SDA or CDA based on the card's ability to support these methods, as indicated in the *AIP*. The Offline Data Authentication methods enabled by the reader are identified in *Terminal Capabilities* (Tag '9F33').

6.2.1 Offline Data Authentication not performed

If the reader is enabled for Offline Data Authentication and the transaction is to be declined offline, or if the reader is not enabled for Offline Data Authentication, then Offline Data Authentication must not be performed.

If Offline Data Authentication is not performed, then the reader must set TVR Byte 1 Bit 8 to 1b, 'Offline data authentication was not performed'.

Requirements - Offline Data Authentication not performed	
6.2.1.1	**If** the card and the reader has ODA enabled, **and** the transaction is to be declined offline, **then** ODA is not performed.
6.2.1.2	**If** the reader does not have ODA enabled, **then** ODA is not performed.
6.2.1.3	**If** ODA is not performed, **then** the reader shall set TVR Byte 1 Bit 8 to 1b, 'Offline data authentication was not performed'.

6.2.2 Single ODA Method Supported

If CDA is the only Offline Data Authentication method supported by the card and enabled by the reader, then the reader shall authenticate the card using CDA.

If SDA is the only Offline Data Authentication method supported by the card and enabled by the reader, then the reader shall authenticate the card using SDA.

Requirements – Offline Data Authentication When Card Supports a Single Method

6.2.2.1 **If** a card indicates support of only CDA method,
and the following conditions are true:

- ODA is required
- Reader has CDA enabled

then the reader performs CDA.

6.2.2.2 **If** a card indicates support of only SDA method,
and the following conditions are true:

- ODA is required
- Reader has SDA enabled

then the reader performs SDA.

6.2.3 Multiple ODA Methods Supported

If more than one Offline Data Authentication method is supported by the card and enabled by the reader, then CDA takes priority over SDA.

Requirements – Offline Data Authentication Priority

6.2.3.1 **If** a card indicates support of both SDA and CDA methods,
and the following conditions are true:

- ODA is required
- Reader has both SDA and CDA enabled

then the reader performs CDA.

6.2.4 Scheme Certification Authority Public Keys

In order that Offline Data Authentication can be performed by a reader, the reader must be configured with the necessary *Certification Authority Public Keys (CAPK)*.

Requirements – Offline Data Authentication Keys	
6.2.4.1	The terminal shall be able to hold a minimum of six Certification Authority Public Keys per AID.

6.2.5 Static Data Authentication

If SDA is determined to be performed, it must be performed as described in *[EMV 4.3 Book 2]*, sections 5 and 6, and *[EMV 4.3 Book 3]*, section 10.3. The reader must set the *TVR* Byte 1 Bit 2 to 1b, 'SDA Selected'.

During SDA the reader will validate the signed Static Application Data read from the card. If SDA fails, the reader must set *TVR* Byte 1 Bit 7 to 1b, 'Offline Static Data Authentication Failed'.

Requirements – Static Offline Data Authentication	
6.2.5.1	**If** the Offline Data Authentication method being employed is SDA, **then**: • It shall be performed as per *[EMV 4.3 Book 2]*, section 5 and 6, and *[EMV 4.3 Book 3]*, section 10.3. • The reader shall set the *TVR* Byte 1 Bit 2 to 1b, 'SDA Selected'.
6.2.5.2	**If** Static Data Authentication fails, **then** the reader shall set *TVR* Byte 1 Bit 7 to 1b, 'Offline Static Data Authentication Failed'.

6.2.6 Combined Dynamic Data Authentication / AC Generation

If CDA is to be performed, the processing for this takes place during 1st Terminal Action Analysis and 1st Card Action Analysis. CDA must be performed as specified in *[EMV 4.3 Book 2]*, section 6.6. If 1st Terminal Action Analysis determines that the transaction is requested to be transmitted online for authorisation, the first GENERATE AC command must request a CDA signature with the request for an ARQC. If CDA fails, the reader must set *TVR* Byte 1 Bit 3 to 1b, 'CDA Failed'.

Requirements – Combined Dynamic Offline Data Authentication	
6.2.6.1	**If** the Offline Data Authentication method being employed is CDA, **then** it shall be performed as per *[EMV 4.3 Book 2]*, section 6.6.
6.2.6.2	**If** the Offline Data Authentication method being employed is CDA **and** the reader determines that an *ARQC* is to be requested at first GENERATE AC stage **then** the reader shall request a CDA signature at first GENERATE AC stage.
6.2.6.3	**If** CDA fails, **then** the reader shall set *TVR* Byte 1 Bit 3 to 1b, 'CDA Failed'.

7 Processing Restrictions

7.1 Overview

At this point in the transaction the reader uses the data gathered from the card during Read Application Data to ascertain the particular restrictions under which this transaction can be carried out.

7.2 Processing Requirements

The reader performs several types of checks and adjustments:

- EMV Processing Restrictions
- Supplementary Processing Restrictions

Depending on the reader configuration, the outcomes of the checks and adjustments are evaluated against a set of Issuer Action Codes (IACs) and Terminal Action Codes (TACs) during 1st Terminal Action Analysis.

7.2.1 [Section removed]

The content in this section has been purposely removed from this specification, as Dynamic Reader Limits are no longer supported.

7.2.2 EMV Processing Restrictions

The reader performs Processing Restrictions, as defined in *[EMV 4.3 Book 3]*, section 10.4, and *[EMV 4.3 Book 4]*, sections 6.3.3 and 6.7.2, to determine whether the transaction should be allowed. Processing Restrictions cover the following mandatory checks performed by the reader:

7.2.2.1 Application Version Number

Application Version Number, if present in the card, is compared to a reader resident *Application Version Number*. The reader must store an *Application Version Number* for each *Application Identifier (AID)* supported by the reader.

Requirements – Processing Restrictions: Application Version Number	
7.2.2.1.1	The reader shall compare the application version number returned by the card in the READ RECORD phase to the one held by the reader. **If** the application version number returned by the card is different to that held by the reader, **then** the reader shall set *TVR* Byte 2 Bit 8 to 1b, 'ICC and terminal have different application versions'.

7.2.2.2 Application Usage Control

Application Usage Control (AUC) is used to determine whether any geographical or transaction type restrictions have been imposed on the card product, e.g. it may be used to restrict a card's use for domestic or international cash, or goods and services:

- Domestic Usage Check – If the *Issuer Country Code* read from the card is equal to the *Terminal Country Code*, then the transaction is defined as 'Domestic'. The reader checks that the transaction type (e.g. Cash, Goods, or Services) for the transaction being processed is permitted in a 'Domestic' environment according to the card's *AUC*.

Requirements – Processing Restrictions: AUC Domestic

7.2.2.2.1 The reader shall compare the *Issuer Country Code* read from the card to the *Terminal Country Code*.

If the country codes are the same,
then:

The transaction is considered Domestic.

If the *Application Usage Control* indicates that the card is **not** valid for the transaction type being performed (domestic cash, goods, or services),
then the reader shall set *TVR* Byte 2 Bit 5 to 1b, 'Requested service not allowed for card product'.

- International Usage Check - If the *Issuer Country Code* read from the card is not equal to the *Terminal Country Code*, then the transaction is defined as 'International'. The reader checks that the transaction type for the transaction being processed is permitted in an 'International' environment according to the card's *AUC*.

Requirements – Processing Restrictions: AUC International

7.2.2.2.2 The reader shall compare the *Issuer Country Code* read from the card to the *Terminal Country Code*.

If the country codes are different,
then:

The transaction is considered International.

If the *Application Usage Control* indicates that the card is **not** valid for the transaction type being performed (international cash, goods, or services),
then the reader shall set *TVR* Byte 2 Bit 5 to 1b, 'Requested service not allowed for card product'.

- Transaction Environment Check – If the reader is an ATM, then the reader checks that the card's *AUC* has Byte 1 Bit 2 set to 1b, 'Valid for use at an ATM'. If the reader is other than an ATM (e.g. POS), then the reader must verify that the card's *AUC* has Byte 1 Bit 1 set to 1b, 'Valid at Readers other than an ATM'.

Requirements – Processing Restrictions: AUC Environment for an ATM

7.2.2.2.3 **If** the reader is an ATM,
then:

The reader shall check the *Application Usage Control* to determine whether the card can be used at an ATM.

If the transaction cannot be performed at an ATM,
then the reader shall set *TVR* Byte 2 Bit 5 to 1b, 'Requested service not allowed for card product'.

Requirements – Processing Restrictions: AUC Environment for other than an ATM

7.2.2.2.4 **If** the reader is not an ATM,
then:

The reader shall check the *Application Usage Control* to determine whether the card can be used at other than an ATM.

If the transaction cannot be performed at other than an ATM,
then the reader shall set *TVR* Byte 2 Bit 5 to 1b, 'Requested service not allowed for card product'.

Table 7-1 illustrates the bit settings for the AUC data element retrieved from the card.

Table 7-1: Bit Settings for Application Usage Control (AUC)

Byte 1 (leftmost)								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
X								1 = Valid for Domestic Cash Transactions
	X							1 = Valid for International Cash Transactions
		X						1 = Valid for Domestic Goods
			X					1 = Valid for International Goods
				X				1 = Valid for Domestic Services
					X			1 = Valid for International Services
						X		1 = Valid at ATMs
							X	1 = Valid at Terminals other than ATMs

Byte 2 (rightmost)								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
X								1 =Valid for Domestic Cashback transactions
	X							1 = Valid for International Cashback transactions
		0						RFU by EMV Specifications
			0					RFU by EMV Specifications
				0				RFU by EMV Specifications
					0			RFU by EMV Specifications
						0		RFU by EMV Specifications
							0	RFU by EMV Specifications
Note: The ISO Country Code of the Chip Card Issuer determines whether a transaction is domestic or international. If the ISO Country Code for the Chip Card and the reader are the same, then the transaction is domestic. If the ISO Country Code in the reader is different from the Chip Card, then the transaction is international.								

7.2.2.3 Effective and Expiration Date Checking

Effective and expiration dates are checked to ensure that the application is not pre-valid and not expired.

- If the transaction date is prior to the *Application Effective Date*, the reader must set *TVR* Byte 2 Bit 6 to 1b, 'Application not effective yet'.
- If the transaction date is past the *Application Expiration Date*, the reader must set *TVR* Byte 2 Bit 7 to 1b, 'Application Expired'.

Requirements – Processing Restrictions: Dates	
7.2.2.3.1	**If** the transaction date is prior to the card *Application Effective Date*, **then** the reader shall set *TVR* Byte 2 Bit 6 to 1b, 'Application not effective yet'.
7.2.2.3.2	**If** the transaction date is past the card *Application Expiration Date*, **then** the reader shall set *TVR* Byte 2 Bit 7 to 1b, 'Application Expired'.

7.2.3 Supplementary Processing Restrictions

This only applies to Delayed Authorisation terminals (shall not be supported in mPOS-C, mPOS-CSP).

7.2.3.1 Delayed Authorisation Usage Check

The Delayed Authorisation Usage Check bits in the *Card Interface and Payment Capabilities data element* are used to determine whether any restriction has been imposed on the use of the card product when a delayed authorisation is to be performed.

If the *Card Interface and Payment Capabilities data element is not* present, then delayed authorisations are permitted if supported by the reader.

- Domestic Delayed Authorisation Usage Check – If the *Issuer Country Code* read from the card is equal to the *Terminal Country Code*, then the transaction is defined as 'Domestic'. If the reader supports delayed authorisation, it checks whether a delayed authorisation transaction is permitted in a 'Domestic' environment according to the card's *Delayed Authorisation Usage Check bits*.

Requirements – Supplementary Processing Restrictions: Domestic Delayed Authorisation

7.2.3.1.1 **If** *Card Interface and Payment Capabilities* is present
and *Card Interface and Payment Capabilities Byte 2 Bit 8 is set to 1b*
and the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b,
then:

The reader shall compare the *Issuer Country Code* read from the card to the *Terminal Country Code*.

If the country codes are the same,
then:

- The transaction is considered Domestic.
- **If** *Card Interface and Payment Capabilities Byte 2 Bit 7 is set to 0b*,
  then the reader shall set *TVR* Byte 2 Bit 5 to 1b, 'Requested service not allowed for card product'.

- International Delayed Authorisation Usage Check – If the *Issuer Country Code* read from the card is not equal to the *Terminal Country Code*, then the transaction is defined as 'International'. If the reader supports delayed authorisation, it checks whether a delayed authorisation transaction is permitted in an 'International' environment according to the card's *Delayed Authorisation Usage Check bits*.

Requirements – Supplementary Processing Restrictions: International Delayed Authorisation

7.2.3.1.2 **If** *Card Interface and Payment Capabilities* is present
and *Card Interface and Payment Capabilities Byte 2 Bit 8 is set to 1b*
and the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b,
then:

The reader shall compare the *Issuer Country Code* read from the card to the *Terminal Country Code*.

If the country codes are different,
then:

- The transaction is considered International.
- **If** *Card Interface and Payment Capabilities Byte 2 Bit 6 is set to 0b*,
  then the reader shall set *TVR* Byte 2 Bit 5 to 1b,
  'Requested service not allowed for card product'.

7.2.4 [Section removed]

The content in this section has been purposely removed from this specification, as Expresspay Magstripe Mode is no longer supported.

8 Cardholder Verification

8.1 Overview

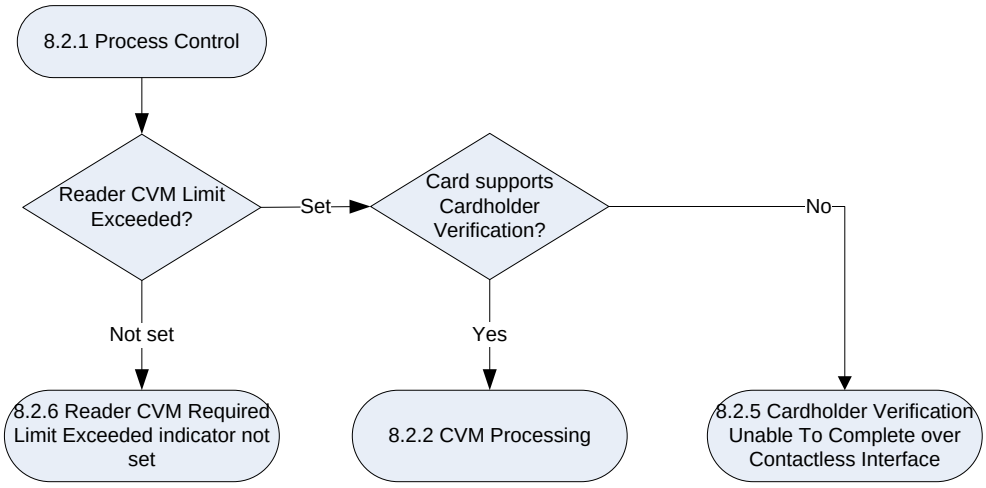
Cardholder Verification must be performed as defined in this section with additional reference to *Cardholder Verification Methods (CVM) List* processing as detailed in *[EMV 4.3 Book 3]*, section 10.5, and *[EMV 4.3 Book 4]*, section 6.3.4.

The card Issuer is allowed to determine the CVM(s) to be used with its cards via the use of the *CVM List*. This list is used to identify the priority order of the various CVM(s) supported, starting with the preferred CVM of the Issuer.

8.2 Processing Requirements

8.2.1 Process Control

Figure 8-1: Process Control



Cardholder Verification processing must be performed as follows:

If the *Reader CVM Required Limit Exceeded* indicator is set,
then:

- **If** the Card Supports Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 1b), **then** perform Cardholder Verification processing as described in section 8.2.2, *CVM Processing*.

- **Else** if the Card does not support Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 0b),
  then continue processing as described in section 8.2.5, *Cardholder Verification Unable To Complete over Contactless Interface*.

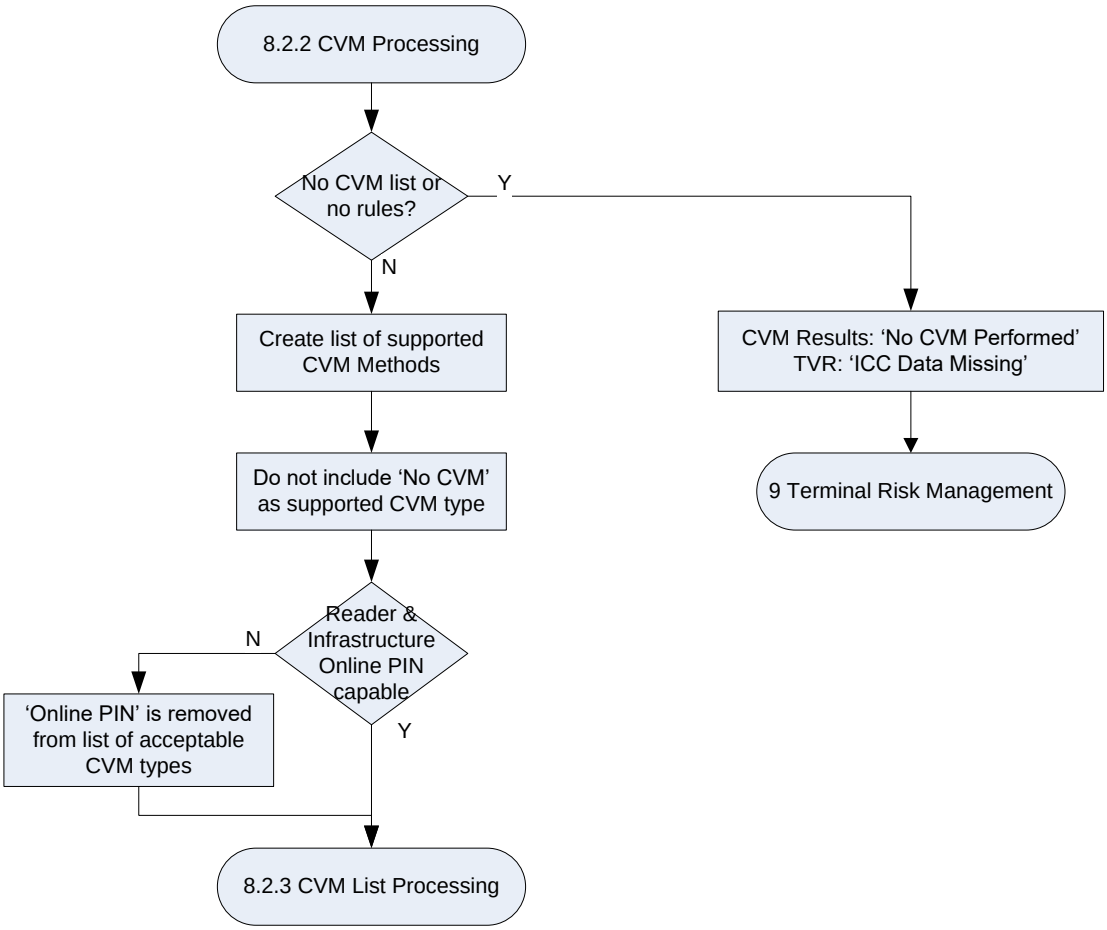
Otherwise perform Cardholder Verification processing as described in section 8.2.6, *Reader CVM Required Limit Exceeded Indicator Not Set*.

Requirements – Cardholder Verification Processing	
8.2.1.1	**If** *Reader CVM Required Limit Exceeded indicator is set,* **and** the Card supports Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 1b), **then** the reader shall perform Cardholder Verification processing as described in section 8.2.2, *CVM Processing*.
8.2.1.2	**If** *Reader CVM Required Limit Exceeded indicator is set,* **and** the Card does not supports Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 0b), **then** the reader shall complete transaction processing as described in section 8.2.5, *Cardholder Verification Unable To Complete over Contactless Interface*.
8.2.1.3	**If** *Reader CVM Required Limit Exceeded indicator is not set,* ***then*** *the reader* shall perform Cardholder Verification processing as described in section 8.2.6, *Reader CVM Required Limit Exceeded Indicator Not Set.*

8.2.2 CVM Processing

If the *Reader CVM Required Limit Exceeded* indicator is set, then CVM Processing shall continue as follows.

Figure 8-2: CVM Processing



8.2.2.1 CVM List Empty or Not Present

If the CVM List is not present or is empty (i.e. present but does not contain any rules),
then:

- The reader shall set CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5. The reader shall set *TVR* Byte 1 Bit 6 to 1b, 'ICC Data Missing'.
- CVM processing is complete, and Terminal Risk Management is performed.

else CVM Processing continues as in section 8.2.2.2.

Requirements – Card Supports Cardholder Verification but CVM List Not Present	
8.2.2.1.1	**If** the Card indicates it supports Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 1b), **and** the CVM list is not present or is empty, **then** the reader shall set *TVR* Byte 1 Bit 6 to 1b, 'ICC Data Missing', and shall set CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5, **and** processing continues with Terminal Risk Management.

8.2.2.2 Supported CVM Methods

The reader shall create a list of supported CVM methods, as described in *[EMV 4.3 Book 3], section 10.5*, with the additional conditions:

- The reader shall not include 'No CVM required' as one of its supported methods.
- If the reader or the associated acquiring infrastructure does not support Online PIN, then 'Online PIN' shall not be included as one of the supported methods.

Once the list of supported CVM methods is created, the process continues as described in Section 8.2.3, *CVM List Processing*.

Requirements – Reader CVM Supported Methods	
8.2.2.2.1	The reader creates a list of Supported CVM Methods with the below conditions, following which processing proceeds as described in Section 8.2.3, *CVM List Processing*: • The reader must not include 'No CVM required' as one of its supported methods. • **If** either the reader or the associated acquiring infrastructure for the payment system card being processed does not support the Cardholder Verification Method of Online PIN, **then** the reader must not include 'Online PIN' as one of its supported methods.

8.2.3 CVM List Processing

CVM List Processing proceeds as described in *[EMV 4.3 Book 3]*, section 10.5, with the following modifications:

- The terminal must keep the CVM List until the transaction reaches a final outcome as it may be needed when processing the authorization response – see 12.2.2.
- **If** the card contains a *CVM List* with a CVM method which is mutually supported by both card and reader, and satisfies the CVM condition codes, **then** the reader shall store the CVM determined and use it to set the CVM Outcome parameter when subsequently requested (i.e. as part of Final Outcome parameter settings during a request for online processing or transaction completion).
- 'Online PIN' CVM is carried out as per Section 8.2.3.2, *Online PIN CVM*.
- 'Mobile CVM' is processed as per Section 8.2.3.3, *Mobile CVM*.
- **If** there is no common CVM method shared by both the card and reader, **then** the processing continues as described in Section 8.2.5, *Cardholder Verification Unable To Complete over Contactless Interface*.

Requirements – CVM List Processing

8.2.3.1 **If** all of the following are true:

- The Reader *CVM Required Limit Exceeded* indicator is set.
- The card supports Cardholder Verification (Card *AIP* Byte 1 Bit 5 is set to 1b).
- The *CVM List* is present and contains at least one entry.

then, the following steps are carried out**:**

1. The reader shall examine the first CVM in the CVM List.
2. **If** the reader supports the CVM, and the Condition Code of the CVM is satisfied,
   then the reader shall save the matching CVM and return the CVM recorded in the Final Outcome.
3. **Else if** another CVM is present in the *CVM List*,
   then the reader shall repeat the process in this requirement from step 2, using the next CVM in the *CVM List*.

8.2.3.2 Online PIN CVM (not applicable for mPOS-C)

If the applicable CVM for the transaction is *Online PIN*, then the reader shall set the TVR Byte 3 Bit 3, 'Online PIN entered' in anticipation of online PIN being entered. The process then proceeds with Section 9, *Terminal Risk Management*.

The online PIN shall be entered after *1st Card Action Analysis*, once the card processing is complete and the card can be removed from the reader. Following PIN entry, the reader proceeds to online authorisation as described in Section 12, *Online Processing* (online PIN transactions require online authorisation).

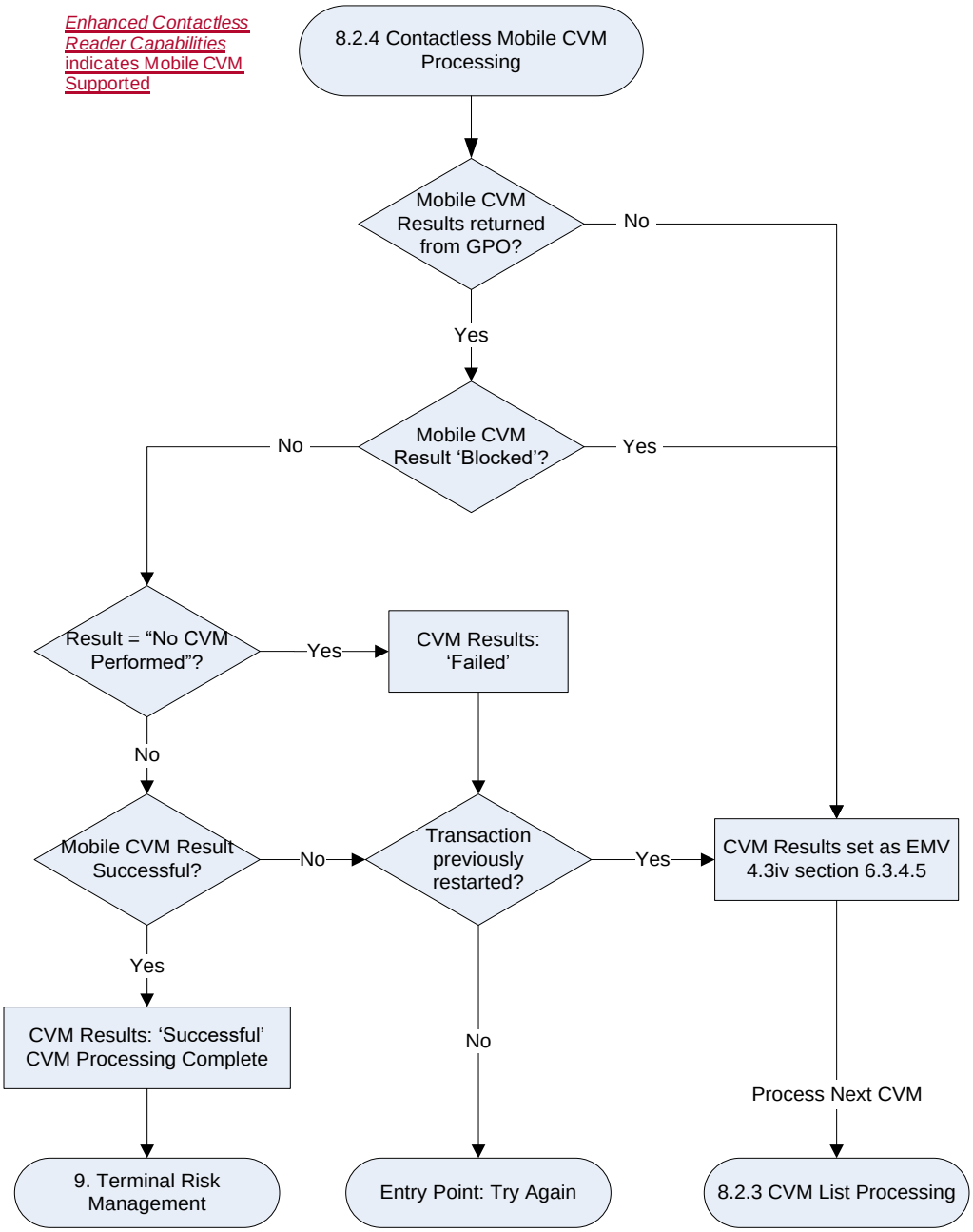
Requirements – Online PIN	
8.2.3.2.1	**If** Online PIN CVM is to be performed, **then** the reader shall set *TVR* Byte 3 Bit 3 to 1b, 'Online PIN entered' and request a PIN after the card is removed.

8.2.3.3 Mobile CVM

In the context of Contactless Mobile transaction processing, *Plaintext Offline PIN* CVM code is redefined as '*Mobile CVM*' in the CVM list returned by the Card.

Reader support for *Mobile CVM* is indicated by the *Enhanced Contactless Reader Capabilities* Byte 2 Bit 8 as 1b, 'Mobile CVM is Supported'. Card support for *Mobile CVM* is indicated in the CV Rule, as Byte 1 Bit 6-1 = 000001b, 'Plaintext PIN verification performed by ICC'.

Figure 8-3: Contactless Mobile CVM Processing



When the applicable CVM is *Mobile CVM*, then CVM processing is carried out as described in section 8.2.4, *Contactless Mobile CVM Processing*.

8.2.4 Contactless Mobile CVM Processing

When Mobile CVM is supported, the Card Application includes the *Mobile CVM Results* as defined in Table 8-1 in the Format 2 response to the GET PROCESSING OPTIONS command.

Table 8-1: Mobile CVM Results – Tag '9F71'

***Mobile CVM Results* Byte 1 – CVM Performed**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
0	0	0	0	0	0	0	1	Mobile CVM Performed
0	0	1	1	1	1	1	1	No CVM Performed
***Mobile CVM Results* Byte 2 – CVM Condition**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
0	0	0	0	0	0	0	0	Mobile CVM not Required
0	0	0	0	0	0	1	1	Terminal Required CVM
***Mobile CVM Results* Byte 3 – CVM Result**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
0	0	0	0	0	0	0	0	Unknown (if Mobile CVM not performed)
0	0	0	0	0	0	0	1	Mobile CVM Failed
0	0	0	0	0	0	1	0	Mobile CVM Successful
0	0	0	0	0	0	1	1	Mobile CVM Blocked

When the reader is to perform *Mobile CVM* as a result of CVM List processing, it must not be carried out as 'Plaintext Offline PIN' described in *[EMV 4.3 Book 3]*, section 10.5.1, but must be processed as follows:

If *Mobile CVM Results* was not returned in the GET PROCESSING OPTIONS response, the reader shall consider that the Mobile CVM is unsuccessful and set the *CVM results* as per *[EMV 4.3 Book 4]*, section 6.3.4.5. The processing then continues as defined in section 8.2.3, *CVM List Processing*.

If *Mobile CVM Results* was returned in the GET PROCESSING OPTIONS response, then:

- **If** CVM Result (Byte 3 of *Mobile CVM Results*) is '03', 'Mobile CVM Blocked', **then** the reader shall consider that the Mobile CVM is unsuccessful and set the *CVM results* as per *[EMV 4.3 Book 4]*, section 6.3.4.5. The processing then continues as defined in section 8.2.3, *CVM List Processing*.
- *Mobile CVM Results* Byte 1, CVM Performed, is processed as follows:

- **If** *Mobile CVM Results* Byte 1 is a value other than '3F' or '01', **then** *Mobile CVM* is considered unsuccessful and the process continues as per Section 8.2.4.1, *Mobile CVM Outcome*.
  - **If** *Mobile CVM Results* Byte 1 is equal to '3F' ('No CVM Performed'), **then** the reader shall set *CVM Results*, Byte 3, CVM Result to '01', 'Failed' and shall consider that Mobile CVM is unsuccessful. The process continues as per Section 8.2.4.1, *Mobile CVM Outcome*.
  - **If** *Mobile CVM Results* Byte 1 is equal to '01' ('Mobile CVM Performed'**),** **then** CVM method processing continues by examining *Mobile CVM Results* Byte 3, CVM Result, as per below.

- *Mobile CVM Results* Byte 3, CVM Result, is processed as follows:
  - **If** Byte 3 is equal to '02', 'Mobile CVM Successful', **then** the reader sets *CVM Results*, Byte 3, CVM Result to '02', 'Successful'. It shall consider that Mobile CVM is successful and the process continues as per Section 8.2.4.1, *Mobile CVM Outcome*. **else** the reader sets CVM Results, Byte 3, CVM Result to '01', 'Failed'. It shall consider that Mobile CVM is unsuccessful and the process continues as per Section 8.2.4.1, *Mobile CVM Outcome*.

8.2.4.1 Mobile CVM Outcome

If *Mobile CVM* is considered successful **then** the CVM List processing is complete. The process continues with Section 9, *Terminal Risk Management*.

If *Mobile CVM* is considered unsuccessful **and** the current transaction has not previously been restarted, **then** the reader sets a Restart indicator to indicate that the transaction is exiting with a ***Try Again*** Outcome with the below parameters set:

Start	B
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '20' (“See Phone for Instructions”) • **Status:** Processing Error • **Hold Time:** 10 • **Language Preference**
UI Request on Restart Present	Yes • **Message Identifier:** '21' (“Present Card Again”) • **Status: Processing Error** • **Hold Time:** 0 • **Language Preference**
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

If *Mobile CVM* is considered unsuccessful **and** the current transaction has previously been restarted, **then** *Mobile CVM* method has failed and the CVM list processing continues as defined in section 8.2.3, *CVM List Processing*.

Requirements – Contactless Mobile CVM Processing

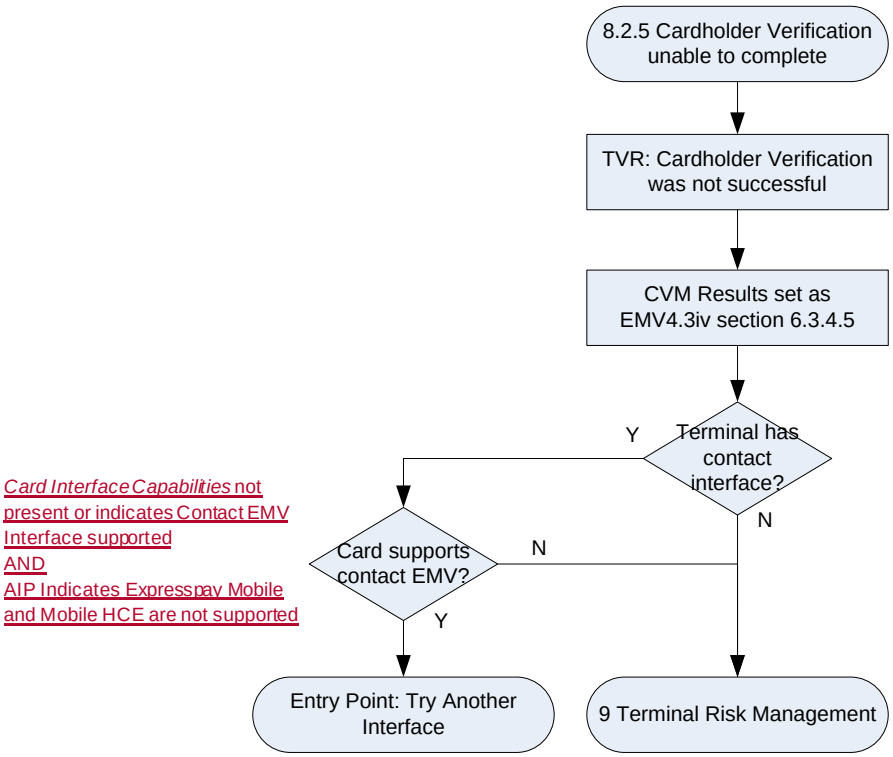
8.2.4.1.1 **If** *Mobile CVM Results* was not returned in the GET PROCESSING OPTIONS response,
then Mobile CVM is unsuccessful the *CVM results* are set as per *[EMV 4.3 Book 4]*, section 6.3.4.5. The processing then continues with CVM List processing as defined in section 8.2.3, *CVM List Processing*.

Requirements – Contactless Mobile CVM Processing	
8.2.4.1.2	**If** *Mobile CVM Results* Byte 3, CVM Result, is equal to '03', 'Mobile CVM Blocked', **then** Mobile CVM is unsuccessful the *CVM results* are set as per *[EMV 4.3 Book 4]*, section 6.3.4.5. The processing then continues with CVM List processing as defined in section 8.2.3, *CVM List Processing*.
8.2.4.1.3	**If** *Mobile CVM Results* Byte 1, CVM Performed, is equal to '3F', 'No CVM performed', **and** the transaction has previously been restarted, **then** Mobile CVM is unsuccessful and the reader shall set *CVM Results* Byte 3, CVM Result to '01', 'Failed' **and** CVM List processing continues as defined in section 8.2.3, *CVM List Processing*.
8.2.4.1.4	**If** *Mobile CVM Results* Byte 1, CVM Performed, is equal to '3F', 'No CVM performed', **and** the transaction has not previously been restarted, **then** the kernel returns control to Entry Point, passing a Final Outcome of ***Try Again***.
8.2.4.1.5	**If** *Mobile CVM Results* Byte 1, CVM Performed, is equal to '01', **and** *Mobile CVM Results* Byte 3, CVM Result is equal to '02', 'Successful', **then** the reader considers Mobile CVM successful and**:** • Sets CVM Results, Byte 3, CVM Result to '02', 'Successful' • Continues the transaction process with Section 9, *Terminal Risk Management*.
8.2.4.1.6	**If** *Mobile CVM Results* Byte 1, CVM Performed, is equal to '01', **and** *Mobile CVM Results* Byte 3, CVM Result, is equal to '01', 'Failed', **then** Mobile CVM is unsuccessful and the reader shall set CVM Results, Byte 3, CVM Result, to '01', 'Failed'.

Requirements – Contactless Mobile CVM Processing	
8.2.4.1.7	**If** all of the following are true: • *Mobile CVM Results* Byte 1, CVM Performed, is equal to '01', • *Mobile CVM Results* Byte 3, CVM Result, is **not** equal to '02', 'Successful', • Transaction has not previously been restarted **then** the kernel returns control to Entry Point, passing a Final Outcome of ***Try Again***.
8.2.4.1.8	**If** all of the following are true: • *Mobile CVM Results Byte 1, CVM Performed, is equal to '01',* • *Mobile CVM Results Byte 3, CVM Result, is not equal to '02', 'Successful',* • *Transaction has previously been restarted* **then** Mobile CVM has failed and the reader shall set *CVM Results*, Byte 3, CVM Result, to '01', 'Failed' and CVM List processing continues as defined in section 8.2.3, *CVM List Processing*.
8.2.4.1.9	**If** all of the following are true: • *Mobile CVM Results Byte 1, CVM Performed, is not equal to '3F', 'No CVM performed' or '01', 'CVM Performed',* • *The transaction has previously been restarted,* **then** Mobile CVM has failed and the reader shall set CVM Results Byte 3, CVM Result to '01', 'Failed' and CVM List processing continues as defined in section 8.2.3, CVM List Processing.
8.2.4.1.10	**If** all of the following are true: • *Mobile CVM Results Byte 1, CVM Performed, is not equal to '3F', 'No CVM performed' or '01', 'CVM performed',* • *The transaction has not previously been restarted,* **then** the kernel returns control to Entry Point, passing a Final Outcome of ***Try Again***.

8.2.5 Cardholder Verification Unable To Complete over Contactless Interface

Figure 8-4: Cardholder Verification Unable To Complete



If Cardholder Verification cannot be performed over the Contactless interface, **then**:

- The reader shall set *TVR* Byte 3 Bit 8 to 1b, 'Cardholder Verification was not successful'.
- And CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5, when No CVM Conditions in the CVM List are satisfied.

The reader proceeds with processing as follows:

If all of the following is true:

- the reader supports AEIPS contact mode (*Enhanced Contactless Reader Capabilities* byte 1 bit 8 set to "1")
- Card *AIP* byte 2 bit 7 and byte 2 bit 6 are both set to "0"
- the *Card Interface and Payment Capabilities* Byte 1 Bit 6 is 1b, 'Contact EMV Interface supported', **or** if *Card Interface and Payment Capabilities* is not present,

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** with the following parameter settings:

Start	**N/A**
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '1D' (“Please insert card”) • **Status:** Processing Error: Conditions for use of contactless not satisfied • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	No
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	Contact Chip
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

.

- **Else** then CVM processing is completed and the transaction continues with Terminal Risk Management.

Requirements – Cardholder Verification Unable To Continue over Contactless Interface

8.2.5.1 **If** all of the following are true:

- The *Reader CVM Required Limit Exceeded* indicator is set.
- Either the card does not support Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 0b), or the card supports Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 1b) and there is not a mutually supported CVM across the contactless interface.
- the reader has an alternative interface.
- *AIP* byte 2 bit 7 and byte 2 bit 6 are both set to "0"
- The *Card Interface and Payment Capabilities* Byte 1 Bit 6 is set to 1b, 'Contact EMV Interface supported'.

then the reader shall:

- Set *TVR* Byte 3 Bit 8 to 1b, 'Cardholder Verification was not successful'.
- Set CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5, when No CVM Conditions in the CVM List are satisfied.
- Return a Final Outcome of ***Try Another Interface***.

8.2.5.2 **If** all of the following are true:

- The *Reader CVM Required Limit Exceeded* indicator is set.
- Either the card does not support Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 0b), or the card supports Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 1b) and there is not a mutually supported CVM across the contactless interface.
- The reader has an alternative interface.
- *AIP* byte 2 bit 7 and byte 2 bit 6 are both set to "0"
- The *Card Interface and Payment Capabilities* element is not present.

then the reader shall:

- Set *TVR* Byte 3 Bit 8 to 1b, 'Cardholder Verification was not successful'.
- Set CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5, when No CVM Conditions in the CVM List are satisfied.
- Return a Final Outcome of ***Try Another Interface***.

Requirements – Cardholder Verification Unable To Continue over Contactless Interface

8.2.5.3 **If** all of the following are true:

- The *Reader CVM Required Limit Exceeded* indicator is set.
- Either the card does not support Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 0b), or the card supports Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 1b) and there is not a mutually supported CVM across the contactless interface.
- The reader has an alternative interface.
- *AIP* byte 2 bit 7 and byte 2 bit 6 are both set to "0"
- The *Card Interface and Payment Capabilities* element Byte 1 Bit 6 is set to 0b, 'Contact EMV Interface supported'.

then the reader shall:

- Set *TVR* Byte 3 Bit 8 to 1b, 'Cardholder Verification was not successful'.
- Set CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5, when No CVM Conditions in the CVM List are satisfied.
- The transaction continues with Terminal Risk Management.

8.2.5.4 **If** all of the following are true:

- The *Reader CVM Required Limit Exceeded* indicator is set.
- Either the card does not support Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 0b), or the card supports Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 1b) and there is not a mutually supported CVM across the contactless interface.
- The reader does not have an alternative interface
- *AIP* byte 2 bit 7 and byte 2 bit 6 are both set to "0"

then the reader shall:

- Set *TVR* Byte 3 Bit 8 to 1b, 'Cardholder Verification was not successful'.
- Set CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5, when No CVM Conditions in the CVM List are satisfied.
- The transaction continues with Terminal Risk Management.

Requirements – Cardholder Verification Unable To Continue over Contactless Interface

8.2.5.5 **If** all of the following are true:

- The *Reader CVM Required Limit Exceeded* indicator is set.
- Either the card does not support Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 0b), or the card supports Cardholder Verification (Card AIP Byte 1 Bit 5 is set to 1b) and there is not a mutually supported CVM across the contactless interface.
- the reader has an alternative interface.
- *AIP* byte 2 bit 7 or byte 2 bit 6 are set to "1"

then the reader shall:

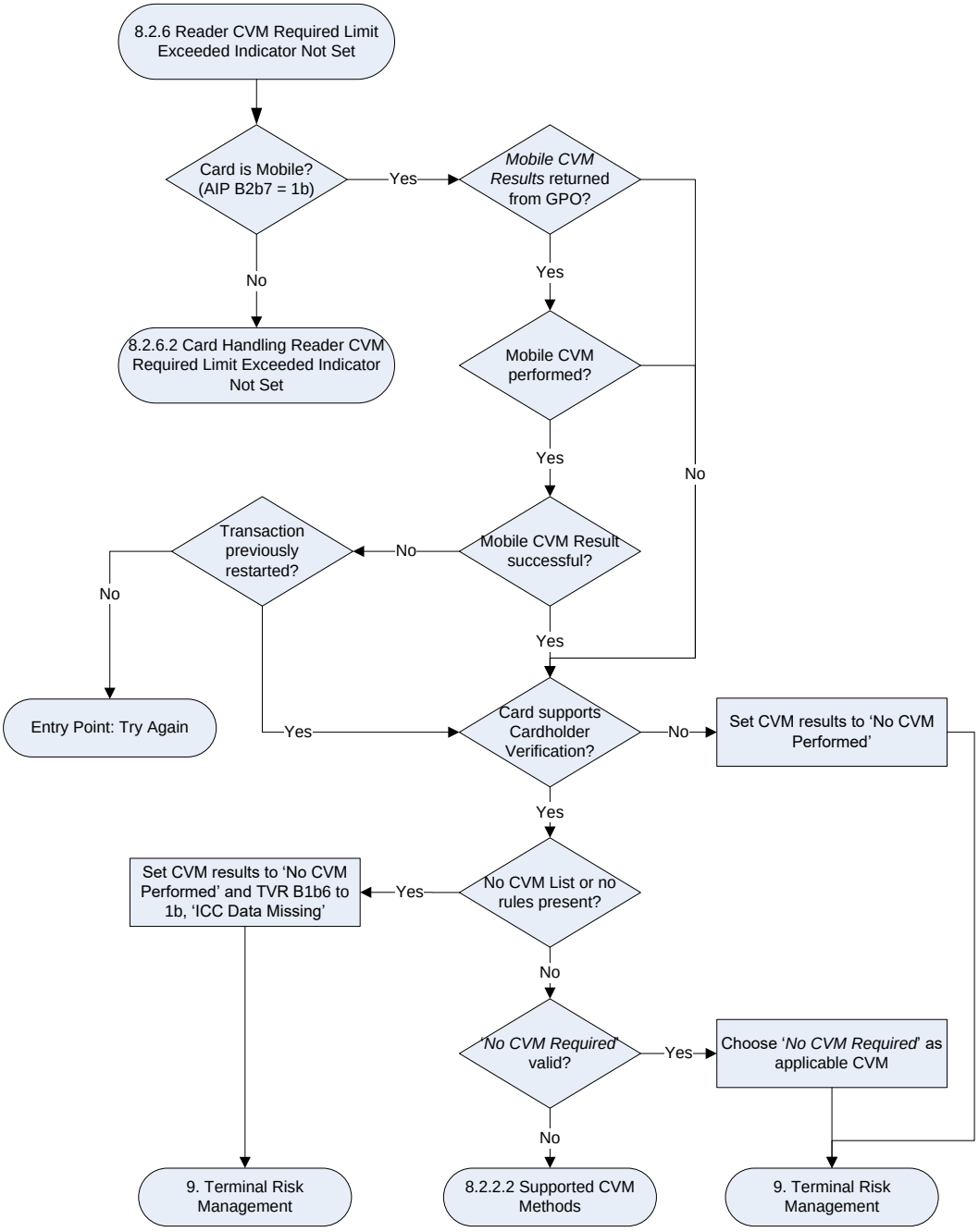
- Set *TVR* Byte 3 Bit 8 to 1b, 'Cardholder Verification was not successful'.
- Set CVM Results as per *[EMV 4.3 Book 4]* Section 6.3.4.5, when No CVM Conditions in the CVM List are satisfied.
- The transaction continues with Terminal Risk Management

8.2.6 *Reader CVM Required Limit Exceeded* Indicator Not Set

If the Reader CVM Required Limit Exceeded indicator is not set then the reader shall determine if the transaction was carried out by a mobile card or not. The reader shall check if the card supports the method no cardholder verification or not.

8.2.6.1 Contactless Mobile CVM Result Validation

Figure 8-5: Contactless Mobile CVM Result Validation



When the value of the *Amount Authorised* does not exceed the *Reader CVM Required Limit*, the reader determines if the card application is Mobile-based by checking the setting for AIP Byte 2 Bit 7, 'Contactless Mobile Supported' as follows.

- **If** *AIP* Byte 2 Bit 7 is equal to 0b, 'Contactless Mobile Supported',
  then the transaction is **not** Contactless Mobile and processing continues as per section 8.2.6.2, *Card Handling Reader CVM Required Limit Exceeded Indicator Not Set*.
  else the transaction **is** Contactless Mobile and processing continues as below.

The following process happens when the transaction is Contactless Mobile:

1. **If** the *Mobile CVM Results* was returned in the GET PROCESSING OPTIONS response
   then:
   a. **If** *Mobile CVM Results* Byte 1 is equal to '01', 'Mobile CVM Performed',
      and *Mobile CVM Results* Byte 3 is equal to '01', 'Failed',
      and the transaction has not previously been restarted,
      then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Again*** with the parameter settings defined in Table 8-2.
   b. **Else** process continues with step 2 below**.**
2. **Else If** the Card supports Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 1b),
   then:
   a. **If** the CVM List is not present or is empty,
      then the reader shall set TVR Byte 1, Bit 6 'ICC Data missing' to 1b, and set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5, and transaction processing continues with Section 9, *Terminal Risk Management*.
   b. **else If** the Card contains a CVM list that includes the '*No CVM Required*' method and CVM Condition Code that is valid for the transaction,
      then 'No CVM Required' is performed as per *[EMV 4.3 Book 3]*, section 10.5, thus considering the CVM successful and the transaction flow continues with Section 9, *Terminal Risk Management*.
   c. **else If** the CVM list does not include '*No CVM Required*' and an applicable CVM Condition Code that is valid for the transaction,
      then continue CVM processing as defined in Section 8.2.2.2, *Supported CVM Methods*.

3. **Else** the Card does not support Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 0b) and CVM List processing is not performed. The CVM Results are set as per *[EMV 4.3 Book 4]*, section 6.3.4.5, and transaction processing continues with Section 9, *Terminal Risk Management*.

Table 8-2: Final Outcome Parameter Settings

Start	B
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '20' (“See Phone for Instructions”) • **Status:** Processing Error • **Hold Time:** 10 • **Language Preference**
UI Request on Restart Present	Yes • **Message Identifier:** '21' (“Present Card Again”) • **Status: Processing Error** • **Hold Time:** 0 • **Language Preference**
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

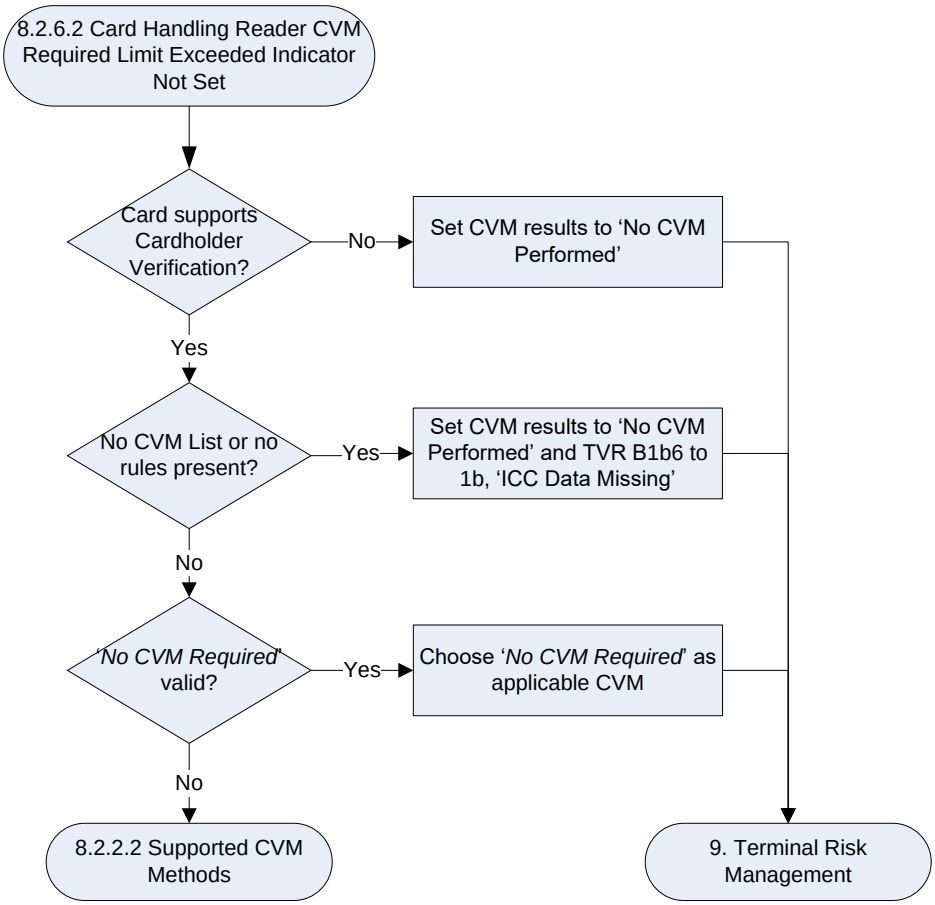
Requirements – Contactless Mobile CVM Result Validation	
8.2.6.1.1	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is '01', 'Failed', **and** the transaction has not previously been restarted, **then** the kernel returns control to Entry Point, passing a Final Outcome of ***Try Again***.
8.2.6.1.2	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is '01', 'Failed', **and** the transaction has been restarted, **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b)**,** **and** the Card does not have a CVM List or has no CVM rules, **then** the reader shall set *TVR* Byte 1 Bit 6 to 1b, 'ICC Data Missing', **and** set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5, and the transaction proceeds with Terminal Risk Management.
8.2.6.1.3	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is '01', 'Failed', **and** the transaction has been restarted, **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card contains a CVM list that includes 'No CVM Required', **and** CVM Condition Code supported for the transaction, **then** 'No CVM' is performed **and** this shall be stored and used to set the CVM Parameter as part of the Final Outcome parameter settings when sending the transaction online or completing an approved transaction.

Requirements – Contactless Mobile CVM Result Validation	
8.2.6.1.4	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is '01', 'Failed', **and** the transaction has been restarted, **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card contains a CVM list that does not include 'No CVM Required', **and** CVM Condition Code supported for the transaction, **then** CVM List processing shall be performed as defined in 8.2.3.
8.2.6.1.5	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is not set to '01', 'Failed', **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card does not have a CVM List or has no CVM rules, **then** the reader shall set *TVR* Byte 1 Bit 6 to 1b, 'ICC Data Missing', **and** set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5, and the transaction proceeds with Terminal Risk Management.
8.2.6.1.6	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is not set to '01', 'Failed', **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card contains a CVM list that includes 'No CVM Required', **and** CVM Condition Code supported for the transaction, **then** 'No CVM' is performed **and** this shall be stored and used to set the CVM Parameter as part of the Final Outcome parameter settings when sending the transaction online or completing an approved transaction.

Requirements – Contactless Mobile CVM Result Validation	
8.2.6.1.7	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is not set to '01', 'Failed', **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card contains a CVM list that does not include 'No CVM Required', **and** CVM Condition Code supported for the transaction, **then** CVM List processing shall be performed as defined in 8.2.3.
8.2.6.1.8	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is not set to '01', 'Mobile CVM performed', **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card does not have a CVM List or has no CVM rules, **then** the reader shall set *TVR* Byte 1 Bit 6 to 1b, 'ICC Data Missing', **and** set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5
8.2.6.1.9	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is not set to '01', 'Mobile CVM performed', **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card contains a CVM list that includes 'No CVM Required', **and** CVM Condition Code supported for the transaction, **then** 'No CVM' is performed **and** this shall be stored and used to set the CVM Parameter as part of the Final Outcome parameter settings when sending the transaction online or completing an approved transaction.

Requirements – Contactless Mobile CVM Result Validation	
8.2.6.1.10	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is not set to '01', 'Mobile CVM performed', **and** the Card supports Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 1b), **and** the Card contains a CVM list that does not include 'No CVM Required', **and** CVM Condition Code supported for the transaction, **then** CVM List processing shall be performed as defined in 8.2.3.
8.2.6.1.11	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is '01', 'Failed', **and** the transaction has been restarted, **and** the Card does not support Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 0b), **then** the reader shall set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5
8.2.6.1.12	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is '01', 'Mobile CVM performed', **and** *Mobile CVM Results* Byte 3 is not set to '01', 'Failed', **and** the Card does not support Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 0b), **then** the reader shall set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5
8.2.6.1.13	**If** *Mobile CVM Results* were returned in the GET PROCESSING OPTIONS response, **and** *Mobile CVM Results* Byte 1 is not set to '01', 'Mobile CVM performed', **and** the Card does not support Cardholder Verification (*AIP*, Byte 1 Bit 5 is set to 0b), **then** the reader shall set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5

Figure 8-6: Card Handling Reader CVM Required Limit Exceeded Indicator Not Set



8.2.6.2 Card Handling Reader CVM Required Limit Exceeded Indicator Not Set

The following process, also depicted in Figure 8-7, is carried out when the transaction is **not** Contactless Mobile, i.e. *AIP* Byte 2 Bit 7 is equal to 0b, 'Contactless Mobile Supported':

1. **If** the Card supports Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 1b), **then:**
    a. **If** the CVM List is not present or is empty,
    then the reader shall set TVR Byte 1, Bit 6 'ICC Data missing' to 1b, and set the CVM Results as per *[EMV 4.3 Book 4]*, section 6.3.4.5, and transaction processing continues with Section 9, *Terminal Risk Management*.

b. **else If** the Card contains a CVM list which includes the '*No CVM Required*' method and CVM Condition Code that is valid for the transaction,
then 'No CVM Required' is performed as per *[EMV 4.3 Book 3]*, section 10.5, thus considering the CVM successful and the transaction flow continues with Section 9, *Terminal Risk Management*.

c. **else If** the Card contains a CVM list which does not include 'No CVM Required' and an applicable CVM Condition Code that is valid for the transaction,
then continue CVM processing as defined in section 8.2.2.2, *Supported CVM Methods*.

2. **Else** the Card does not support Cardholder Verification (*AIP* Byte 1 Bit 5 is set to 0b) and CVM List processing is not performed. The CVM Results are set as per *[EMV 4.3 Book 4]*, section 6.3.4.5, and transaction processing continues with Section 9, *Terminal Risk Management*.

Requirements – CVM Processing – Card Supports Cardholder Verification but CVM List Not Present or Empty

8.2.6.2.1 **If** the *Reader CVM Required Limit Exceeded* indicator is not set, **and** the card *AIP* Byte 2 Bit 7 is 0b ('Contactless Mobile Supported'), **and** the following are true:

- The card *AIP* Byte 1 Bit 5 is 1b, ('Cardholder verification supported'), **and**
- *CVM List* is not present, **or**
- *CVM List* is empty,

then the reader sets the *CVM Results* to 'No CVM Performed' and this shall be stored and used to set the CVM Parameter as part of the Final Outcome parameter settings. The transaction processing continues with Section 9, *Terminal Risk Management*.

Requirements – CVM Processing – Card Supports Cardholder Verification and CVM List contains 'No CVM Required'

8.2.6.2.2 **If** the *Reader CVM Required Limit Exceeded* indicator is not set, **and** the card *AIP* Byte 2 Bit 7 is 0b ('Contactless Mobile Supported'), **and** the following are true:

- The card *AIP* Byte 1 Bit 5 is 1b, ('Cardholder verification supported'), **and**
- *CVM List* contains 'No CVM required', **and**
- *Valid CVM condition code for the transaction*

then the reader shall perform 'No CVM Required' as per *[EMV 4.3 Book 3]*, section 10.5, thus considering the CVM successful and the transaction flow continues with Section 9, *Terminal Risk Management*.

Requirements – CVM Processing – Card Supports Cardholder Verification and CVM list is present but does not contain 'No CVM Required'

8.2.6.2.3 **If** the *Reader CVM Required Limit Exceeded* indicator is not set, **and** the card *AIP* Byte 2 Bit 7 is 0b ('Contactless Mobile Supported'), **and** the following are true:

- The card *AIP* Byte 1 Bit 5 is 1b, ('Cardholder verification supported'), **and**
- *CVM List* is present, **and**
- *CVM List does not* contain 'No CVM required'

then the reader shall continue CVM processing as defined in section 8.2.2.2, *Supported CVM Methods*.

Requirements – CVM Processing – Card Does Not Support Cardholder Verification

8.2.6.2.4 **If** the *Reader CVM Required Limit Exceeded* indicator is not set, **and** the card *AIP* Byte 2 Bit 7 is 0b ('Contactless Mobile Supported'), **and** the card *AIP* Byte 1 Bit 5 is 0b, ('Cardholder verification supported'),
then the reader shall not perform CVM List processing. The CVM Results are set as per *[EMV 4.3 Book 4]*, section 6.3.4.5, and transaction processing continues with Section 9, *Terminal Risk Management*.

9 Terminal Risk Management

9.1 Overview

During a transaction, certain risk management checks are performed by the reader, for example, floor limits as defined in *[EMV 4.3 Book 3]*, section 10.6, and *[EMV 4.3 Book 4]*, section 6.3.5.

Terminal Risk Management shall always be performed, regardless of the setting of the Terminal Risk Management is to be performed bit in the *AIP* read from the card.

Requirements – Terminal Risk Management Not Requested By Card	
9.1.1	**If** a Card with *AIP* Byte 1 Bit 4 = 0b (Terminal Risk Management) is presented, **then** Terminal Risk Management shall be performed.

Requirements – Terminal Risk Management Requested By Card	
9.1.2	**If** the Card indicates that Terminal Risk Management is to be performed (*AIP* Byte 1 Bit 4 is set to 1b), **then** Terminal Risk Management shall be performed.

Terminals may optionally support an exception/hot list file and a card account number may be checked against this list if present. Results of the risk management check are stored in a reader resident data element called *TVR*.

Reader processing decisions based on the outcome of the above checks are configurable, determined by the card and reader resident data elements which are the *IACs* and the *TACs*. (See section 10, 1st Terminal Action Analysis.)

9.2 Processing Requirements

Terminal Risk Management must be performed as defined in *[EMV 4.3 Book 3]*, section 10.6, and *[EMV 4.3 Book 4]*, section 6.3.5 with the exception that random transaction selection and velocity checking shall not be performed.

9.2.1 Floor Limit Checking

Readers shall support a *Reader Contactless Floor Limit* in place of any other *Terminal Floor Limit*. The *Reader Contactless Floor Limit* is checked during Entry Point processing (refer to *Book B*) and the *Reader Contactless Floor Limit Exceeded* indicator may be set as a result.

Requirements – Terminal Risk Management – Floor Limit Checking	
9.2.1.1	**If** the *Reader Contactless Floor Limit Exceeded* indicator is set to 1, **then** the reader shall set *TVR* Byte 4 Bit 8 to 1b, 'Transaction exceeds floor limit'.

9.2.2 Random Transaction Selection

Readers must not support random transaction selection processing for contactless transactions.

9.2.3 Velocity Checking

Readers must not support velocity checking processing for contactless transactions.

9.2.4 Exception File Checking

When the terminal indicates to the reader that a Terminal Exception File/ Hotlist is supported, then the reader may format a Data Exchange Request message containing the card PAN, PAN Sequence Number, and Expiry Date and send to the terminal[2]. If the response data returned indicates a match is found on the Terminal Exception File/ Hotlist, then the reader shall set *TVR* Byte 1 Bit 5 to 1b, 'Card appears on Terminal Exception File'.

Requirements – Terminal Risk Management – Exception File Checking	
9.2.4.1	**If** the card response data matches that found on the Exception File / Hotlist, **then** the reader shall set *TVR* Byte 1 Bit 5 to 1b, 'Card appears on terminal exception file'.

[2] Alternatively in some Terminal or POS System architectures the Exception File / Hotlist checking may take place after the Reader and Card interaction has completed and the final transaction outcome will be determined subsequently.

10 1st Terminal Action Analysis

10.1 Overview

Terminal Action Analysis applies rules on the card, set by the Issuer, and on the reader, set by the Scheme, to the transaction to determine if it should request of the card whether the transaction be approved offline, declined offline, or sent online for authorisation as defined in *[EMV 4.3 Book 3]*, section 10.7, and *[EMV 4.3 Book 4]*, section 6.3.6.

The Terminal Action Analysis function may be executed at several places during a transaction to eliminate the need for unnecessary processing. As described in *[EMV 4.3 Book 3]*, section 6.7.

10.2 Processing Requirements

1st Terminal Action Analysis comprises two stages:

- Checking of the Offline Processing Results
- Requesting a cryptogram from the card

10.2.1 Offline Processing Results

The reader examines the results of Offline processing recorded in the *TVR* during the transaction so far, for example, during Terminal Risk Management, to determine the action to be taken. The TVR settings are shown in Table 10-1.

Table 10-1: Terminal Verification Results (TVR) Settings

***TVR* Byte 1 (Leftmost)**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
1								Offline Data Authentication was not performed
	1							Offline Static Data Authentication Failed
		1						Card Data Missing
			1					Card appears on Terminal Exception File
				0				RFU
					1			Combined DDA/AC (CDA) Failed
						1		SDA Selected
							0	RFU
***TVR* Byte 2**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
1								Card and Terminal have different application versions
	1							Expired Application
		1						Application not effective yet
			1					Requested service not allowed for Card product
				1				New Card
					0			RFU
						0		RFU
							0	RFU
***TVR* Byte 3**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
1								Cardholder Verification failed
	1							Unrecognised CVM

	x	1						Mobile CVM Try Limit exceeded
			1					PIN entry required and PIN pad not present or not working
				1				PIN entry required, PIN pad present, but PIN was not entered
					1			Online PIN entered
						0		RFU
							0	RFU
***TVR* Byte 4**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
1								Transaction Exceeds Floor Limit
	1							Lower consecutive offline limit exceeded
		1						Upper consecutive offline limit exceeded
			1					Transaction selected randomly for online processing
				1				Merchant forced transaction online
					0			RFU
						0		RFU
							0	RFU
***TVR* Byte 5 (Rightmost)**								
b8	**b7**	**b6**	**b5**	**b4**	**b3**	**b2**	**b1**	**Meaning**
1								Default TDOL used
	1							Issuer Authentication was unsuccessful
		1						Script processing failed before final GENERATE AC
			1					Script processing failed after final GENERATE AC
				0				RFU
					0			RFU
						0		RFU
							0	RFU

The review of the offline processing results, in the *TVR*, is performed against the *IACs* (obtained from the Card, as set by the Issuer) and the *TACs* (in the terminal, as set by the Scheme). A setting of the corresponding bit in either the *IACs* or *TACs* will determine the outcome of the Terminal Action Analysis as described below.

The *TAC* settings depend on the terminal's capabilities and its configuration. Each reader configuration type (see Table 2-3) has its own *TAC* settings.

There are three sets of *IACs* and corresponding *TACs*:

• *IAC – Denial* • *TAC – Denial*	Defines conditions that determine whether a transaction should be declined offline.
• *IAC – Online* • *TAC – Online*	Defines conditions that determine whether a transaction should be transmitted online for authorisation.
• *IAC – Default* • *TAC – Default*	Defines conditions that determine whether to decline a transaction that was required to be sent online but that the reader is unable to send online.

The checks performed by the reader depend on its configuration. The reader checks each of the above sets of *IACs* and *TACs* against the results of the current transaction recorded in the *TVR* in the order given in Table 10-2.

Table 10-2: Reader Configurations IAC/TAC Checks

Offline Only	Online Only	Offline with Online Capability	Delayed Authorisation
IAC/TAC – Denial	IAC/TAC – Denial	IAC/TAC – Denial IAC/TAC – Online IAC/TAC – Default	IAC/TAC – Denial IAC/TAC – Online

10.2.1.1 Offline Only Terminal (Not supported by mPOS-C, mPOS-CSP)

The reader must compare the *IAC – Denial* and *TAC – Denial* with the results of the current transaction as recorded in the *TVR*. If any of the corresponding bits are set, then the transaction is requested to be declined and the reader must:

- Set the cryptogram type to be requested in the GENERATE AC command to *AAC*.

Refer to section 10.2.4, Request *AC* in First GENERATE AC.

Otherwise the reader shall request a TC.

Requirements – Terminal Action Analysis – Offline Only Compare Denial Codes	
10.2.1.1.1	During Terminal Action Analysis an Offline Only terminal shall compare the *Terminal Action Code – Denial* and the *Issuer Action Code – Denial* read from the card with the results as recorded by the *TVR*. **If** the reader is Offline only, **and** any corresponding bits are set, **then** the reader shall request an *AAC* at first GENERATE AC stage, **else** the reader shall request a TC at the first GENERATE AC stage.

10.2.1.2 Online Only Terminal

The reader must compare the *IAC – Denial* and *TAC – Denial* with the results of the current transaction as recorded in the *TVR*. If any of the corresponding bits are set, then the transaction is requested to be declined and the reader must:

- Set the cryptogram type to be requested in the GENERATE AC command to *AAC*.

Refer to section 10.2.4, Request *AC* in First GENERATE AC.

Requirements – Terminal Action Analysis – Online Only Compare Denial Codes	
10.2.1.2.1	During Terminal Action Analysis an Online Only terminal shall compare the *Terminal Action Code – Denial* and the *Issuer Action Code – Denial* read from the card with the results as recorded by the *TVR*. **If** the reader is Online only, **and** any corresponding bits are set, **then** the reader shall request an *AAC* at first GENERATE AC stage.

If the reader is unable to go online, then the transaction is requested to be declined and the reader must:

- Set the cryptogram type to be requested in the GENERATE AC command to *AAC*.

Refer to section 10.2.4, Request *AC* in First GENERATE AC.

Otherwise the reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*.

Requirements – Terminal Action Analysis – Online Only Terminal Unable To Go Online	
10.2.1.2.2	**If** the terminal is online only but is unable to complete an online connection, **then** the reader shall request an *AAC* at first GENERATE AC stage. **else** The reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*.

10.2.1.3 Offline with Online Capability Terminal (Not supported by mPOS-C, mPOS-CSP)

The reader carries out the following steps to determine the transaction disposition to be requested in first Generate AC stage:

1. The reader must compare the *IAC – Denial* and *TAC – Denial* with the results of the current transaction as recorded in the *TVR,* with the following outcome:
    a. **If** any of the corresponding bits are set,
    then the transaction is requested to be declined offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *AAC*.

Requirements – Terminal Action Analysis – Offline with Online Capability Compare Denial Codes	
10.2.1.3.1	During Terminal Action Analysis the Offline with Online Capability terminal shall compare the *Terminal Action Code – Denial* and the *Issuer Action Code – Denial* read from the card with the results as recorded by the *TVR*. **If** the reader is Offline with Online capability, **and** any corresponding bits are set, **then** the transaction is requested to be declined offline and the reader shall request an *AAC* at first GENERATE AC stage.

2. **If** the transaction was **not** declined offline in step 1,
then the reader must compare the *IAC – Online* and *TAC – Online* with the results of the current transaction as recorded in the *TVR*, with the following outcome:

a. **If** any of the corresponding bits are set,
then the transaction is requested to be processed online and the reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*.
else the transaction is requested to be approved offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *TC*.

Requirements – Terminal Action Analysis – Offline with Online Capability Terminal Compare Online Codes

10.2.1.3.2 During Terminal Action Analysis the Offline with Online Capability terminal shall compare the *Terminal Action Code – Online* and the *Issuer Action Code – Online* read from the card with the results as recorded by the *TVR*.

If the terminal is Offline with Online capability,
and any of the corresponding bits are set,
then the transaction is requested to be processed online and the reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*.
else the transaction is requested to be approved offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *TC*.

If the cryptogram to be requested is an *ARQC*, and the reader is unable to go online, **then** the reader must compare the *IAC- Default* and *TAC - Default* with the results of the current transaction as recorded in the *TVR*, with the following outcome:

1. **If** any of the corresponding bits are set,
then the transaction is requested to be declined offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *AAC*.
else the transaction is requested to be approved offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *TC*.

Requirements – Terminal Action Analysis – Offline with Online Capability Terminal Unable To Go Online

10.2.1.3.3 During Terminal Action Analysis the Offline with Online Capability terminal shall compare the *Terminal Action Code – Default* and the *Issuer Action Code – Default* read from the card with the results as recorded by the *TVR*.

If the terminal is Offline with Online capability but is unable to complete an online connection,
and any of the corresponding bits are set
then the transaction is requested to be declined offline and the reader shall request an *AAC* at first GENERATE AC stage.
else the transaction is requested to be approved offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *TC*.

Otherwise the reader shall request a TC.

10.2.1.4 Delayed Authorisation Terminal (Not supported by mPOS-C, mPOS-CSP)

If the Reader supports delayed authorisation, *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 set to 1b, the following steps have to be performed in order to determine the transaction disposition to be requested in the first Generate AC stage:

1. The reader must compare the *IAC – Denial* and *TAC – Denial* with the results of the current transaction as recorded in the *TVR,* with the following outcome:
    a. **If** any of the corresponding bits are set,
    then the transaction is requested to be declined offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *AAC*.

Requirements – Terminal Action Analysis – Delayed Authorisation Terminal Compare Denial Codes

10.2.1.4.1 During Terminal Action Analysis the Delayed Authorisation terminal shall compare the *Terminal Action Code – Denial* and the *Issuer Action Code – Denial* read from the card with the results as recorded by the *TVR*.

If the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b,
and any corresponding bits are set,
then the transaction is requested to be declined offline and the reader shall request an *AAC* at first GENERATE AC stage.

2. **If** the transaction was **not** declined offline in step 1,
then the reader must compare the *IAC – Online* and *TAC – Online* with the results of the current transaction as recorded in the *TVR*, with the following outcome:

   a. **If** any of the corresponding bits are set,
   then the transaction is requested to be processed online and the reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*.
   else the transaction is requested to be approved offline and the reader must set the cryptogram type to be requested in the GENERATE AC command to *TC*.

Requirements – Terminal Action Analysis – Delayed Authorisation Terminal Compare Online Codes

10.2.1.4.2 During Terminal Action Analysis a Delayed Authorisation terminal shall compare the *Terminal Action Code – Online* and the *Issuer Action Code – Online* read from the card with the results as recorded by the *TVR*.

If the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b,
and any of the corresponding bits are set,
then the transaction is requested to be processed online and the reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*,
else the transaction is requested to be approved offline and the reader shall request a TC at the GENERATE AC.

10.2.2 Zero Amount Allowed and Status Check Requested Validation

The *Zero Amount Allowed* and *Status Check Support* flags are checked during Entry Point processing (refer to *Book B*). The corresponding 'Zero Amount' and 'Status Check Requested' indicators are set as a result and processing should continue as follows:

- If the 'Zero Amount' indicator is set to 1 and the current cryptogram type to be requested is **not** an *AAC*, then the reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*.
- If the 'Status Check Requested' indicator is set to 1 and the current cryptogram type to be requested is **not** an *AAC*, then the reader must set the cryptogram type to be requested in the GENERATE AC command to *ARQC*.

Requirements – Zero Amount Allowed

10.2.2.1 **If** the reader supports Zero Amount Allowed,
and the Zero Amount indicator is set to 1 during Entry Point processing,
and the current cryptogram type to be requested is **not** an *AAC*,
then the reader shall request an *ARQC* at first GENERATE AC stage.

10.2.2.2 **If** the reader supports Zero Amount Allowed,
and the Zero Amount indicator is set to 0 during Entry Point processing,
or the current cryptogram type to be requested is an *AAC*,
then the reader shall determine which cryptogram to request based on the normal Terminal Action Analysis process.

Requirements – Status Check Requested

10.2.2.3 **If** the reader supports Status Check,
and the Status Check Requested indicator is set to 1 during Entry Point processing,
and the current cryptogram type to be requested is **not** an *AAC*,
then the reader shall request an *ARQC* at first GENERATE AC stage.

10.2.2.4 **If** the reader supports Status Check,
and the Status Check Requested indicator is set to 0 during Entry Point processing,
or the current cryptogram type to be requested is an *AAC*,
then the reader shall determine which cryptogram to request based on the normal Terminal Action Analysis process.

10.2.3 [Section removed]

The content in this section has been purposely removed from this specification, as Expresspay Magstripe Mode is no longer supported.

10.2.4 Request *AC* in First GENERATE AC

The 1st Terminal Action Analysis processing concludes with the issuance of the first GENERATE AC command to the card.

When CDA is to be performed the reader indicates that to the card in the reference control parameter as defined in *[EMV 4.3 Book 2]*, section 6.6.

The reader formats the GENERATE AC command to request a *TC* (excluding mPOS-C, mPOS-CSP), an *AAC*, or an *ARQC* from the card dependent on the results of the review of the offline processing results described in section 10.2.1, Offline Processing Results.

- A request for a *TC* indicates that the reader is requesting that the transaction be approved offline.
- A request for an *AAC* indicates that the reader is requesting that the transaction be declined offline. Note that there is no need to perform CDA if the reader requests *AAC*.
- A request for an *ARQC* indicates that the reader is requesting that the transaction be sent online for authorisation.
- In response to the GENERATE AC command issued by the reader, the card will (on completion of any Card Risk Management) return an *AC* to the reader. The card may in some circumstances override the reader's decision for the transaction disposition (Approve, Decline, Go Online) in accordance with the rules defined in *[EMV 4.3 Book 3]*, section 10.8.

11 1st Card Action Analysis

11.1 Overview

The purpose of Card Action Analysis is to allow the card to perform a number of predefined risk management tests and use the results of these tests to decide upon an appropriate action. These tests are carried out on the details of this transaction and the outcome of previous transactions. They determine if positive online authorisation is required for this transaction to be completed, whether the transaction can be completed with local offline authorisation (not supported by mPOS-C, mPOS-CPS) or whether the transaction should be declined offline.

These card tests are performed regardless of the outcome of the Terminal Risk Management checks carried out by the reader on this transaction. The *AC* produced by the card in response to a GENERATE AC command, is used by the Issuer of the card to validate the transaction and the card. When CDA generation is being performed the card generates a dynamic signature that is returned to the reader with the *AC*. This is then validated by the reader before the transaction progresses to any further stages. *ACs* perform two roles:

- The *ARQC* when sent in an online authorisation request message allows the Issuer to authenticate that they actually issued the card. Each card contains a unique key that is used to generate the cryptogram. This key, which is known only by the card Issuer, is then used in their host systems to validate the *AC* received in the Authorisation Request Message.
- When sent in a clearing or advice message (*TC, ARQC* or *AAC*), the cryptogram can be used to authenticate the integrity of the transaction parameters or data (i.e. Amount, Date, Time, etc.), as they pass through the various processing systems between reader and Issuer. This can also be used in dispute resolution to confirm the parameters of a transaction post event.

11.2 Processing Requirements

The reader is not involved in 1st Card Action Analysis, however it is triggered by the reader issuing the GENERATE AC command to the card, and the reader is informed of the result of this process in the response data returned by the card.

The card generates the *AC* using application data and a secret DES key (the *AC DEA Keys*) stored on the card. (When CDA is being performed, the card will also create a dynamic signature that includes the *TC* or *ARQC*.)

Subsequent processing depends on the type of cryptogram returned and the results of Offline Data Authentication if CDA is performed. When a CDA signature is returned by the card the reader uses the *CAPK* to validate this dynamic signature as described in *[EMV 4.3 Book 2]*, section 6.6.

11.2.1 Format of the Response to GENERATE AC Command

The reader must check that the format of the response data is compliant to Format 1 or Format 2 as defined by *[EMV 4.3 Book 3]*, section 6.5.5.4 when CDA is not used, or Format 2 when CDA is used (see *[EMV 4.3 Book 2]*, section 6.6).

If the response is in the incorrect format or the *Cryptogram Information Data* (CID) is not a TC, ARQC or AAC, then the reader determines whether an alternative interface is supported as follows:

- **If** all of the following conditions are true:
  - the *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 is set to 1b, 'Contact Mode supported'
  - *AIP* byte 2 bit 7 and byte 2 bit 6 are both set to 0b
  - *Card Interface and Payment Capabilities* is not present. or *Card Interface and Payment Capabilities* Byte 1 Bit 6 is set to 1b, 'Contact EMV interface supported'.

  then the card and the reader support an alternative interface and the kernel returns control to Entry Point with a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1.
  else (i.e. the case of mPOS-C, mPOS-CSP), the card and the reader **do not** support an alternative interface, and the transaction shall be terminated. The kernel returns control to Entry Point with a Final Outcome of ***End Application*** and parameters set as per Table 11-2.

Table 11-1: Card Action analysis - Final Outcome Parameter Settings for Try Another Interface

Start	N/A
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '1D' (“Please insert card”) • **Status:** Processing Error: Conditions for use of contactless not satisfied • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	No
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	Contact Chip
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

Table 11-2: Card Action analysis - Final Outcome Parameter Settings for End Application

Start	N/A
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '1C' ("Insert, Swipe or Try Another Card") • **Status:** Ready to Read • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	No
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

Requirements – Card Action Analysis Return Formats

11.2.1.1 **If** CDA is not used,
then:

The terminal shall check that the GENERATE AC response is either in Format 1 **or** Format 2.

If the response is not in Format 1 **or** Format 2
and an alternative interface is supported by the reader and the card,
then the kernel returns control to Entry Point with a Final Outcome of ***Try Another Interface***.

11.2.1.2 **If** CDA is used,
then:

The terminal shall check that the format of the GENERATE AC response is in Format 2 or Format 1 as appropriate:

If either:

- The card returns an AAC and the response is not in Format 1 or Format 2,
- **or** the card returns an AC other than an AAC and the response is not in Format 2,

and an alternative interface is supported by the reader and the card,
then the kernel returns control to Entry Point with a Final Outcome of ***Try Another Interface***.

11.2.1.3 **If** CDA is not used,
then:

The terminal shall check that the GENERATE AC response is either in Format 1 **or** Format 2.

If the response is not in Format 1 **or** Format 2,
and an alternative interface is **not** supported by the reader and the card (e.g. as in the case of mPOS-C and mPOS-CSP),
then the transaction shall be terminated. The kernel returns control to Entry Point with a Final Outcome of ***End Application***.

Requirements – Card Action Analysis Return Formats

11.2.1.4 **If** CDA is used,
then:

The terminal shall check that the format of the GENERATE AC response is in Format 2 or Format 1 as appropriate:

If either:

- The card returns an AAC and the response is not in Format 1 or Format 2,
- **or** the card returns an AC other than an AAC and the response is not in Format 2,

and an alternative interface is **not** supported by the reader and the card,
then the transaction shall be terminated. The kernel returns control to Entry Point with a Final Outcome of ***End Application***.

11.2.1.5 **If** card returns a CID other than AAC, ARQC or TC,

then:

If an alternative interface is supported by the reader and the card, **then** the kernel returns control to Entry Point with a Final Outcome of ***Try Another Interface***

11.2.2 General Card Action Analysis

Requirements – Card Action Analysis Processing

11.2.2.1	**If** the terminal requests CDA at first GENERATE AC, **and** the card responds with an *AAC*, **then** the terminal shall not set *TVR* Byte 1 Bit 3 to 1b, 'CDA failed'.
11.2.2.2	**If** the terminal requests CDA with *TC* at first GENERATE AC, **then** **If** the card responds with a TC, then the terminal shall validate the signature, **else If** the card responds with an *ARQC*, then the terminal shall validate the signature and extract the *ARQC*.
11.2.2.3	**If** the terminal requests CDA with *ARQC* at first GENERATE AC, **then** the terminal shall validate the signature and extract the *ARQC*.
11.2.2.4	**If** any of the following are true: • The Terminal requested an AAC and the card responded with any CID but an AAC, • The Terminal requested an ARQC and the card responded with a TC value in the CID, **then** the transaction shall be declined.

11.2.3 Card Returns SW = '6984'

If Card Risk Management has determined that a Mobile CVM is required, but has not been successfully entered then Status Word '6984' is returned by the Card.

If the card returns SW='6984' **and** the transaction has **not** been restarted,
then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Again*** with the parameter settings defined in Table 11-3.
Else if the card returns SW='6984' **and** the transaction has been restarted,
then an error condition has occurred and the kernel returns control to Entry Point with a Final Outcome of ***End Application*** and the parameters defined in Table 11-4.

Note that ***Try Again*** processing invokes the collection of the Mobile CVM by the Cardholder's mobile device. The processing by the reader on retry is handled by CVM processing as per Section 8.2.4, *Contactless Mobile CVM Processing*. The process flow is not expected to result in a second Status Word '6984' (and consequently a re-entry to the flow would be an error).

Table 11-3: Card returns SW='6984' – Try Again Parameter Settings

Start	B
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier**: '20' ("See Phone for Instructions") • **Status:** Processing Error • **Hold Time:** 10 • **Language Preference**
UI Request on Restart Present	Yes • **Message Identifier:** '21' ("Present Card Again") • **Status:** Ready to Read. • **Hold Time:** 0 • **Language Preference**
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	15
Removal Timeout	Zero

Table 11-4: Card returns SW='6984' – *End Application* Parameter Settings

Start	N/A
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '1C' ("Insert, Swipe or Try Another Card") • **Status:** Ready to Read • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	**No**
Data Record Present	No
Discretionary Data Present	No
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

Requirements – Card returns SW='6984' and transaction has not been restarted

11.2.3.1 **If** the Card returns SW='6984' **and** the transaction has **not** been restarted,
then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Again*** with the parameter settings defined in Table 11-3.

Requirements – Card returns SW='6984' and transaction has been restarted

11.2.3.2 **If** the Card returns SW='6984' **and** the transaction has been restarted,
then an error condition has occurred and the kernel returns control to Entry Point, passing a Final Outcome of ***End Application*** with the parameter settings defined in Table 11-4.

11.2.4 Card Returns a *TC*

For offline-approved transactions (not applicable for mPOS-C, mPOS-CSP):

- The reader shall send a User Interface Request Message with the following parameters set:
- **Message Identifier:** '17' ("Card read OK. Please remove card")
- **Status:** Card Read Successfully
- **Hold Time:** 300ms
- **Language Preference:** If returned by the card during Application Selection
- A *TC* is generated and Offline Data Authentication will be performed if applicable.

If *TVR* Byte 1 Bit 3 is set to 1b, 'CDA Failed', then the reader may either decline the transaction or request another interface; else the reader continues with section 13.2, Transaction Completion – Transaction Approved.

For mPOS-C, mPOS-CSP, the transaction must be declined.

Requirements – Card Action Analysis Return *TC*

11.2.4.1 **If** the reader is an mPOS-C or mPOS-CSP,
then the terminal shall decline the transaction, returning control to Entry Point as defined in 13.3

11.2.4.2 **If** the card returns a TC,
then:

If Offline Data Authentication is not required to be performed,
then the terminal shall approve the transaction, returning control to Entry Point as defined in 13.2.

11.2.4.3 **If** the card returns a TC,
then:

If Offline Data Authentication is required to be performed,
and Offline Data Authentication is successful,
then the terminal shall approve the transaction, returning control to Entry Point as defined in 13.2**.**

11.2.4.4 **If** the card returns a TC,
then:

If Offline Data Authentication is required to be performed,
and Offline Data Authentication is unsuccessful,
then:

If all of the following conditions are true:

- The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b
- AIP Byte 2 bit 7 and byte 2 bit 6 are both set to 0b
- The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1
else the terminal shall decline the transaction, returning control to Entry Point as defined in 13.3

11.2.5 Card Returns an *AAC*

For offline-declined transactions:

- The reader shall send a User Interface Request Message with the following parameters set:
- **Message Identifier:** '17' (“Card read OK. Please remove card”)
- **Status:** Card Read Successfully
- **Hold Time:** 300ms
- **Language Preference:** If returned by the card during Application Selection

The cryptogram generated by the card is an *AAC* and the reader may either decline the transaction or request another interface.

Requirements – Card Action Analysis Return *AAC*

11.2.5.1 **If** the card returns an AAC,
then

If all of the following conditions are true:

- The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b,
- AIP Byte 2 bit 7 and byte 2 bit 6 are both set to 0b
- The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1

else the terminal shall decline the transaction, returning control to Entry Point as defined in 13.3

11.2.6 Card Returns an *ARQC*

If the card returns an *ARQC* in the response to the first GENERATE AC command, Offline Data Authentication will be performed if applicable.

If *TVR* Byte 1 Bit 3 is set to 1b, ‘CDA Failed, then the reader may either decline the transaction or request another interface.

Requirements – Card Action Analysis Return *ARQC* – CDA failure

11.2.6.1 **If** a terminal sends the first GENERATE AC,

and the terminal receives an *ARQC* with CDA which fails,

then:

If all of the following conditions are true:

- The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b
- AIP Byte 2 bit 7 and byte 2 bit 6 are both set to 0b
- The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1

else the terminal shall decline the transaction, returning control to Entry Point as defined in 13.3

Subsequent processing depends upon both the reader configuration and the transaction mode.

11.2.6.1 Reader is Offline Only (not applicable to mPOS-C, mPOS-CSP)

When the reader is offline only, then the reader may either decline the transaction or request another interface.

Requirements – Card Action Analysis Return *ARQC* – Offline Only Terminal

11.2.6.1.1 **If** all of the following are true:

- The terminal is an offline only terminal.
- The terminal sends the first GENERATE AC to a card.
- The terminal receives an *ARQC*.

then If all of the following conditions are true:

- The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b
- AIP Byte 2 bit 7 and byte 2 bit 6 are both set to 0b
- The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1
else the terminal shall decline the transaction, returning control to Entry Point as defined in 13.3.

11.2.6.2 Reader is either Online Only or Offline with Online Capability

Offline with Online Capability is not applicable to mPOS-C, mPOS-CSP.

The reader shall send a User Interface Request Message with the following parameters set:

- **Message Identifier:** '17' (“Card read OK. Please remove card”)
- **Status:** Card Read Successfully
- **Hold Time:** 300ms
- **Language Preference:** If returned by the card during Application Selection

Requirements – Card Action Analysis Return *ARQC* – EMV Mode (partial online) at Online Capable Terminal

11.2.6.2.1 **If** all of the following are true:

- The terminal is configured to be either online only or offline with online capability.
- The terminal sends the first GENERATE AC to a card.
- The terminal receives an *ARQC*.
- If Offline Data Authentication is required to be performed, it is performed successfully.

then the terminal shall perform an online transaction (See section 12).

11.2.6.2.2 **If** all of the following are true:

- The terminal is configured to be either online only or offline with online capability.
- The terminal sends the first GENERATE AC to a card.
- The terminal receives an *ARQC*.
- If Offline Data Authentication is required to be performed, it is performed successfully.
- The online connection cannot be completed.

then If all of the following conditions are true:

- The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b
- AIP Byte 2 bit 7 and byte 2 bit 6 are both set to 0b
- The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1
else the terminal shall decline the transaction, returning control to Entry Point as defined in 13.3.

11.2.6.3 Terminal supports Delayed Authorisations (not applicable to mPOS-C, mPOS-CSP)

The reader shall send a User Interface Request Message with the following parameters set:

- **Message Identifier:** '17' ("Card read OK. Please remove card")
- **Status:** Card Read Successfully
- **Hold Time:** 300ms
- **Language Preference:** If returned by the card during Application Selection

Requirements – Card Action Analysis Return *ARQC* – EMV Mode (partial online) at Delayed Authorisations Terminal

11.2.6.3.1 **If** all of the following are true:

- The *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b.
- The terminal sends the first GENERATE AC to a card.
- The terminal receives an *ARQC*.
- Offline Data Authentication is performed successfully.

then the terminal shall approve the transaction, returning control to Entry Point as defined in 13.2.

12 Online Processing

12.1 Overview

If the card or reader determines that the transaction requires an online authorisation, and if the reader has online capability, the reader transmits an online authorisation message to the Acquirer. This may be immediately or at a later time if the reader is configured to perform Delayed Authorisations.

Terminal must securely keep the data used in the authorization request until a final outcome is reached, as described in section 13, in case the Issuer indicates in the authorization response that Online PIN should be requested – see section 12.2.2. After the final outcome is reached, the terminal must purge the data. Terminals must follow the local market regulatory requirements on how to store and when to purge sensitive data.

Online Processing, as defined in *[EMV 4.3 Book 3]*, section 10.9, and *[EMV 4.3 Book 4]*, section 6.3.8, allows the Issuer's host system to authenticate and decision the transactions using the Issuer's host-based risk management parameters. An online authorisation request is initiated by the response from the first GENERATE AC command being an *ARQC*. The Issuer must return an ARC in the Authorisation Response as defined in Table 12-2.

Requirements – Online Processing	
12.1.1	**If** the card requests online authorisation, **and** the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 0b, **then** the terminal shall attempt to send the transaction online for authorisation
12.1.2	**If** the card requests online authorisation, **and** the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b, **then** the terminal shall accept the transaction locally, **and** send the transaction online for authorisation at a later time.

12.2 Processing Requirements

12.2.1 [Section removed]

The content in this section has been purposely removed from this specification, as Expresspay Magstripe Mode is no longer supported.

12.2.2 Partial Online Processing

At this stage in the transaction the card and reader interaction is complete, and the card may be removed. If a reader is not performing a delayed authorisation transaction, then it carries out the following process after it formats a User Interface Request Message to send the "Remove card" prompt (as described in Section 11.2.6, *Card Returns an ARQC*):

- **If** the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 0b, **and** is able to go online,
  then the kernel returns control to Entry Point to send the transaction online, passing a Final Outcome of ***Online Request*** with the parameter settings defined in Table 12-1. The reader processes the final outcome and formats the authorisation request to be transmitted to the Acquirer for online authorisation. The reader determines the transaction disposition based on the authorisation response indication – guidelines can be found in *Book A*, section 5.5.6. The final transaction outcome must be determined by the ARC returned by the Issuer as defined in Table 12-2 and requirement 12.2.2.1,
  else if the reader is unable to go online,
  then:

  If all of the following conditions are true:

  - The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b
  - AIP byte 2 bit 7 and byte 2 bit 6 are both set to 0b
  - The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

  then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1
  else the transaction must be declined as per section 13.3.

Table 12-1: Partial Online - Parameter Settings

Start	D
Online Response Data	Any
CVM	As determined in section 8.2, Cardholder Verification – Processing Requirements
UI Request on Outcome Present	Yes • **Message Identifier:** '1B' ("Authorising, Please Wait") • **Status:** Processing • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	**No**
Data Record Present	Yes
Discretionary Data Present	Conditional[1]
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

[1] If the configuration data element *Discretionary Data Object List* is present, the data elements in the list, if available, will be added to the Discretionary Data.

Table 12-2: Authorisation Response Code (ARC) Values

Value	Meaning
00, 08, 10, 11	Reader must interpret this code as "Issuer approved transaction"
12	Terminal must treat this code as meaning "Try another interface if supported, decline otherwise"
13	Terminal must treat this code as meaning "Request Online PIN if supported, try another interface otherwise"
Other values	Reader must interpret this code as "Issuer has declined the transaction"

Requirements – Online Response Processing

12.2.2.1 **If** the *ARC* indicates an approval,
then the reader continues with section 13.2, Transaction Completion – Transaction Approved
else If the *ARC* indicates "Try another interface if supported, decline otherwise",
then If all of the following conditions are true:

- The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b
- AIP byte 2 bit 7 and byte 2 bit 6 are both set to 0b
- The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1
else the transaction must be declined as per section 13.3

Table 12-3: Request Online PIN - Parameter Settings

Start	D
Online Response Data	Any
CVM	Online PIN
UI Request on Outcome Present	Yes • **Message Identifier:** '09' ("Please Enter Your PIN") • **Status:** Processing • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	**No**
Data Record Present	Yes
Discretionary Data Present	Conditional[1]
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

[1] If the configuration data element *Discretionary Data Object List* is present, the data elements in the list, if available, will be added to the Discretionary Data.

Requirements – Online Response Processing

12.2.2.2 **If** the ARC indicates 'Request Online PIN'

then If the following conditions are True:

- Enhanced Contactless Reader Capabilities Byte 2 bit 7 (Online PIN supported) is set to 1b
- The Card CVM List – the same used in CVM List Processing, Section 8.2 – contains at least one CV Rule entry where the CVM coded in the first byte of the CV Rule is equal to 'Enciphered PIN verified online'

then the kernel returns control to Entry Point, passing a Final Outcome of ***Request Online PIN*** and parameters set as per Table 12-3. When the Online PIN is captured successfully, the Terminal must send the transaction online for authorization as defined in section 12.2, containing the captured Online PIN and the same authorization data from the transaction that initiated the authorization request. Otherwise, the transaction must be declined as per section 13.3.

else If all of the following conditions are true:

- The *Enhanced Contactless Reader Capabilities* Byte 1 Bit 8 (Contact mode supported) is set to 1b
- AIP byte 2 bit 7 and byte 2 bit 6 are both set to 0b
- The *Card Interface and Payment Capabilities* is not present or the *Card Interface and Payment Capabilities* Byte 1 Bit 6 (Contact EMV Interface Supported) is set to 1b

then the kernel returns control to Entry Point, passing a Final Outcome of ***Try Another Interface*** and parameters set as per Table 11-1
else the transaction must be declined as per section 13.3

else for any other *ARC* values the transaction must be declined as per section 13.3.

12.2.3 Delayed Authorisation Processing (Not applicable to mPOS-C, mPOS-CSP)

At this stage in the transaction the card and reader interaction is complete, and the card may be removed. A reader that is performing a delayed authorisation transaction carries out the following process after it formats a User Interface Request Message to send the "Remove card" prompt (as described in Section 11.2.6.3, *Terminal Supports Delayed Authorisation*):

- **If** the *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b, **then** the kernel returns control to Entry Point to complete the transaction as per Section 13.2, *Transaction Approved*. The authorisation request is transmitted to the Acquirer for online authorisation at a later time.

Requirements – Delayed Authorisation Processing

12.2.3.1 **If** *Enhanced Contactless Reader Capabilities* Byte 4 Bit 7 is set to 1b

then the kernel returns control to Entry Point to complete the transaction as per Section 13.2, *Transaction Approved*. The authorisation request is transmitted to the Acquirer for online authorisation at a later time.

13 Transaction Completion

13.1 Overview

Once the transaction has either been approved or declined, the card's role in the transaction is complete. The reader will then complete the transaction with one of the Final Outcomes indicated below.

13.2 Transaction Approved

If the transaction is approved then the kernel returns control to Entry Point, passing a Final Outcome of ***Approved*** with the following parameter settings:

Start	N/A
Online Response Data	N/A
CVM	As determined in section 8.2, Cardholder Verification – Processing Requirements
UI Request on Outcome Present	Yes • **Message Identifier:** '03' ("Approved") • **State:** Card Read Successfully • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	No
Data Record Present	Yes
Discretionary Data Present	Conditional[1]
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

[1] If the configuration data element *Discretionary Data Object List* is present, the data elements in the list, if available, will be added to the Discretionary Data.

If an approved transaction requires a cardholder signature then the kernel returns control to Entry Point, passing a Final Outcome of Approved Please Sign with the following parameter settings:

Start	N/A
Online Response Data	N/A
CVM	As determined in section 8.2, Cardholder Verification – Processing Requirements
UI Request on Outcome Present	Yes **Message Identifier:** '1A' (“Approved Please Sign”) **State:** Card Read Successfully **Hold Time:** 0 **Language Preference**
UI Request on Restart Present	No
Data Record Present	Yes
Discretionary Data Present	Conditional[1]
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

[1] If the configuration data element *Discretionary Data Object List* is present, the data elements in the list, if available, will be added to the Discretionary Data.

13.3 Transaction Declined

If the transaction is declined, then the kernel returns control to Entry Point, passing a Final Outcome of ***Declined*** with the following parameter settings:

Start	N/A
Online Response Data	N/A
CVM	N/A
UI Request on Outcome Present	Yes • **Message Identifier:** '07' (“Not Authorised”) • **Status:** Card Read Successfully • **Hold Time:** 0 • **Language Preference**
UI Request on Restart Present	No
Data Record Present	Optional
Discretionary Data Present	Conditional[1]
Alternate Interface Preference	N/A
Receipt	N/A
Field Off Request	N/A
Removal Timeout	Zero

[1] If the configuration data element *Discretionary Data Object List* is present, the data elements in the list, if available, will be added to the Discretionary Data.

14 Membership-Related Data Processing

14.1 Overview

The Card Issuer may require unique Membership Reference Number or Membership Product or Scheme information be stored on the Card for processing at a reader that supports such a Membership scheme. To support this functionality the Card may hold ***optional*** data elements that provide values to support such Membership Related Data Processing.

During the Read Application Data phase of a transaction the reader may recover optional tags from the Card associated with a Membership Scheme by use of the READ RECORD command, and reading the data elements from the data files that have been personalised on the Card during initial Card Issuance.

14.2 Data

The following data elements held on the Chip, are used by the reader:

- ***Membership Product Identifier*** **(Tag '9F5A')** - The presence of the *Membership Product Identifier* on the Card is optional. The value of the field indicates which product (or 'scheme') is supported.
- ***Product Membership Number*** **(Tag '9F5B')** - The presence of the *Product Membership Number* on the Card is optional. The field is dependent on a valid *Membership Product Identifier* being available. The value of the field, if present, indicates the membership number associated with the product.

The *Membership Product Identifier* indicates that the Card is part of a membership scheme. The *Product Membership Number* optionally indicates the Cardholder's membership number for the membership scheme. Only one *Membership Product Identifier* and *Product Membership Number* pair may exist per Card.

14.3 Processing Requirements

The reader will read the membership details from the Card during Read Application Data processing using the READ RECORD commands. If the reader supports a membership scheme, then it may use the data in the *Membership Product Identifier* to identify whether the Card is in a scheme that the reader supports. If the reader requires a membership number associated with that scheme then the reader will use the *Product Membership Number* retrieved from the Card. The reader can then utilise these values to perform any Membership processing it requires. Any Membership Related Data processing must take place after the Read Application Data phase of the transaction and must not negatively impact the remainder of the payment transaction flow, processing or performance.

The functionality to be performed as part of Membership Related Data is outside the scope of this specification.

Requirements – Membership-Related Data	
14.3.1	**If** the reader supports the use of Membership Data, **then** the reader shall make use of the Membership Data read during Read Application Data processing if the data is available.
14.3.2	**If** the reader supports the use of Membership Data, **then** the reader shall not impact the transaction processing or performance.

Annex A Kernel 4 Data Elements

This annex defines the data elements used for Kernel 4 processing.

- Section A.1 lists all data elements.
- Section A.2 lists transaction data.
- Section A.3 lists the minimum data elements required for an EMV mode data record.
- Section A.4 lists the minimum data elements required for authorisation and Clearing and Settlement.

A.1 Data Elements

Table 14-1: Data Elements

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Amount, Authorised	Authorised amount of the transaction (excluding adjustments).	Terminal	n 12	'9F02'	6		A required data element for an transaction.
Amount, Other	Secondary amount associated with the transaction representing a cashback amount	Terminal	n 12	'9F03'	6		A required data element for an transaction.
Application Cryptogram (AC)	AC computed by the card during a transaction.	Card	b 64	'9F26'	8	Can be: • ARQC • AAC • TC	This data element is returned to the Terminal in a valid response to the 1st GENERATE AC command.
Application Currency Code	Indicates the currency in which the account is managed.	Card	n 3	'9F42'	2	Coded according to *[ISO 4217]*	May be used by a Card for offline velocity checks and available to the Terminal via the READ RECORD command.
Application Definition File (ADF) Name	Identifies the name of the DF as associated with an application. See Application Identifier (AID). Another name for the AID.	Card				See Application Identifier (AID)	Terminal must terminate the transaction if this is missing.
Application Discretionary Data	Issuer-specified data relating to the Card application.	Card	B 8 - 256	'9F05'	1-32		A data element available to the Terminal via the READ RECORD command.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Application Dual Currency Code	Indicates the secondary currency in which the account is managed.	Card	n 3	'9F50'	2	Coded according to *[ISO 4217]*	May be used by a Card for offline velocity checks and available to the Terminal via the READ RECORD command.
Application Effective Date	Date from which the card application may be used.	Card	n 6 YYMMDD	'5F25'	3		A required data element available to the Terminal via the READ RECORD command and checked, if present, during Processing Restrictions.
Application Elementary File (AEF) Data Template	Indicates the record template of a record containing data elements. Templates are used to define TLV structures that contain other data elements.	Card	Var	'70'	Var.		If the AEF is incorrectly formatted the Terminal must terminate the transaction.
Application Expiration Date	Date after which the card application expires.	Card	n 6 YYMMDD	'5F24'	3		A required data element available to the Terminal via the READ RECORD command. Terminal must terminate the transaction if this data is missing.
Application File Locator (AFL)	Indicates the location (SFI, range of records) of the AEFs related to a given application.	Card	var.	'94'	var. up to 64		A data element available to the Terminal via valid response to GET PROCESSING OPTIONS. Terminal must terminate the transaction if this data is missing.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Application Interchange Profile (*AIP*)	Indicates the capabilities of the card to support specific functions in the application.	Card	b 16	'82'	2		A data element available to the Terminal via valid response to GET PROCESSING OPTIONS. Terminal must terminate the transaction if this data is missing.
Application Label	Mnemonic associated with the AID.	Card	ans 1-16 (special character limited to space)	'50'	1-16	Used in application selection.	A data element available to the Terminal via a SELECT command, providing a "friendly" name for an application.
Application Primary Account Number (PAN)	Card number.	Card	var. up to cn 19	'5A'	var. up to 10	.	A mandatory data object made available to the reader via the READ RECORD command.
Application Primary Account Number (PAN) Sequence Number	Identifies and differentiates cards (applications) with the same PAN.	Card	n 2	'5F34'	1	Due to limitations set by Kernel 4 mag-stripe mode, this must be set to 00 or be otherwise predictable by the Issuer	An optional data object made available to the reader via the READ RECORD.
Application Priority Indicator	Indicates the priority of a given application or group of applications in a directory.	Card	b 8	'87'	1		Optional data element returned in response to a SELECT command.
Application Public Key Certificate	Application Public Key Certificate used during CDA.	Card	b	'9F46'	var. up to 128		Used for CDA.
Application Public Key Exponent	Exponent of Application Public Key	Card	b	'9F47'	1 or 3		Used for CDA.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Application Public Key Remainder	Remaining digits of Application Public Key.	Card	b	'9F48'	var.	See *[EMV 4.3 Book 2]*, section 6.1.	Used for CDA.
Application Specification Version	Identify which version of the Card Specification the Card Application was developed to.	Card	an	'9F77'	Var up to 6		A data element available to the Terminal via the READ RECORD command.
Application Selection Registered Proprietary Data	This contains proprietary data related to the services offered by the payment application. It is present if the application is being personalized for a market that requires its use	Card	b	'9F0A'	Var	Coded according to EMVCo	The Application Selection Registered Proprietary Data is an optional primitive data object that may be returned by the ICC during Application Selection. It may be present in any Directory Entry ('tag 61') within the FCI of the PPSE, AND/OR in the FCI Issuer Directory Discretionary data (tag 'BF0C') within the FCI of any ADF.
Application Template	Template containing one or more data objects relevant to an application directory entry according to *[ISO 7816-5]*.	Card	b	'61'	var. up to 252		Templates are used to define TLV structures that contain other data elements.
Application Transaction Counter (ATC)	Counter maintained by the application in the card.	Card	b 16	'9F36'	2	Initial value is zero. It is incremented by 1 each time a transaction is performed.	Use is **optional** for EMV Mode

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Application Usage Control (AUC)	Indicates Issuer-specified restrictions on the geographic usage and services allowed for the card application.	Card	b 16	'9F07'	2		A data element available to the Terminal via the READ RECORD command and checked if present, during Processing Restrictions.
Application Version Number	Version number assigned by the Issuer for the application.	Card	b 16	'9F08'	2	For this specification the Application Version Number must always be '0001'.	An optional data object made available to the reader via the READ RECORD command.
Application Version Number	Version number of a particular application supported by the Terminal.	Terminal	b 16	'9F09'	2		A configuration data element stored in the Terminal that defines the application version number(s) it supports for each application.
Authorisation Response Code (ARC)	Data element generated by the Issuer Host System indicating the disposition of the transaction.	Issuer	an 2	'8A'	2	Codes generated as indicated in *[ISO 8583]*.	The value received from the Issuer that indicates if the transaction is to be approved, declined or if the terminal should request another interface.
Authorisation Response Cryptogram (ARPC)	A cryptogram generated by the Issuer Host System during an online transaction	Issuer	b 64	—	8		A cryptogram generated by the Issuer Host System and included in the Issuer Authentication Data to be returned to the reader and sent to the chip card in the response to an online transaction. Refer to Issuer Authentication Data in this table.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Card Interface and Payment Capabilities	Data element indicating: • Other interfaces supported by the device. • Issuer-specified restrictions on usage at delayed authorisation terminals.	Card	b 16	'9F70'	2	See Table 5-1.	An optional data object made available to the reader via the READ RECORD command.
Card Risk Management Data Object List 1 (CDOL1)	List of data objects (tag and length) to be passed to the card application with the first GENERATE AC command.	Card	b	'8C'	var. up to 252		A mandatory data object made available to the reader via the READ RECORD command.
Card Risk Management Data Object List 2 (CDOL2)	List of data elements (tag and length) to be passed to the card application with the second GENERATE AC command.	Card	b	'8D'	var. up to 252		An optional data object made available to the reader via the READ RECORD command.
Cardholder Name	Indicates Cardholder Name according to *[ISO 7813]*.	Card	ans 2-26	'5F20'	2-26	Due to privacy concerns, this data element should contain a static value different from the actual Cardmember Name (e.g. ''Valued Customer''.) Maximum length of this data field should be 23 bytes.	Use is ***optional*** for EMV Mode

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Cardholder Name - Extended	Indicates the whole Cardholder Name when greater than 26 characters.	Card	Ans 27 – 45	‘9F0B’	27 – 45	Due to privacy concerns, this data element should contain a static value different from the actual Cardmember Name (e.g. ‘‘Valued Customer’’.) Maximum length of this data field should be 23 bytes.	A data element available to the Terminal via the READ RECORD command.
Cardholder Verification Method (CVM) List	Identifies a prioritised list of methods of verification of the cardholder supported by the card application.	Card	b	'8E'	var. up to 32		An optional data object made available to the reader via the READ RECORD command.
Cardholder Verification Results (CVR)	Proprietary data element indicating the exception conditions that occurred during Card Risk Management.	Card	b 32	—	4		Transmitted to the reader in Issuer Application Data during GENERATE AC processing.
Certification Authority Public Key	Payment system public key used for offline data authentication.	Terminal	Per payment system specifi-cations	—	Per pay-ment system specifi-cations	Value generated by the payment system CA and loaded to terminal by acquirer.	Terminals must be capable of holding a minimum of six CAPKs per AID

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Certification Authority Public Key Checksum	A check value calculated on the concatenation of the following parts of the Certification Authority Public Key (RID, Certification Authority Public Key Index, Certification Authority Public Key Modulus, Certification Authority Public Key Exponent) using SHA-1.	Terminal	b		20	Var.	Used for Offline Data Authentication (ODA).
Certification Authority Public Key Exponent	Value of the exponent part of the Certification Authority Public Key.	Terminal	B		1 or 3	As defined by Issuer	Used for Offline Data Authentication (ODA).
Certification Authority Public Key Index	Identifies the certification authority's public key in conjunction with the Registered Identification Provider (RID) for use in static data authentication.	Card	b 8	'8F'	1	Values assigned by the Payment System.	Used for Offline Data Authentication (ODA).
Certification Authority Public Key Modulus	Value of the Modulus part of the Certification Authority Public Key.	Terminal	B		Up to 248	As defined by Issuer	Used for Offline Data Authentication (ODA)
Contactless Reader Capabilities	A proprietary data element with bits 8, 7, and 4 only used to indicate a terminal's capability to support Kernel 4 mag-stripe or EMV contactless. This data element is OR'd with *Terminal Type*, Tag '9F35', resulting in a modified Tag '9F35', which is passed to the card when requested.	Terminal	b	'9F6D'	1	Refer to Table 4-2 for specific values	Configured in a reader compliant with Kernel 4 and passed to the card via a modified *Terminal Type*, Tag '9F35' when Tag '9F35' is present in the PDOL of the card

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Cryptogram Information Data (CID)	Indicates the type of cryptogram (TC, ARQC or AAC) returned by the card and the actions to be performed by the terminal.	Card	b 8	'9F27'	1	As defined in [*EMV4.3 Book 1*] Table 14: Coding of Cryptogram Information Data	This data element is returned to the Terminal in a valid response to the 1st GENERATE AC command.
Cryptogram Version Number	Proprietary data element indicating the version of the TC, AAC/ARQC algorithm used by the application.	Card	b 8	Issuer Specific	1	Value = '01' or '02' for this specification	Data element held within CDOL. Transmitted in the Issuer Application Data.
Discretionary Data Object List	Configuration data used to identify which data elements will be added, if available, to the Discretionary Data Outcome parameter for the following Outcomes: Approved, Declined and Online Request.	Terminal	b	—	var. up to 252		
Enhanced Contactless Reader Capabilities	Proprietary Data Element for managing Contactless transactions and includes Contactless terminal capabilities (static) and contactless Mobile transaction (dynamic data) around CVM	Terminal	b 32	'9F6E'	4		Configured in the Terminal and passed to the Card during GET PROCESING OPTIONS in response to PDOL
File Control Information (FCI) Proprietary Template	Identifies the data elements proprietary to the [*EMV4.3 Book 1*] in the FCI Template.	Card	var	'A5'	Var	As defined in [*EMV4.3 Book 1]*	Data element returned in response to a SELECT command.
File Control Information (FCI) Template	Identifies the FCI template.	Card	Var	'6F'	Var up to 64		Data element returned in response to a SELECT command.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Form Factor	Identifies the form factor of the Card.	Card	n 6	‘9F67’	3		A data element available to the Terminal via the READ RECORD command
ICC Dynamic Number	Time-variant number generated by the Card to be captured by the Terminal.	Card	b	‘9F4C	8		A transient data element generated by the Card during Combined Dynamic Data Authentication. Note: An 8 byte number is generated for this purpose.
Issuer Action Code – Default	Specifies conditions that cause a transaction to be declined if it might have been approved online, but the reader is unable to process the transaction online.	Card	b 40	'9F0D'	5		A data element available to the Terminal via the READ RECORD command and used during Terminal Action Analysis to modify the Terminal Action Code setting.
Issuer Action Code – Denial	Specifies conditions that cause the decline of a transaction without attempting to go online.	Card	b 40	'9F0E'	5		A data element available to the Terminal via the READ RECORD command and used during Terminal Action Analysis to modify the Terminal Action Code setting.
Issuer Action Code – Online	Specifies conditions that cause a transaction to be transmitted online.	Card	b 40	'9F0F'	5		A data element available to the Terminal via the READ RECORD command and used during Terminal Action Analysis to modify the Terminal Action Code setting.
Issuer Application Data	Contains proprietary application data for transmission to the Issuer in all transaction messages.	Card	b	'9F10'	var. 32		A data element the Terminal passes on to the Issuer but not otherwise used by the Terminal.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Issuer Authentication Data	Issuer data transmitted to card for online Issuer authentication.	Issuer	b 64-128	'91'	var. up to 16	The Issuer Authentication Data consists of the following data: • First 8 bytes = ARPC • Last 2 bytes = Authorisation Response Code	This data is transmitted to the card by the reader in the EXTERNAL AUTHENTICATE command.
Issuer Code Index Table	Indicates the code table to be used for displaying the Application Preferred Name at the Terminal.	Card	n 2	'9F11'	1	According to *[ISO 8859]*	A data element returned in response to a SELECT command
Issuer Country Code	Indicates the country of the Issuer, represented according to *[ISO 3166]*.	Card	n 3	'5F28'	2	According to *[ISO 3166]*	A data element available to the Terminal via the READ RECORD command and used if present, during Processing Restrictions.
Issuer Public Key Certificate	Issuer's public key certified by a certification authority for use in static data authentication.	Card	b 512-1984	'90'	var. 64-248		Used for Offline Data Authentication (ODA)
Issuer Public Key Exponent	Issuer-specified data to be used with the Issuer's public key algorithm for static data authentication.	Card	b	'9F32'	1 or 3		Used for Offline Data Authentication (ODA)
Issuer Public Key Remainder	Remaining digits of the Issuer's public key to be hashed.	Card	b	'92'	var.	See *[EMV 4.3 Book 2]*, section 6.1.	Used for Offline Data Authentication (ODA)

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Kernel Identifier	Indicates the card's preference for the kernel on which the contactless application can be processed.	Card	b	'9F2A'	1	'04' Identifies the EMV Entry Point kernel as specified in this specification.	A data element returned in response to a SELECT command for the PPSE.
Language Preference	Table of up to four language codes indicating the preferred language for Terminal messages to be displayed to the Cardmember.	Card	an 2	'5F2D'	2-8	*[ISO 639]* codes alpha-numeric codes	A data element returned in response to an APPLICATION SELECT command.
Last 4 Digits of PAN	Represents the last four digits of the underlying PAN affiliated with the Payment Token. Its purpose is to support customer service, for example digital wallet display or receipt creation.	Card	n 4	'9F25'	2	The last four digits of the funding PAN before tokenization.	If present and made available to the terminal via the READ RECORD command, the usage of this data element is at the discretion of the acquirer.
Membership Product Identifier	A product identifier for the membership scheme.	Card	an	'9F5A'	Var up to 8		A data element used by the Terminal to determine whether the card is in a supported membership scheme.
Merchant Category Code	Classifies the type of business being done by the merchant, represented according to ISO 8583:1993 for Card Acceptor Business Code	Terminal	n 4	'9F15'	2		This data element is requested by particular card applications (e.g. HCE wallet) as part of the PDOL for certain types of transaction (e.g. Transit). The Terminal passes on the respective value to the card application as part of the GPO command.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Merchant Name and Location	Indicates the name and location of the merchant	Terminal	ans	‘9F4E’	Var.		This data element is requested by particular card applications (e.g. HCE wallet) as part of the PDOL for certain types of transaction (e.g. Transit). The Terminal passes on the respective value to the card application as part of the GPO command.
Mobile CVM Results	Proprietary data element returned from the Card in the GET PROCESSING OPTIONS response, indicating the status of Mobile CVM entry.	Card	b 32	‘9F71’	3	Byte 1: CVM Performed '01' = Performed '3F' = Not performed Byte 2: '03' Byte 3: CVM Result '00' = Unknown '01' = Failed '02' = Successful '03' = Blocked	Used during Cardholder Verification.
Offline Capability	Offline capable terminals are capable of performing offline contactless transactions.	Terminal	Implementation specific	—	Implementation specific		
Online Capability (Partial)	Terminals that are Online Capable must be capable of performing Partial Online contactless transactions.	Terminal	Implementation specific	—	Implementation specific		

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Payment Account Reference (PAR)	Uniquely identifies the underlying cardholder account to which a payment token is associated, as defined in [PTOKS2.0]	Card	an	‘9F24’	29	Coded according to [PTOKS2.0]	The usage of this data element by the Terminal is at the discretion of the acquirer.
Point of Service Data Code	This is a series of codes that shows the capability, security data, and conditions of a terminal when a transaction occurs at the point of service.	Terminal	an	—	12	Payment System Network defined	This value is set by the POS System and not by the Kernel.
Processing Options Data Object List (PDOL)	Contains a list of reader resident data objects (tags and lengths) needed by the ICC in processing the GET PROCESSING OPTIONS command.	Card	b	'9F38'	var.		A required data element for EMV Mode. When in EMV Mode, the Terminal must terminate the transaction if this data is missing.
Product Membership Number	A unique number to identify the cardholder as part of the scheme.	Card	an	‘9F5B’	Var up to 32		A data element available to the Terminal via the READ RECORD command and whose presence depends on tag ‘9F5A’ being present.
Reader Contactless Floor Limit	Indicates the contactless floor limit.	Entry Point	n 12	—	6		
Reader Contactless Transaction Limit	Indicates the limit for which contactless transactions can be conducted.	Entry Point	n 12	—	6		
Reader CVM Required Limit	Indicates the limit for which CVM is required.	Terminal	n 12	—	—	—	

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Registered Application Provider Identifier (RID)	First 5 bytes of an AID registered as owned by the Card Scheme or Card Issuer.	Terminal	b	-	5		A configuration data element stored in the Terminal.
Removal Timeout	Indicates whether a timeout function should be started with the time specified.	Terminal	Implementation specific	—	Implementation specific		
Service Code	Contains the Service Code elements.	Card	n 3	'5F30'	2	Should be coded according to *[ISO 7813]*.	An optional data element retrievable via the READ RECORD command.
Short File Identifier (SFI)	Identifies the SFI to be used in the commands related to a given AEF.	Card	b 8	'88'	1	Values are: - 1-10: Governed by joint payment systems - 11-20: Payment System specific - 21-30: Issuer Specific	Contained in a valid response to the SELECT command, SFIs are pointers to the records readable during READ APPLICATION DATA.
Signed Application Data	Digital signature on critical application parameters that is used in static data authentication.	Card	b 512-1984	'93'	64-248		
Static Data Authentication Tag List	List of tags of primitive data objects defined in *[EMV 4.3 Book 3]* whose value fields are to be included in the signed static or dynamic application data.	Card	—	'9F4A'	var.	Tag '82' (Application Interchange Profile)	A data element available to the Terminal via the READ RECORD command.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Status Check Support	This flag indicates whether the reader is able to use a single unit of currency check to determine whether the card is genuine and active.	Entry Point	Implementation specific	Implementation specific	Implementation specific		
Terminal Action Code – Default	Specifies the Acquirer's conditions that cause a transaction to be rejected if it might have been approved online, but the reader is unable to process the transaction online.	Terminal	b 40	—	5		A configuration data element stored in the Terminal, which, depending on the terminal configuration, may be used along with Issuer Action Codes to decide on action to be taken during Terminal Action Analysis.
Terminal Action Code – Denial	Specifies the Acquirer's conditions that cause a transaction to be denied without an attempt to go online.	Terminal	b 40	—	5		A configuration data element stored in the Terminal, which, depending on the terminal configuration, may be used along with Issuer Action Codes to decide on action to be taken during Terminal Action Analysis.
Terminal Action Code – Online	Specifies the Acquirer's conditions that cause a transaction to be transmitted online.	Terminal	b 40	—	5		A configuration data element stored in the Terminal, which, depending on the terminal configuration, may be used along with Issuer Action Codes to decide on action to be taken during Terminal Action Analysis.
Terminal Capabilities	Indicates the card data input, CVM, and security capabilities of the terminal.	Terminal	b 24	'9F33'	3	Defined in *[EMV 4.3 Book 4]*, Annex A2.	A configuration data element stored in the Terminal.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Terminal Country Code	Indicates the country of the Terminal represented according to [ISO3166].	Terminal	n 3	'9F1A'	2	According to *[ISO 3166]*.	A configuration data element stored in the Terminal that may be used to populate a CDOL.
Terminal Floor Limit	Indicates the floor limit in the Terminal.	Entry Point	b 32	'9F1B'	4		
Terminal Type	Indicates the environment of the terminal, its communication capability, and its operational control.	Terminal	n 2	'9F35'	1	Defined in [*EMV 4.3 Book 3*], Annex A1	A configuration data element stored in the Terminal that may be used to populate a CDOL.
Terminal Verification Results	Status of the different functions as seen from the terminal.	Terminal	b 40	'95'	5		A dynamic data element maintained by the terminal per transaction that may be used to populate a CDOL.
Token Requestor ID (TRID)	Uniquely identifies the pairing of the Token Requestor with the Token Doman, as defined in [PTOKS2.0]	Card	n 11	‘9F19’	6	Codes according to [PKOKS2.0]	The usage of this data element by the Terminal is at the discretion of the acquirer
Track 2 Equivalent Data	Image of magnetic stripe Track 2. (For Kernel 4, Track 2 Equivalent Data may not be an exact image of magnetic stripe Track 2.)	Card	Cn	'57'	var. up to 19	According to *[ISO 7813]*	
Transaction Currency Code	Indicates the currency code of the transaction.	Terminal	n 3	'5F2A'	2	According to *[ISO 4217]*	A configuration data element stored in the Terminal that may be used to populate a CDOL.
Transaction Date	Local date that the transaction was authorised.	Terminal	n 6	'9A'	3	As YYMMDD	A configuration data element stored in the Terminal that may be used to populate a CDOL.

Name	Description	Source	Format	Tag	Length	Values	Location/Usage
Transaction Type	Indicates the type of financial transaction, represented by the first two digits of *[ISO 8583:1987]* Processing Code. The actual values to be used for the Transaction Type data element are defined by the relevant payment system.	Terminal or reader	n 2	'9C'	1		A configuration data element stored in the Terminal that may be used to populate a CDOL.
Unpredictable Number	Value to provide variability and uniqueness to the generation of the AC.	Terminal	b 32	'9F37'	4		A required data element which the Terminal passes to the Card application for uses within the GENERATE AC process.
Unpredictable Number Range	Specifies the range in which the unpredictable number must be generated in for contactless mag-stripe mode.	Terminal		—			The default minimum range is 0 to 60. Note that the number range is inclusive, so a range of 0 to 60 should be capable of generating 61 integer numbers in the range 0 to 60.
Zero Amount Allowed	This flag indicates whether a transaction with a zero amount is permitted.	Entry Point	Implementation specific	Implementation specific	Implementation specific		

A.2 Transaction Data

Table 14-2: Transaction Data

Data Object	Presence	Tag	Source
Amount, Authorised	M	'9F02'	Terminal
Amount, Other	M	'9F03'	Terminal
Application Effective Date	M	'5F25'	Card
Application PAN Sequence Number	M	'5F34'	Card
Application Primary Account Number (PAN)	M	'5A'	Card
Application Version Number	M	'9F08'	Card
Card Risk Management Data Object List 1 (CDOL1)	M	'8C'	Card
Cardholder Name	M	'5F20'	Card
Issuer Action Code – Default	M	'9F0D'	Card
Issuer Action Code – Denial	M	'9F0E'	Card
Issuer Action Code – Online	M	'9F0F'	Card
Issuer Country Code	M	'5F28'	Card
Terminal Country Code	M	'9F1A'	Terminal
Terminal Verification Results	M	'95'	
Track 2 Equivalent Data	M	'57'	Card
Transaction Currency Code	M	'5F2A'	Reader (configured) or Terminal (dynamic)
Transaction Date	M	'9A'	
Transaction Type	M	'9C'	Terminal or Reader depending on implementation
Unpredictable Number	M	'9F37'	Entry Point

A.3 Read Record Data

All data supplied to the reader for use in the processing of a financial transaction that is not dynamically maintained by the card will be held in file records and presented to the reader during the appropriate READ RECORD commands.

Table 14-3: Mandatory Read Record Data Objects

Data Object	Presence	Comments
Application Primary Account Number	M	The account number associated with this application.
Application Expiration Date	M	Date after which the card application expires.
Card Risk Management Data Object List 1 (CDOL1)	M	Used during GENERATE AC

A.4 Data Records and Discretionary Data

The following tables list the minimum data elements required for authorisation. Table 14-4 lists data elements for EMV mode. For further information regarding these elements, please refer to the Payment Scheme Network Specifications.

Data elements present in the *Discretionary Data Object List* Configuration Data will, if available, be added to the Discretionary Data Outcome parameter for the following Outcomes: Approved, Declined, Online Request and Request Online PIN. If the Configuration Parameter is not present or empty, the Discretionary Data outcome Parameter will consequently be empty.

Table 14-4: Data Record for EMV Mode (Minimum Data Elements)

Data Object	Auth Message	Clearing Message
Amount, Authorised	M	M
Amount, Other	M	M
Application Cryptogram	M	M
Application Interchange Profile *(*AIP*)*	M	M
Application PAN Sequence Number	M	M
Application Transaction Counter (ATC)	M	M
Cryptogram Information Data	M	M
Issuer Application Data	M	M
Point of Service Data Code[3]	M	M
Terminal Country Code	M	M
Terminal Verification Results (TVR)	M	M
Track 2 Equivalent Data	M	—
Transaction Currency Code	M	M
Transaction Date	M	M
Transaction Type	M	M
Unpredictable Number	M	M

[3] This Data Object is provided by the POS system and not by the kernel.

Annex B Configuration Data

This annex lists the data that the terminal and Entry Point shall make available to the kernel.

B.1 Configuration Data Provided by the Terminal

Table 14-5 lists the static configuration data per AID that the terminal shall make available to the kernel.

Table 14-5: Kernel Configuration Data

Name	Tag	Description
Application Version Number	'9F08'	The version number assigned by the payment scheme for the kernel application.
Cardholder Verification Method (CVM) Capability	—	Defines the CVM capabilities of the terminal (e.g. Signature, Enciphered Online PIN, No CVM Support).
Certification Authority Public Keys	—	A terminal shall be capable of holding six CAPKs.
Contactless Reader Capabilities	'9F6D'	A proprietary data element with bits 8, 7, and 4 only used to indicate a terminal's capability to support Kernel 4 contactless mag-stripe mode or contactless EMV mode.
Discretionary Data Object List	—	Data Object List (DOL) containing a list of data elements to be added to the Discretionary Data Outcome Parameter in case of Approved and Online Request Outcomes. As a DOL, the list shall contain Tag and Length for each data element present.
Enhanced Contactless Reader Capabilities	'9F6E'	Proprietary Data Element for managing Contactless transactions and includes Contactless terminal capabilities (static) and contactless Mobile transaction (dynamic data) around CVM

Name	Tag	Description
Offline Capability	—	Offline capable terminals are capable of performing offline contactless transactions.
Online Capability (Partial)	—	Online capable terminals are capable of performing Partial Online contactless transactions.
Terminal Action Codes	—	A set of *Terminal Action Codes* (Online, Decline, and Default) shall be available.
Terminal Exception File	—	A file of account numbers to be used by the terminal, for which it has been predetermined that there shall be an authorisation decision of denial.
Terminal Type	'9F35'	Indicates the environment of the terminal, its communication capability, and its operational control.
Unpredictable Number Range	—	Specifies the range in which the unpredictable number must be generated in for contactless mag-stripe mode.

B.2 Configuration Data Provided by Entry Point

Table 14-6: Entry Point Configuration Data

Status Check Support flag
Zero Amount Allowed flag
Reader Contactless Transaction Limit
Reader Contactless Floor Limit
Reader Contactless Floor Limit Exceeded
Reader CVM Required Limit
Reader CVM Required Limit Exceeded
Terminal Floor Limit (Tag '9F1B'), if present

Annex C mPOS Requirements

This annex lists the mPOS requirements.

If an mPOS device is based on reference architectures A or ASP, the functional requirements and options are the same as for a traditional POS.

An accessory device must not be used in conjunction with the contactless interface on a COTS device. If an accessory device is used it must provide a contact and/or contactless interface and may provide a PIN pad.

If an mPOS device is based on reference architectures C or CSP, there is no support for the contact interface , delayed authorisation or offline transactions. Therefore, all transactions on this architecture must be contactless EMV and online only.

For reference architectures ASP and CSP, additional security requirements apply because of the Software PIN entry on the COTS devices. This is because there is no trusted PIN entry device used in these particular system architectures.

The following requirement applies to all mPOS architectures implementing this specification:

- They must not support non-EMV magstripe format transactions

The following requirements apply to mPOS-C, mPOS-CSP architectures implementing this specification.

They must:

- check that they have an online connection to their host system during transaction processing.
- support EMV transactions only in partial online mode (i.e. up to and including the 1st Generate AC command).
- support online only transactions
- be operated as Attended terminals.
- the *Terminal Type* shall be Merchant, Attended – Online only, which means Terminal Type '9F35' value of XX10X001.
- the *Contactless Reader Capabilities* (Tag '9F6D') shall be 11XX0XXX for no CVM requested or 11XX1XXX for CVM requested. Although Expresspay Magstripe is no longer supported by this specification, these bit settings indicate EMV and Magstripe for legacy reasons only.
- the *Enhanced Contactless Reader Capabilities* (Tag '9F6E') shall be
  - Byte 1 – 00011000
  - Byte 2 – 1XX00000
  - Byte 3 – 0X000000

- Byte 4 – 00000011

They must not:

- support offline transactions.
- support a contact interface. This is to maintain the segregation between base reference architectures using accessories and contactless on COTS, because of the differences in security certification.
- be used for ATM transactions as defined by *Application Usage Control* (Tag'9F07').
- be configured as exempt from No CVM checks.
- support delayed authorisation transactions.

The following requirements apply to mPOS-A, mPOS-ASP architectures implementing this specification.

- They must be operated as Attended terminals.
- They must not be used for ATM transactions as defined by *Application Usage Control* (Tag'9F07').

Annex D Glossary

This annex provides a glossary of terms and abbreviations used in this specification. For descriptions of data elements, see Annex A.

AAC	Application Authentication Cryptogram
AC	Application Cryptogram
Acquirer	A financial institution that signs a merchant (or disburses currency to a cardholder in a cash disbursement) and directly or indirectly enters the resulting transaction into interchange.
ADF	Application Definition File
AEF	Application Elementary File
AFL	Application File Locator
AIP	Application Interchange Profile
an	Alphanumeric characters
ans	, as defined in *[EMV 4.3 Book 4]*, Annex B
Application Cryptogram	Cryptogram returned by the card; one of the following cryptogram types: TC Transaction Certificate ARQC Authorisation Request Cryptogram AAC Application Authentication Cryptogram
Approved	A Final Outcome
ARC	Authorisation Response Code
ARPC	Authorisation Response Cryptogram
ARQC	Authorisation Request Cryptogram
ATC	Application Transaction Counter

ATM	Automated Teller Machine
AUC	Application Usage Control
b	Binary or Bit string
CA	Certification Authority
CAPK	Certification Authority Public Key
Card	As used in these specifications, a consumer device supporting contactless transactions.
CDA	Combined Dynamic Data Authentication/Application Cryptogram
CDOL	Card Risk Management Data Object List
CID	Cryptogram Information Data
COTS	Commercial Off-The-Shelf. i.e. readily available consumer technology devices that are not dedicated for payment transaction. Such as mobile phones, tablets, wearables etc.
CPoC	Contactless Payment on COTS)
CVM	Card Verification Method
CVR	Card Verification Results
DDA	Dynamic Data Authentication
DEA	Data Encryption Algorithm
Declined	A Final Outcome
Delayed Authorisation	Designates a Partial Online contactless transaction plus mandatory Offline Data Authentication. For more information, see section 1.5.
DES	Digital Encryption Standard
EMV®	A global standard for credit and debit payment cards based on chip card technology. The *EMV Integrated Circuit Card Specifications for Payment Systems* are developed and maintained by EMVCo.

EMVCo	EMVCo LLC is the organisation of payment systems that manages, maintains, and enhances the EMV specifications. EMVCo is currently operated by American Express, JCB, MasterCard, and Visa.
End Application	A Final Outcome
FCI	File Control Information
Final Outcome	Result provided to the reader as a result of Entry Point processing the Outcome from the kernel, or provided directly by Entry Point under exception conditions.
Full Online	Designates a transaction in which the card remains in the operating field while an online authorisation request is processed, and EMV response data may be returned. Kernel 4 does not support such transactions.
Form Factor	A term used to define the physical characteristics of the device a payment application resides in, e.g. a plastic card or mobile phone.
GENAC	GENERATE AC
GPO	Get Processing Options
HCE	Host Card Emulation
IAC	Issuer Action Code
ICC	Integrated Circuit Card. Synonymous with 'Smart Card' and 'Card'
ISO	International Organization for Standardization
N/A	Not Applicable; a possible value for several Outcome and Final Outcome parameters
mPOS	Mobile Point of Sale. A point of sale solution using a COTS device such as a mobile phone or tablet.
mPOS-A	Accessory. Relating to an accessory device used for mPOS-A architecture.
mPOS-ASP	Accessory with Software PIN. Relating to an accessory device supporting software PIN used for mPOS-ASP architecture.

mPOS-C	Contactless on COTS. Relating to a COTS device mPOS-C architecture.
mPOS-CSP	Contactless on COTS with Software PIN. Relating to a COTS device supporting software PIN used for mPOS-CSP architecture.
ODA	Offline Data Authentication
Online Request	A Final Outcome
OR	Bitwise OR
Outcome	Result from the kernel processing, provided to Entry Point, or under exception conditions, result of Entry Point processing. In either case, a primary value with a parameter set.
PAN	Primary Account Number
PAR	Payment Account Reference
Partial Online	Designates a transaction in which the card may be removed from the operating field early in the transaction and the result of the transaction is based on the response from the Issuer's authorisation system. For more information, see section 1.5.
PDOL	Processing Options Data Object List
PIN	Personal Identification Number
POS	Point of Sale
RFU	Reserved for Future Use
RID	Registered Application Provider Identifier
RNM	Random Number of Month
SDA	Static Data Authentication
Select Next	An Outcome (not used by Kernel 4)
SFI	Short File Identifier [ISO7816-4]
SPoC	Software PIN on COTS

TAC	Terminal Action Code
TC	Transaction Certificate
TDOL	Transaction Certificate Data Object List
TRID	Token Requestor ID
Try Again	An Outcome
Try Another Interface	A Final Outcome
TVR	Terminal Verification Results
UI	User Interface

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