



Heartland Integrator's Guide

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Heartland

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Release Notes

Version 16.1.1 Release Notes

Version	Release Date	Revisions
16.1.1	June-2016	<p>General release clarification updates:</p> <ul style="list-style-type: none"> • Correction to the PRIMARY ACCOUNT NUMBER - minimum length is 16 digits: <ul style="list-style-type: none"> – Table 3-20 MasterCard Track 1 Format, pg. 49 – Table 3-21 MasterCard Track 2 Format, pg. 49 – Table 3-22 MasterCard Fleet Track 1 Format, pg. 51 – Table 3-23 MasterCard Fleet Track 2 Format, pg. 52 – Table 3-24 MasterCard Purchasing Track 1 Format, pg. 53 – Table 3-25 MasterCard Purchasing Track 2 Format, pg. 54 • Added clarification that EMV Void request should contain the 'final' chip data from the original authorization: <ul style="list-style-type: none"> – Table 5-11 Full vs. Partial Credit Transactions, pg. 98 – Table 5-12 Full vs. Partial Debit Transactions, pg. 99 • Table A-15 Multi Service BIN Ranges, pg. 246: Updated bin ranges. Removed Multi Service Government Air card bin ranges, as this card is no longer used.

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Chapter 1: Overview

1.1 Introduction

Heartland Payment Systems, Inc. (Heartland) is a leading third-party provider of payment card transaction processing, providing the following services:

- Host Network transaction services
- Bank Card, Fleet, Debit and Private Label card processing
- Mobile and e-commerce solutions
- Settlement processing

1.2 Document Purpose

The purpose of this document is to provide information in order to integrate a POS system to Heartland. Topics include:

- [General POS Requirements](#)
- [Card Brand Information](#)
- [E3 Processing Overview](#)
- [EMV Processing Overview](#)
- [EMV Development Overview](#)
- [EMV Terminal Interface](#)
- [EMV Parameter Interface](#)
- [Card Association BIN Ranges](#)
- [Industry Codes](#)
- [Receipt Requirements](#)
- [State Codes / Region Codes](#)
- [EMV Field Definitions](#)
- [EMV PDL Data Examples](#)
- [Glossary](#)

REQUIREMENT

This document is to be used along with Heartland's Network platform specifications (Exchange, POS 8583, NTS, Z01, Portico, SpiDr). Information found in the Network specifications could override content within this document.

1.3 Audience

The primary audience for this document consists of third-party vendors responsible for developing POS payment systems to interface with Heartland network. The secondary audience consists of Heartland internal staff responsible for certifying or supporting POS payment applications. All users of this document are assumed to have a basic understanding of POS applications.

1.4 Payment Application Data Security Standards (PA-DSS)

The Payment Card Industry (PCI) Security Standards Council (SSC) has released the Payment Application Data Security Standards (PA-DSS) for payment applications running at merchant locations. The PA-DSS assist software vendors to ensure their payment applications support compliance with the mandates set by the Bank Card Companies (VISA, MasterCard, Discover, American Express, and JCB).

In order to comply with the mandates set by the bank card companies, Heartland Payment Systems:

- Requires that the account number cannot be stored as plain, unencrypted data to meet PCI and PA-DSS regulations. It must be encrypted while stored using strong cryptography with associated key management processes and procedures.

Note: Refer to PCI DSS Requirements 3.4–3.6* for detailed requirements regarding account number storage. The retention period for the Account Number in the shadow file and open batch must be defined and at the end of that period or when the batch is closed and successfully transmitted, the account number and all other information must be securely deleted. This is a required process regardless of the method of transmission for the POS.

- Requires that, with the exception of the Account Number as described above and the Expiration Date, **no** other Track Data is to be stored on the POS if the Card Type is a: VISA, including VISA Fleet; MasterCard, including MasterCard Fleet; Discover, including JCB, UnionPay, Carte Blanche, Diner's Club, and PayPal; American Express; Debit or EBT. This requirement does **not** apply to WEX, FleetCor, Fleet One, Voyager, or Aviation cards; Stored Value cards; Proprietary or Private Label cards.
- Recommends that software vendors to have their applications validated by an approved third party for PA-DSS compliance.
- Requires all software vendors to sign a Non-Disclosure Agreement / Development Agreement.
- Requires all software vendors to provide evidence of the application version listed on the PCI Council's website as a PA-DSS validated Payment Application, or a written certification to HPS testing to Developer's compliance with PA-DSS.
- Requires that all methods of cryptography provided or used by the payment application meet PCI SSC's current definition of 'Strong Cryptography'.

*Refer to www.pcisecuritystandards.org for the PCI DSS Requirements document and further details about PA-DSS.

Chapter 2: General POS Requirements

2.1 Address Verification Service

Visa, MasterCard, AMEX and Discover offer an Address Verification Service (AVS) as a risk-management tool for merchants accepting transactions in which:

- neither the card nor the cardholder are present (e.g., mail, telephone order, Internet transactions), or
- the card is present but its magnetic stripe cannot be read by a terminal at the point of sale.

AVS helps reduce the risk of accepting fraudulent transactions by issuer verification of the cardholder's billing address. The AVS Result Code helps the merchant determine whether to accept a particular transaction or to take further follow-up action.

When a merchant accepts a card-not-present transaction, financial liability is also accepted by the merchant in the event the transaction proves to be fraudulent. If the transaction is fraudulent, the dollar value of the transaction may be "charged back" to the merchant. In addition to the "charge back," there are additional costs to process these exception items, plus the loss of merchandise.

Table 2-1 Address Verification Service

AVS Request	Description
Address Verification Request	Address verification may be requested in one of two ways: <ul style="list-style-type: none"> • by itself, or • as part of an authorization request.
AVS By Itself (AVS Only)	An AVS only request may be used under the following circumstances: <ul style="list-style-type: none"> • a merchant wants to verify the customer's billing address before requesting an authorization, or • the merchant sent an AVS and an authorization request earlier and received an authorization approval but an AVS "try again later" response.

Table 2-1 Address Verification Service (Continued)

AVS Request	Description
AVS Authorization Request	<p>You may process AVS requests the same way you process authorizations simply by including the AVS information in the authorization request. The authorization and address verification process is as follows:</p> <ul style="list-style-type: none"> • Customer contacts the merchant to place an order. • The merchant confirms the usual order information including the merchandise description, price, the customer's account number, card expiration date, and shipping address. • The merchant requests the cardholder's billing address (street address and/or ZIP Code) for the card being used. (The billing address is where the cardholder's monthly statement is sent for the card being used.) • The POS system includes the address information with the authorization request to Heartland. • The issuer makes an authorization decision separately from the AVS request. The issuer compares the cardholder billing address with the billing address it has for that account. The issuer returns both the authorization response and a code indicating the address verification results. Like any other transaction, if the issuer declines the authorization request do not complete the transaction for that account. This rule holds true even if you receive an "exact match" on the address verification request.

2.1.1 AVS Data Flow



2.1.2 AVS Result Code Guidelines

Not all Heartland POS message specifications support AVS Result Codes. See your specific POS message specification for details.

For some industries, if the AVS Result Code is not a match, the payment engine automatically declines and voids the transaction to the issuer.

For other industries, the merchant makes the decision on whether to proceed when the AVS information is not an exact match, but the issuer approves the authorization request. See you Heartland Representative for more information.

2.2 Chargeback Protected Limits

The following amounts are the ICR-initiated chargeback protected amounts for approved transactions by the bank card associations.

The merchant may choose to override these amounts. Any amount above the limits listed will **not** include Chargeback Protection.

The merchant is at risk for any amount above these limits.

Table 2-2 Chargeback Protected Limits

Card Type	Description
VISA	<ul style="list-style-type: none"> VISA Consumer (including VISA Signature and Sign Preferred), VISA Business (including VISA Signature Business), VISA Corporate, and VISA Purchasing cards offer Chargeback Protection to \$100 if the card has been authorized for \$1.00. VISA Fleet cards offer Chargeback Protection to \$150 if the card has been authorized for \$1.00.
MasterCard	<ul style="list-style-type: none"> MasterCard Consumer cards offer Chargeback Protection to \$100 if the card has been authorized for \$1.00. MasterCard Corporate, MasterCard Corporate Fleet, and MasterCard Purchasing cards offer Chargeback Protection to \$150 if the card has been authorized for \$1.00.
Discover Card	<ul style="list-style-type: none"> Discover Card offers Chargeback Protection to \$100 if the card has been authorized for \$1.00. If the merchant has a custom agreement with Discover to authorize for a different amount, chargeback protection is the approved amount.
American Express	<ul style="list-style-type: none"> American Express does not offer Chargeback Protection.

2.3 No Signature Required

No Signature Required is a program offered by Visa, MasterCard, AMEX and Discover for consumer and commercial cards. The No Signature Required program allows merchants within certain MCC codes to process transactions without having to obtain the cardholders signature or provide the cardholder with a receipt unless the cardholder requests it.

In order to be eligible for No Signature Required, the following conditions must be met:

- The cardholder must be present at the time of the transaction in a face-to-face environment.
- The merchant name and location must be included in the authorization request.
- The total amount of the transaction must be less than the No Signature Required threshold for the merchant's MCC. Refer to the individual card associations for current information about amounts, MCCs allowed, etc.
- Online authorization must be obtained and the full track data must be included in the authorization message. The track data can be obtained from the chip for EMV transactions or from the magnetic stripe for swiped transactions.

To process a No Signature Required transaction with a chip card (on a chip-card-capable POS terminal), the terminal application must set the Terminal Capabilities field to enable only the No CVM Required card verification method (CVM). This action will cause the chip card not to require a CVM.

2.4 Binary to ASCII Hex Conversion

Since some the Host message formats allow for only printable characters to appear in transaction data fields. Binary fields must be expanded to ensure that no values less than hexadecimal **20** are transmitted.

To convert a binary field to its corresponding ASCII equivalent, remove 4 bits at a time and convert them to the ASCII characters defined below. Performing this conversion procedure will result in a doubling of the field size, i.e., a 20-digit binary field will yield a 40-character ASCII result. After performing the conversion, the resulting ASCII data may then be populated within the transaction data field.

Table 2-3 Binary to ASCII Hex Conversion

BIT Data	ASCII Hex Characters
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

The table below shows examples of data **before** conversion as well as **after** the ASCII conversion as the data moves from the POS to the Host.

The order of the fields is arbitrary and the values used below are only provided as an example.

Table 2-4 Binary ASCII Hex Conversion Example

Field Name	RED is Before Conversion		BLUE is after conversion	
UNPREDICTABLE NUMBER	Tag	9F37	Tag	39463337
	Length	04	Length	3034
	Value	00010203	Value	3030303130323033
ISSUER APPLICATION DATA	Tag	9F10	Tag	39463130
	Length	20	Length	3230
	Value	00010203040506070809 0A0B0C0D0E0F1011121 31415161718191A1B1C 1D1E1F	Value	303030313032303330343035303 630373038303930413042304330 443045304631303131313231333 134313531363137313831393141 31423143314431453146
APPLICATION CRYPTOGRAM	Tag	9F26	Tag	39463236
	Length	08	Length	3038
	Value	0001020304050607	Value	303030313032303330343035303 63037
APPLICATION TRANSACTION COUNTER	Tag	9F36	Tag	39463336
	Length	02	Length	3032
	Value	0001	Value	30303031

Chapter 3: Card Brand Information

3.1 Introduction

This chapter gives an overview of payment cards, embossing information, including Track 1 and Track 2 layouts.

The maximum length of Track 1 is 79 characters. This length includes the START SENTINEL, FIELD SEPARATORS, END SENTINEL and LONGITUDINAL REDUNDANCY CHECK (LRC) fields. The Track 1 overall length will vary by card after the CARDHOLDER NAME field.

The maximum length of Track 2 is 40 characters. This length includes the START SENTINEL, FIELD SEPARATOR, END SENTINEL, and LONGITUDINAL REDUNDANCY CHECK (LRC) fields.

Track Data is sent unaltered.

Track data is defined by a number of [International Organization for Standardization](#) standards. [ISO/IEC 7810](#), [ISO/IEC 7811](#), [ISO/IEC 7812](#), [ISO/IEC 7813](#), [ISO 8583](#), and [ISO/IEC 4909](#), now define the physical properties of the card, including size, flexibility, location of the magstripe, magnetic characteristics, and data formats. They also provide the standards for financial cards, including the allocation of card number ranges to different card issuing institutions. The standards should be referenced for details on track data.

Refer to the specific POS message specifications (Exchange, POS 8583, NTS, Z01, Portico, SpiDr) to determine cards supported, transactions supported and data requirements.

Table 3-1 Card Brand References to BIN Ranges and Track Data

Card Type	Track Preference when Swiped	BIN Ranges	Track Data
American Express	Track 1	Table A-8 American Express BIN Ranges, pg. 243	<ul style="list-style-type: none"> • 3.2.1 American Express Track 1 Format X4.16 Standard, pg. 30 • 3.2.2 American Express Track 1 Format ISO 7813 Standard, pg. 31 • 3.2.3 American Express Track 2 Format X4.16 Standard, pg. 33 • 3.2.4 American Express Track 2 Format ISO 7813 Standard, pg. 34
AVcard	No preference	Table A-16 AVCard BIN Range, pg. 246	<ul style="list-style-type: none"> • 3.3.1 AVcard Track 1 Format, pg. 36 • 3.3.2 AVcard Track 2 Format, pg. 36

Table 3-1 Card Brand References to BIN Ranges and Track Data (Continued)

Card Type	Track Preference when Swiped	BIN Ranges	Track Data
Centego	Track 2	Table A-18 Centego Prepaid BIN Range, pg. 247	<ul style="list-style-type: none"> • 3.4.1 Centego Prepaid Track 1 Format, pg. 37 • 3.4.2 Centego Prepaid Track 2 Format, pg. 38
Diner's Club (Now processed as Discover)	No preference	Table A-9 Discover IIN Ranges, pg. 244	<ul style="list-style-type: none"> • 3.6.1 Diner's Club International Track 1 Format, pg. 41 • 3.6.2 Diner's Club International Track 2 Format, pg. 42
Discover	No preference	Table A-9 Discover IIN Ranges, pg. 244	<ul style="list-style-type: none"> • 3.5.1 Discover Track 1 Format, pg. 39 • 3.5.2 Discover Track 2 Format, pg. 40
Drop Tank	No preference	Table A-19 Drop Tank BIN Range, pg. 247	<ul style="list-style-type: none"> • 3.7.1 Drop Tank Track 1 Format, pg. 43 • 3.7.2 Drop Tank Track 2 Format, pg. 43
EBT	Track 2 only	Table A-20 EBT BIN Ranges, pg. 247	<ul style="list-style-type: none"> • 3.9.1 EBT Track 2 Format, pg. 45
Fleet One	Track 2 only	Table A-14 Fleet One BIN Range, pg. 245	<ul style="list-style-type: none"> • 3.10.1 Fleet One Track 2 Format, pg. 46
FleetCor	Track 2 only	Table A-13 FleetCor BIN Ranges, pg. 245	<ul style="list-style-type: none"> • 3.11.1 FleetCor Track 2 Format, pg. 47
Heartland Gift Card	Track 2 only	Table A-17 SVS BIN Ranges, pg. 246	<ul style="list-style-type: none"> • 3.8.1 Heartland Gift Card Track 2 Format, pg. 44
MasterCard	No preference	A.2 MasterCard BIN Ranges, pg. 235	<ul style="list-style-type: none"> • 3.13.1 MasterCard Track 1 Format, pg. 49 • 3.13.2 MasterCard Track 2 Format, pg. 49
MasterCard Corporate	No preference	Table A-6 MasterCard Corporate BIN Ranges, pg. 237	<ul style="list-style-type: none"> • 3.13.1 MasterCard Track 1 Format, pg. 49 • 3.13.2 MasterCard Track 2 Format, pg. 49
MasterCard Fleet	No preference	Table A-7 MasterCard Fleet BIN Ranges, pg. 243	<ul style="list-style-type: none"> • 3.14.2 MasterCard Fleet Track 1 Format, pg. 51 • 3.14.3 MasterCard Fleet Track 2 Format, pg. 52
MasterCard Purchasing	No preference	Table A-5 MasterCard Purchasing BIN Ranges, pg. 235	<ul style="list-style-type: none"> • 3.15.2 MasterCard Purchasing Track 1 Format, pg. 53 • 3.15.3 MasterCard Purchasing Track 2 Format, pg. 54
Multi Service	Track 2 only	Table A-15 Multi Service BIN Ranges, pg. 246	<ul style="list-style-type: none"> • 3.16.1 Multi Service Swiped Track 2 Format, pg. 55

Table 3-1 Card Brand References to BIN Ranges and Track Data (Continued)

Card Type	Track Preference when Swiped	BIN Ranges	Track Data
PayPal	No preference	Table A-10 PayPal IIN Ranges, pg. 244	<ul style="list-style-type: none"> • 3.5.1 Discover Track 1 Format, pg. 39 • 3.5.2 Discover Track 2 Format, pg. 40
PIN Debit	Track 2 only	A.10 Debit BIN Ranges, pg. 247	Issuer dependent.
Stored Value	Track 2	Table A-17 SVS BIN Ranges, pg. 246	<ul style="list-style-type: none"> • 3.18.1 SVS Track 1 Format, pg. 56 • 3.18.2 SVS Track 2 Format, pg. 56
ValueLink	Track 2	Table A-17 SVS BIN Ranges, pg. 246	<ul style="list-style-type: none"> • 3.20.1 ValueLink Track 1 Format, pg. 57 • 3.20.2 ValueLink Track 2 Format, pg. 58
VISA	No preference	A.1 VISA BIN Ranges, pg. 158	<ul style="list-style-type: none"> • 3.21.1 VISA Track 1 Format, pg. 59 • 3.21.2 VISA Track 2 Format, pg. 60
VISA Corporate or Business	No preference	Table A-3 VISA Corporate or Business BIN Ranges, pg. 162	<ul style="list-style-type: none"> • 3.21.1 VISA Track 1 Format, pg. 59 • 3.21.2 VISA Track 2 Format, pg. 60 <p>Use VISA Track layouts for VISA Corporate or Business.</p>
VISA Fleet	Track 1	Table A-2 VISA Fleet BIN Ranges, pg. 161	<ul style="list-style-type: none"> • 3.24.2 VISA Fleet Track 1 Format, pg. 62 • 3.24.3 VISA Fleet Track 2 Format, pg. 63
VISA Purchasing	No preference	Table A-1 VISA Purchasing BIN Ranges, pg. 158	<ul style="list-style-type: none"> • 3.21.1 VISA Track 1 Format, pg. 59 • 3.21.2 VISA Track 2 Format, pg. 60 <p>Use VISA Track layouts for VISA Purchasing.</p>
VISA ReadyLink	Track 2	Table A-4 VISA ReadyLink BIN Ranges, pg. 229	<ul style="list-style-type: none"> • 3.21.1 VISA Track 1 Format, pg. 59 • 3.21.2 VISA Track 2 Format, pg. 60 <p>Use VISA Track layouts for VISA ReadyLink.</p>
Voyager Fleet	No preference	Table A-11 Voyager BIN Ranges, pg. 245	<ul style="list-style-type: none"> • 3.25.1 Voyager Fleet Track 1 Format, pg. 65 • 3.25.2 Voyager Fleet Track 2 Format, pg. 66
WEX Fleet	Track 2 only	Table A-12 WEX BIN Ranges, pg. 245	<ul style="list-style-type: none"> • 3.26.3 WEX Fleet Track 2 Format, pg. 69

3.2 American Express

American Express issues cards in either of following track formats.

- ANSI X4.16
- ISO 7813

Note: If sending the Primary Account Number (PAN), it must not contain any spaces.

3.2.1 American Express Track 1 Format X4.16 Standard

Table 3-2 American Express Track 1 Format X4.16 Standard

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3 ^{varies}	15–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (caret)
CARD MEMBER NAME	varies	26	A/N	Field identifies the name of the cardholder and contains a maximum of 26 characters. The format of the field is last name followed by first name and initial. Each cardholder name component is separated as follows: <ul style="list-style-type: none"> • / (forward slash) = Separates the first and last name. • (space) = Separates first name from the middle name or middle initial. Use only when the cardholder names qualify for separation. • . (period) = Separates the first name and title. <p>Example: Last Name/First Name Initial Embossing JOHN P. JONES JR. Mag Stripe JONES/JOHN P.JR</p>
FIELD SEPARATOR	varies	1	A/N	^ (caret)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format. The card expires on the last day of the month.
EFFECTIVE DATE	varies	4	N	The date in YYMM format. The card becomes valid on the first day of the month.
DISCRETIONARY DATA	varies	5	N	
END SENTINEL	varies	1	A/N	? (question mark)

Table 3-2 American Express Track 1 Format X4.16 Standard (Continued)

Field Name	Position	Length	Format	Value/Description
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment. LRC may or may not be present.
UNUSED	varies	17	A/N	Reserved for future use.

3.2.2 American Express Track 1 Format ISO 7813 Standard

Table 3-3 American Express Track 1 Format ISO 7813 Standard

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3 ^{varies}	15–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
CARD MEMBER NAME	varies	26	A/N	Field identifies the name of the cardholder and contains a maximum of 26 characters. The format of the field is last name followed by first name and initial. Each cardholder name component is separated as follows: <ul style="list-style-type: none"> • / (forward slash) = Separates the first and last name. • (space) = Separates first name from the middle name or middle initial. Use only when the cardholder names qualify for separation. • . (period) = Separates the first name and title. <p>Example: Last Name/First Name Initial Embossing JOHN P. JONES JR. Mag Stripe JONES/JOHN P.JR</p>
FIELD SEPARATOR	varies	1	A/N	^ (carat)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format. The card expires on the last day of the month.

Table 3-3 American Express Track 1 Format ISO 7813 Standard (Continued)

Field Name	Position	Length	Format	Value/Description
INTERCHANGE DESIGNATOR	varies	1	N	Code indicating whether the American Express card is valid outside the country of issue. <ul style="list-style-type: none"> • 1 = Available for international interchange • 2 = Chip card • 5 = Available for interchange only in country of issue • 6 = Chip card, available for interchange only in country of issue • 7 = Not available for general interchange • 9 = System test card
SERVICE CODE	varies	2	N	Code indicating whether the American Express card is valid for ATM/Cash Access or if a positive authorization is required. <ul style="list-style-type: none"> • 01 = No restrictions • 02 = No ATM service • 03 = ATM Service only • 06 = No restrictions; prompt for PIN, if PIN pad is present • 10 = No cash advance • 11 = No cash advance or ATM service • 20 = Requires positive authorization by issuer or issuer's agent • 21 = Authorization by issuer only • 22 = Authorization by issuer only; Goods & Services • 23 = Authorization by issuer only; ATM only, PIN required • 26 = Authorization by issuer only; prompt for PIN, if PIN pad is present
EFFECTIVE DATE	varies	4	N	The date in YYMM format. The card becomes valid on the first day of the month.
DISCRETIONARY DATA	varies	5	N	
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.
UNUSED	varies	17	A/N	Reserved for future use.

3.2.3 American Express Track 2 Format X4.16 Standard

Table 3-4 American Express Track 2 Format X4.16 Standard

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	15–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format. The card expires on the last day of the month.
EFFECTIVE DATE	varies	4	N	The date in YYMM format. The card becomes valid on the first day of the month.
DISCRETIONARY DATA	varies	5	N	
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment. LRC may or may not be present.
UNUSED	varies	8	N	Reserved for future use.

3.2.4 American Express Track 2 Format ISO 7813 Standard

Table 3-5 American Express Track 2 Format ISO 7813 Standard

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	15–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format. The card expires on the last day of the month.
INTERCHANGE DESIGNATOR	varies	1	N	Code indicating whether the American Express card can be used outside the country of issue. <ul style="list-style-type: none"> • 1 = Available for international interchange • 2 = Chip card • 5 = Available for interchange only in country of issue • 6 = Chip card, available for interchange only in country of issue • 7 = Not available for general interchange • 9 = System test card
SERVICE CODE	varies	2	N	Code indicating whether the American Express card is valid for ATM/Cash Access or if a positive authorization is required. <ul style="list-style-type: none"> • 01 = No restrictions • 02 = No ATM service • 03 = ATM Service only • 06 = No restrictions; prompt for PIN, if PIN pad is present • 10 = No cash advance • 11 = No cash advance or ATM service • 20 = Requires positive authorization by issuer or issuer's agent • 21 = Authorization by issuer only • 22 = Authorization by issuer only; Goods & Services • 23 = Authorization by issuer only; ATM only, PIN required • 26 = Authorization by issuer only; prompt for PIN, if PIN pad is present
EFFECTIVE DATE	varies	4	N	The date in YYMM format. The card becomes valid on the first day of the month.
DISCRETIONARY DATA	varies	8	N	

Table 3-5 American Express Track 2 Format ISO 7813 Standard (Continued)

Field Name	Position	Length	Format	Value/Description
LANGUAGE CODE	varies	2	N	Code indicating non-Canadian versus Canadian cardholders and when a Canadian, whether English or French is the spoken language of the cardholder. <ul style="list-style-type: none"> • 00 = Non-Canadian Card member • 01 = Canadian Card members (English Language) • 02 = Canadian Card members (French Language)
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	N	Created by the encoding equipment.

3.3 AVcard

- The AVcard requires a date check and a MOD-10 check.

3.3.1 AVcard Track 1 Format

Table 3-6 AVcard Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	^ (caret)
ISO PREFIX	3	6	N	601029
ACCOUNT NUMBER	9	13 ^{max}	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (caret)
CREDIT CARD NAME	varies	26 ^{max}	A/N	Customer or company name.
FIELD SEPARATOR	varies	1	A/N	^ (caret)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE INDICATOR	varies	3	N	Constant, 701
DISCRETIONARY DATA	varies	15	A/N	Miscellaneous Cardholder Info.
END SENTINEL	varies	1	A/N	? (question mark)

3.3.2 AVcard Track 2 Format

Table 3-7 AVcard Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
ISO PREFIX	2	6	N	601029
ACCOUNT NUMBER	8	13 ^{max}	N	AVcard Account Number.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	YYMM
SERVICE CODE INDICATOR	varies	3	N	Constant, 701
DISCRETIONARY DATA	varies	15		Miscellaneous Cardholder Info.
END SENTINEL	varies	1	A/N	? (question mark)

3.4 Centego Prepaid Card

- PAN must pass MOD 10 check-digit test. (MOD 10 check on first 18 digits, 19th digit is the check digit.)
- Cards are embossed with the Account Number.

3.4.1 Centego Prepaid Track 1 Format

Note: Track data must be sent excluding the START SENTINEL, END SENTINEL, and LRC.

Table 3-8 Centego Prepaid Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3–21	19	N	Cardholder's PAN.
FIELD SEPARATOR	22	1	A/N	^ (caret)
CARDHOLDER NAME	23–48	26 ^{max}	A/N	Contains a maximum of 26 characters.
FIELD SEPARATOR	49	1	A/N	^ (caret)
EXPIRATION DATE	50–53	4	N	The date the card expires in YYMM format.
SECURITY DATA	54–63	10	N	Card verification value.
MEMBER NUMBER	64–74	11	A/N	Club member number.
END SENTINEL	75	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	76	1	A/N	Created by the encoding equipment.

Note: The position ranges are valid for a 26-character cardholder name. The cardholder name is a variable length field delimited by field separators. As a result, position ranges following the CARDHOLDER field will change with varying CARDHOLDER field lengths.

3.4.2 Centego Prepaid Track 2 Format

Table 3-9 Centego Prepaid Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	;(semicolon)
PRIMARY ACCOUNT NUMBER	2–20	19	N	Cardholder's PAN.
FIELD SEPARATOR	21	1	A/N	= (equal sign)
EXPIRATION DATE	22–25	4	N	The date the card expires in YYYYMM format.
SECURITY DATA	26–35	10	N	Card verification value.
END SENTINEL	36	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	37	1	A/N	Created by the encoding equipment.

3.5 Discover Card

Discover Network (now known as DFS Services, LLC) allocates Issuer Identification Number (IIN) ranges to authorized Issuers using the Discover Network. Discover Card recognition includes the following Account Number field structures:

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number and the Expiration Date.

3.5.1 Discover Track 1 Format

Table 3-10 Discover Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3 ^{varies}	16–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
CARDHOLDER NAME	varies	varies	A/N	Field identifies the name of the cardholder and contains a maximum of 26 characters. The format of this field is last name followed by first name and initial. A / (forward slash) separates the first and last name. Example: Last Name/First Name Initial Embossing John P. Jones III Mag Stripe Jones III/John P
FIELD SEPARATOR	varies	1	A/N	^ (carat)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
SECURITY CODE	varies	13	A/N	
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.5.2 Discover Track 2 Format

Table 3-11 Discover Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	16–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
SECURITY CODE	varies	13	A/N	
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.6 Diner's Club International Card

The Diner's Club International card must also be processed as a Discover Card.

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number and the Expiration Date.

3.6.1 Diner's Club International Track 1 Format

Table 3-12 Diner's Club International Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3 ^{varies}	14–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
CARDHOLDER NAME	varies	varies	A/N	Field identifies the name of the cardholder and contains a maximum of 26 characters. The format of the field is last name followed by first name and initial. Each cardholder name component is separated as follows: <ul style="list-style-type: none"> • / (forward slash) = Separates the first and last name. • (space) = Separates first name from the middle name or middle initial. It is also used to separate a title from the first name or middle name or initial. Used to separate a title only when the cardholder names qualify for separation. <p>Example: Last Name/First Name Initial Embossing JOHN P. JONES JR. Mag Stripe JONES/JOHN P JR</p>
FIELD SEPARATOR	varies	1	A/N	^ (carat)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
INTERCHANGE QUALIFICATION CODE	varies	3	N	Code indicating the type of interchange that is available on the card. Valid codes are as follows: <ul style="list-style-type: none"> • 101 = Card is valid for unrestricted international interchange. • 587 = Card is valid only in territory of issuance.
EFFECTIVE DATE	varies	4	A/N	The data in YYMM format.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.6.2 Diner's Club International Track 2 Format

Table 3-13 Diner's Club International Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	14–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
INTERCHANGE QUALIFICATION CODE	varies	3	N	Code indicating the type of interchange that is available on the card. Valid codes are as follows: <ul style="list-style-type: none"> • 101 = Card is valid for unrestricted international interchange. • 587 = Card is valid only in territory of issuance.
EFFECTIVE DATE	varies	4	N	The data in YYMM format.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.7 Drop Tank Card

3.7.1 Drop Tank Track 1 Format

Table 3-14 Drop Tank Track 1 Format

Field Name	Position	Length	Format	Value Description
START SENTINEL	1	1	Hex	% (percent sign)
FORMAT CODE	2	1	A/N	b
ACCOUNT NUMBER	3–20	18	N	Cardholder's PAN (token).
FIELD SEPARATOR	21	1	A/N	^ (caret)
FILLER	22	1	A/N	Space
FIELD SEPARATOR	23	1	A/N	^ (caret)
FILLER	24	1	A/N	Space
END SENTINEL	25	1	A/N	? (question mark)
LRC	26	1	A/N	Created by the encoding equipment. LRC may or may not be present.

3.7.2 Drop Tank Track 2 Format

Table 3-15 Drop Tank Track 2 Format

Field Name	Position	Length	Format	Value Description
START SENTINEL	1	1	Hex	; (semicolon)
ACCOUNT NUMBER	2–19	18	N	Cardholder's PAN (token).
FIELD SEPARATOR	20	1	A/N	= (equal sign)
DATE	21-24	4	N	Expiration date in MMY format.
END SENTINEL	25	1	A/N	? (question mark)
LRC	26	1	A/N	Created by the encoding equipment. LRC may or may not be present.

3.8 Heartland Gift Card

- PAN must pass a MOD 10 check-digit test. The 19th position is the check-digit for the preceding 18 digits).
- Cards are embossed with the Account Number and the printed Access Code on the back.

3.8.1 Heartland Gift Card Track 2 Format

Table 3-16 Heartland Gift Card Track 2 Format

Field Name	Position	Length	Format	Value Description
START SENTINEL	1	1	3B Hex	; (semicolon)
PRIMARY ACCOUNT NUMBER	2–20	19	N	Cardholder's PAN.
FIELD SEPARATOR	21	1	A/N	= (equal sign)
DATE	22–25	4	N	Expiration date in MMY format. Default expiration is 9999.
SECURITY DATA	26–38	13	N	
END SENTINEL	39	1	A/N	? (question mark)
LRC	40	1	OF Hex	Longitudinal Redundancy Check.

3.9 EBT Card

- The POS application must perform a MOD 10 check.
- No Specific ISO – No information in the account number or track data identifies the card as a Food Stamp or Cash Benefit card. This identification must come from POS prompts.

3.9.1 EBT Track 2 Format

Table 3-17 EBT Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2–20	19	N	Cardholder's PAN.
FIELD SEPARATOR	21	1	A/N	= (equal sign)
EXPIRATION DATE	22–25	4	N	The date the card expires in YYMM format.
SERVICE CODE	26–28	3	N	120
DISCRETIONARY DATA	29	varies	A/N	
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.10 Fleet One Card

- Cards are embossed with the Account Number, Company Name and Vehicle Name / Customer Name.

3.10.1 Fleet One Track 2 Format

Table 3-18 Fleet One Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
CARD ISO/ABA PREFIX	2	6	A/N	501486 See A.6 Fleet Card BIN Ranges, pg. 245 .
PROMPT CODE	8	2	N	Valid options are 10–19 and 99.
ACCOUNT NUMBER	10	6	N	Fleet company number.
CARD NUMBER	16	4	N	
CHECK DIGIT	20	1	N	0–9
FIELD SEPARATOR	21	1	A/N	= (equal sign)
EXPIRATION DATE	22	4	N	The date the card expires in YYMM format. 9912 or 4912 indicates “does not expire.”
MEMBER NUMBER	26	1	N	0–9
PIN OFFSET	27	6	N	Not used.
END SENTINEL	33	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	34	1	A/N	Created by the encoding equipment.

3.11 FleetCor Card

- Cards are embossed with the Account Number, Expiration Date, Company Name and Vehicle Name/Customer Name.

3.11.1 FleetCor Track 2 Format

Table 3-19 FleetCor Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
CARD ISO/ABA PREFIX	2	6	A/N	See A.6 Fleet Card BIN Ranges, pg. 245 .
ISSUER IDENTIFIER	8	5	N	
CARD NUMBER	13	6	N	
FIELD SEPARATOR	19	1	A/N	= (equal sign)
EXPIRATION DATE	20	4	N	The date the card expires in YYMM format. 9912 is a valid value and indicates card does not expire.
DISCRETIONARY DATA	24	0–13	N	Reserved for Future Use. Value is either 0 or NULL.
END SENTINEL	24–37	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	25–38	1	A/N	b

3.12 JCB Card

All JCB cards follow the same track format as Discover. See [3.5 Discover Card, pg. 39](#).

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number and the Expiration Date.

3.12.1 JCB IIN Ranges on Discover Network

The JCB IIN Ranges are effective only for the domestic United States, and to the extent that other Territories and Protectorates may be included, we will provide you with further information. All other international markets are out of scope at this time. Additionally, ATM transactions will not be enabled for the IIN ranges assigned to JCB. See [A.4 Discover IIN Ranges, pg. 244](#).

3.13 MasterCard

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number and the Expiration Date.

3.13.1 MasterCard Track 1 Format

Table 3-20 MasterCard Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3 ^{varies}	16–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
CARDHOLDER NAME	varies	2–26	A/N	Contains a maximum of 26 characters.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
DISCRETIONARY DATA	varies	varies	A/N	Contains the CVC.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.13.2 MasterCard Track 2 Format

Table 3-21 MasterCard Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	16–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
DISCRETIONARY DATA	varies	varies	A/N	Contains the CVC.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.14 MasterCard Fleet Card Type

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number, Expiration Date and Cardholder Name.

3.14.1 MasterCard Fleet Card Example



Figure 3-1 MasterCard Fleet Card: Driver Assigned Example



Figure 3-2 MasterCard Fleet Card: Vehicle Assigned Example

3.14.2 MasterCard Fleet Track 1 Format

Note: All MasterCard Fleet cards use the entire allocated length of the track. Therefore, space-fill any variable length fields as necessary.

Table 3-22 MasterCard Fleet Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3 ^{varies}	16–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
CARDHOLDER NAME	varies	26	A/N	Contains a maximum of 26 characters.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	A/N	Identifies the circumstances under which the card can be used.
DISCRETIONARY DATA	varies	22	A/N	
PRODUCT RESTRICTION CODE	varies	1	N	1 to 2 required.
PRODUCT TYPE CODE	varies	1	N	1 to 5 required.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.14.3 MasterCard Fleet Track 2 Format

Table 3-23 MasterCard Fleet Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	16–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYYY format.
SERVICE CODE	varies	3	A/N	Identifies the circumstances under which the card can be used.
DISCRETIONARY DATA	varies	11	A/N	
PRODUCT RESTRICTION CODE	varies	1	N	1 to 2 required.
PRODUCT TYPE CODE	varies	1	N	1 to 5 required.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.15 MasterCard Purchasing Card

- PAN must pass a MOD 10 check-digit test.
- Card are embossed with the Primary Account Number and the Expiration Date.

3.15.1 MasterCard Purchasing Card Example



3.15.2 MasterCard Purchasing Track 1 Format

Table 3-24 MasterCard Purchasing Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3varies	16-19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (caret)
CARDHOLDER NAME	varies	varies	A/N	Contains a maximum of 26 characters.
FIELD SEPARATOR	varies	1	A/N	^ (caret)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	A/N	Identifies the circumstances under which the card can be used.
DISCRETIONARY DATA	varies	22	A/N	Optional field.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.15.3 MasterCard Purchasing Track 2 Format

Table 3-25 MasterCard Purchasing Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	16–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	A/N	Identifies the circumstances under which the card can be used.
DISCRETIONARY DATA	varies	varies	A/N	Optional field.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.16 Multi Service Track Data

3.16.1 Multi Service Swiped Track 2 Format

Table 3-26 Multi Service Swiped Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
ISO PREFIX	2	6	N	Refer to the <i>Heartland POS Integrator's Guide</i> for BIN Ranges.
ACCOUNT NUMBER	8	8	N	Cardholder's PAN.
FIELD SEPARATOR	16	1	A/N	= (equal)
CASH FLAG	17	1	N	
PO REQUIRED FLAG	18	1	N	
TWO DIGIT DAY OF ISSUANCE	19	2	N	
FIELD SEPARATOR	21	1	A/N	= (equal)
DATE OF ISSUANCE	22	4	N	YYMM
SERVICE RESTRICTIONS	26	1	N	
FUEL FLAG	27	1	N	
OIL FLAG	28	1	N	
PLUS AMOUNT ON CARD	29	3	N	
TYPE FLAG	32	1	N	
FILLER SPACE	33	5		
STRIPE VERSION NUMBER	38	1	N	
END SENTINEL	39	1	A/N	? (question mark)

3.17 PayPal Card

PayPal cards are now part of the Discover Network and follow the same track format as Discover. See [3.5 Discover Card, pg. 39](#).

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number and the Expiration Date.

3.18 Stored Value Solutions (SVS)

- PAN must pass MOD 10 check-digit test. (MOD 10 check on first 18 digits, 19th digit is the check digit.)
- Cards are embossed with the Account Number.

3.18.1 SVS Track 1 Format

Table 3-27 SVS Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	5–21	19	N	Cardholder's PAN.
FIELD SEPARATOR	22	1	A/N	^ (caret)
CARDHOLDER NAME	23–48	26 ^{max}	A/N	Contains a maximum of 26 characters.
FIELD SEPARATOR	49	1	A/N	^ (caret)
EXPIRATION DATE	50–53	4	N	The date the card expires in YYMM format.
SERVICE CODE	54–56	3	N	110
CVV DATA	57–59	3	A/N	Card Verification Value.
END SENTINEL	60	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	61	1	A/N	Created by the encoding equipment.

3.18.2 SVS Track 2 Format

Table 3-28 SVS Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1–1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2–20	19	N	Cardholder's PAN.
FIELD SEPARATOR	21–21	1	A/N	= (equal sign)
EXPIRATION DATE	22–25	4	N	The date the card expires in YYMM format.
SERVICE CODE	26–28	3	N	110
CVV DATA	29–36	8	N	Card Verification Value.
END SENTINEL	37–37	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	38–38	1	A/N	Created by encoding equipment.

3.19 UnionPay Card

All UnionPay issued cards follow the same track format as Discover. See [3.5 Discover Card, pg. 39](#).

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number and the Expiration Date.

3.20 ValueLink Card

- PAN must pass MOD 10 check digit test. (MOD 10 check on first 18 digits, 19th digit is the check digit.)
- Card are embossed with the Account Number. CLGC cards (Closed Loop Gift Cards) are embossed with 16 digits.

3.20.1 ValueLink Track 1 Format

Table 3-29 ValueLink Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3–20	13–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (caret)
CARDHOLDER NAME	varies	2–26	A/N	Contains a maximum of 26 characters.
SEPARATOR	varies	1	A/N	^ (caret)
CARD EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	
PVKI		1	N	PIN Verification Key Index.
PVV		4	N	PIN Verification Value.
DISCRETIONARY DATA	varies	varies	A/N	
VISA RESERVED	varies	11	A/N	
END SENTINEL	varies	1	A/N	
LRC	varies	1	A/N	Longitudinal Redundancy Check.

3.20.2 ValueLink Track 2 Format

Table 3-30 ValueLink Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	
PRIMARY ACCOUNT NUMBER	3–20	13–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	Usually = (equal)
CARD EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	
PVKI		1	N	PIN Verification Key Index.
PVV		4	N	PIN Verification Value.
DISCRETIONARY DATA	varies	8	A/N	
END SENTINEL	varies	1	A/N	
LRC	varies	1	A/N	Longitudinal Redundancy Check.

3.21 VISA Card

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number and the Expiration Date.

3.21.1 VISA Track 1 Format

Table 3-31 VISA Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3 ^{varies}	13–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
CARDHOLDER NAME	varies	2–26	A/N	Contains a maximum of 26 characters.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
PIN VERIFICATION	varies	0 or 5	N	If used, this field is composed of two components.
PVKI		1		PIN Verification Key Index.
PVV		4		PIN Verification Value.
DISCRETIONARY DATA	varies	varies	A/N	
VISA RESERVED	varies	11 ¹	A/N	PIN Verification. All 11 positions are required.
Filler		1–2		Zero-fill
CVV		3–5		Card Verification Value.
Filler		6–7		Zero-fill
ACI		8		Authorization Control Indicator.
Filler		9–11		Zero-fill
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

1. The length is always the last 11 positions of Track 1, excluding the END SENTINEL and LONGITUDINAL REDUNDANCY CHECK.

3.21.2 VISA Track 2 Format

Table 3-32 VISA Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	13–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
PIN VERIFICATION	varies	0 or 5	N	If used, this field is composed of two components.
PVKI		1	N	PIN Verification Key Index (PVKI).
PVV		4	N	PIN Verification Value (PVV).
DISCRETIONARY DATA	varies	varies	A/N	Contains the Card Verification Value.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

3.22 VISA Corporate or Business

- For Track 1, see [Table 3-31 VISA Track 1 Format, pg. 59](#).
- For Track 2, see [Table 3-32 VISA Track 2 Format, pg. 60](#).

3.23 VISA Purchasing

- For Track 1, see [Table 3-31 VISA Track 1 Format, pg. 59](#).
- For Track 2, see [Table 3-32 VISA Track 2 Format, pg. 60](#).

3.24 VISA Fleet Card Type

- PAN must pass a MOD 10 check-digit test.
- Cards are embossed with the Primary Account Number, Expiration Date, Company Name or generic Cardholder ID.

3.24.1 VISA Fleet Card Example



Figure 3-3 VISA Fleet Card: Driver Assigned Example



Figure 3-4 VISA Fleet Card: Vehicle Assigned Example

3.24.2 VISA Fleet Track 1 Format

Table 3-33 VISA Fleet Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	B
PRIMARY ACCOUNT NUMBER	3–20	13–19	N	Cardholder's PAN.
FIELD SEPARATOR	varies	1	A/N	^ (caret)
CARDHOLDER NAME	varies	2–26	A/N	Contains a maximum of 26 characters.
SEPARATOR	varies	1	A/N	^ (caret)
CARD EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
PIN VERIFICATION	varies	0 or 5	N	If used, this field is composed of two components.
PVKI		1	N	PIN Verification Key Index.
PVV		4	N	PIN Verification Value.
DISCRETIONARY DATA	varies	varies	A/N	
VISA RESERVED	varies	11	A/N	
FILLER		2	A/N	Zero-filled.
CVV		3	A/N	Card Verification Value.
FILLER		2	A/N	Zero-filled.
AUTHORIZATION CONTROL INDICATOR (ACI)		1	A/N	Zero or A to Z required.
RESERVED		1	A/N	0 (zero)
SERVICE ENHANCEMENT INDICATOR		1	A/N	<ul style="list-style-type: none"> • 0 = Fleet, No restriction (fuel, maintenance and non-fuel purchases) • 1 = Fleet (fuel and maintenance purchases only) • 2 = Fleet (fuel only) • 3–9 = Reserved

Table 3-33 VISA Fleet Track 1 Format (Continued)

Field Name	Position	Length	Format	Value/Description
SERVICE PROMPT		1	A/N	<ul style="list-style-type: none"> • 0 = Reserved (no prompt) • 1 = Generic Identification Number and ODOMETER¹ • 2 = VEHICLE ID and ODOMETER • 3 = DRIVER ID and ODOMETER • 4 = ODOMETER • 5 = No Prompt • 6 = Generic Identification Number² • 7–9 = Reserved (no prompt)
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by the encoding equipment.

1. SERVICE PROMPT 1: After prompt for an ID, cardholder enters 6-digit VEHICLE ID, DRIVER ID, or a generic identification number followed by Odometer.
2. SERVICE PROMPT 6: After prompt for an ID, cardholder enters 6-digit VEHICLE ID, DRIVER ID, or generic identification number.

3.24.3 VISA Fleet Track 2 Format

Table 3-34 VISA Fleet Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2 ^{varies}	13–19	N	Cardholder's PAN.
SEPARATOR	varies	1	A/N	= (equal sign)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
SERVICE CODE	varies	3	N	Identifies the circumstances under which the card can be used.
PIN VERIFICATION	26 varies if used	0 or 5	N	If used, this field is composed of two components.
PVKI		1	N	PIN Verification Key Index.
PVV		4	N	PIN Verification Value.
DISCRETIONARY DATA	varies	varies	N	
CARD VERIFICATION VALUE (CVV)		3	N	Identifies the Card Verification Value.

Table 3-34 VISA Fleet Track 2 Format (Continued)

Field Name	Position	Length	Format	Value/Description
ISSUER INFORMATION		varies	N	The length of this field depends on the length of PIN Verification and must occupy the third last position of the field. VISA Fleet cards are required to use the last three positions of this field to provide instructions for customized prompts. For valid BIN ranges, see A.1.2 VISA Fleet BIN Ranges, pg. 161 .
FLEET SERVICES		2	N	The third to last position from the END SENTINEL, valid value is zero. Service Enhancement Indicator. The value entered in this field must occupy the second last position of the field. <ul style="list-style-type: none"> • 0 = Fleet, No restriction (fuel, maintenance and non-fuel purchases) • 1 = Fleet (fuel and maintenance purchases only) • 2 = Fleet (fuel only) Note: The position of this field varies depending on the length of PIN Verification.
		1	N	Indicate the SERVICE PROMPT. <ul style="list-style-type: none"> • 0 = Reserved (no prompt) • 1 = Generic Identification Number and ODOMETER¹ • 2 = VEHICLE ID and ODOMETER • 3 = DRIVER ID and ODOMETER • 4 = ODOMETER • 5 = No Prompt • 6 = Generic Identification Number² • 7–9 = Reserved (no prompt)
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Value of 0 (zero) to F.

1. SERVICE PROMPT 1: After prompt for an ID, cardholder enters six-digit VEHICLE ID, DRIVER ID, or a generic identification number followed by Odometer.
2. SERVICE PROMPT 6: After prompt for an ID, cardholder enters six-digit VEHICLE ID, DRIVER ID, or generic identification number.

3.25 Voyager Fleet Card

- PAN must pass two MOD 10 check-digit tests. The 13th position is the check-digit for the previous eight digits. The 19th position is the check-digit for the previous 18 digits.
- Cards are embossed with the Account Number, ID Number, Restriction Code and Expiration Date.

3.25.1 Voyager Fleet Track 1 Format

Table 3-35 Voyager Fleet Track 1 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	% (percent sign)
FORMAT CODE	2	1	A/N	0 (zero)
PRIMARY ACCOUNT NUMBER	3–21	19	N	Cardholder's PAN.
FIELD SEPARATOR	22	1	A/N	^ (carat)
CARDHOLDER NAME	23–47	varies	A/N	Contains a maximum of 25 characters.
FIELD SEPARATOR	varies	1	A/N	^ (carat)
EXPIRATION DATE	varies	4	N	The date the card expires in YYMM format.
RESTRICTION CODE	varies	2	N	Code indicating the type of prompts that display for a customer transaction. <ul style="list-style-type: none"> • 00 = Do not prompt for ID Number or odometer. All items allowed. • 01 = Do not prompt for ID Number or odometer. Fuel only. • 10 = Prompt for ID Number. All items allowed. • 11 = Prompt for ID Number. Fuel only. • 20 = Prompt for odometer. All items allowed. • 21 = Prompt for odometer. Fuel only. • 30 = Prompt for ID Number and odometer. All items allowed. • 31 = Prompt for ID Number and odometer. Fuel only.
DISCRETIONARY DATA	varies	13	N	Contains a valid numeric value or be zero-filled.
END SENTINEL	varies	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	varies	1	A/N	Created by encoding equipment.

3.25.2 Voyager Fleet Track 2 Format

Table 3-36 Voyager Fleet Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1		A/N	; (semicolon)
PRIMARY ACCOUNT NUMBER	2–20	19	N	Cardholder's PAN.
FIELD SEPARATOR	21	1	A/N	= (equal sign)
EXPIRATION DATE	22–25	4	N	The date the card expires in YYYY format.
RESTRICTION CODE	26–27	2	N	Code indicating the type of prompts that display for a customer transaction. <ul style="list-style-type: none"> • 00 = Do not prompt for ID Number or odometer. All items allowed. • 01 = Do not prompt for ID Number or odometer. Fuel only. • 10 = Prompt for ID Number. All items allowed. • 11 = Prompt for ID Number. Fuel only. • 20 = Prompt for odometer. All items allowed. • 21 = Prompt for odometer. Fuel only. • 30 = Prompt for ID Number and odometer. All items allowed. • 31 = Prompt for ID Number and odometer. Fuel only.
DISCRETIONARY DATA	28–38	11	N	Will contain a valid numeric value or be zero-filled.
END SENTINEL	39	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	40	1	A/N	Created by encoding equipment.

3.26 WEX Fleet Card

- Account Number is seven positions in length where the first six digits must pass MOD 10 check-digit test. The seventh digit is the check-digit.
- Cards are embossed with the Account Number, ISO Number, Purchase Device Sequence Number, Expiration Date, Cardholder Name, Description and Restriction.

3.26.1 WEX Fleet Card Example



Figure 3-5 WEX Fleet Card Example

3.26.2 WEX GSA Fleet Cards

The following WEX GSA cards are to be treated just like any other WEX Fleet card.

- WEX Universal cards and WEX GSA cards have the same Track 2 layout.
- The card front for WEX Universal cards and WEX GSA cards differs, as the placement of the six-digit ISO of 690046, the 13-digit Account Number, and five-digit value for the Purchase Device Sequence Number varies by card type.
- WEX Universal cards display the 690046 ISO below the 13-digit Account Number, and label the five-digits Purchase Device Sequence Number as the PURCH. DEV. SEQ. NO.
- WEX GSA Fleet cards display the 690046 ISO above the 13-digit Account Number and place the five-digit Purchase Device Sequence Number after the 13-digit Account Number, with no distinct label.
- WEX Dept of Defense cards and Dept of Energy cards display the 690046 ISO above the 13-digit Account Number and label the five-digit Purchase Device Sequence Number as CARD NO.



Figure 3-6 WEX GSA Fleet



Figure 3-7 WEX Dept. of Defence Fleet



Figure 3-8 WEX Dept. of Energy Fleet

3.26.3 WEX Fleet Track 2 Format

Table 3-37 WEX Fleet Track 2 Format

Field Name	Position	Length	Format	Value/Description
START SENTINEL	1	1	A/N	; (semicolon)
ISO PREFIX	2	6	N	See A.6 Fleet Card BIN Ranges, pg. 245 .
PRIMARY ACCOUNT NUMBER	3–20	19	N	Cardholder's PAN.
FIELD SEPERATOR	21	1	A/N	= (equal sign)
EXPIRATION DATE	22–25	4	N	The date the card expires in YYMM format.
PROMPT TABLE KEY	26	1	N	Values are 0, 1, 2, 3, 4 or 5.
PURCHASE RESTRICTION	27–28	2	N	<ul style="list-style-type: none"> • 00 = Fuel Only • 01 = Unrestricted • 02 = Fuel and Auto (Includes Car Wash) • 04 = Fuel and Oil <p>Note: Product restriction or validation is only performed by the POS when processing in offline mode. Product restriction or validation is never performed by the Host.</p>
PURCHASE DEVICE SEQUENCE NUMBER	29–33	5	N	Distinct from the prompt Vehicle ID.
CAV1	34–37	4	N	Card Authentication Value.
POS PROMPTS	38	1	N	Refer to the <i>Heartland POS Integrator's Guide</i> for WEX Fleet Prompting Values.
END SENTINEL	39	1	A/N	? (question mark)
LONGITUDINAL REDUNDANCY CHECK (LRC)	40	1	A/N	Created by encoding equipment.

3.26.4 WEX MOD 10 Calculation

WEX defines their Fleet number as:

- ISO – six numeric
- Client Id – four numeric
- Zeros – two numeric
- Account Number – six numeric
- Check Digit – one numeric

To calculate the Check Digit, follow these steps:

- Examine the six-digit Account Number, one digit at a time
- Result 1 = Multiply digit 1 by 1
- Result 2 = Multiply digit 2 by 2
- Result 3 = Multiply digit 3 by 1
- Result 4 = Multiply digit 4 by 2
- Result 5 = Multiply digit 5 by 1
- Result 6 = Multiply digit 6 by 2

If any of these Results (1 through 6) are > 9, then subtract 9 from that Result

The sum of all Results (1 through 6) = the Dividend

Divide the Dividend by 10 resulting in a Quotient and a Remainder

The Remainder = the MOD10-Value

If the MOD10-Value is not equal to **0**, compute MOD10-Value = 10 minus MOD10-Value

Move MOD10-Value to Check Digit

Chapter 4: E3 Processing Overview

4.1 Introduction

Heartland Secure™ is a comprehensive credit/debit card data security solution that combines three powerful technologies working in tandem to provide merchants with the highest level of protection available against card-present data fraud.

Offered to Heartland customers for no additional processing fees as part of Heartland's comprehensive solutions, Heartland Secure combines:

- EMV electronic chip card technology to prove that a consumer's card is genuine.
- Heartland's E3® end-to-end encryption technology, which immediately encrypts card data as it is acquired so that no one else can read it.
- Tokenization technology, which replaces card data with “tokens” that can be used for returns and repeat purchases, but are unusable by outsiders because they have no value.

This guide focuses on Heartland's E3 end-to-end encryption solution and contains integration information for POS systems. It serves as a companion to Heartland's host network specifications and the E3 device programmer's manuals. These documents should be referred to for more detailed information.

4.2 The E3® Solution

E3, an end-to-end encryption product by Heartland Payment Systems, is designed to protect credit and debit card data from the moment of card swipe and through the Heartland network — not just at certain points of the transaction flow.

E3 is based on Voltage Security's SecureData Payments product which provides a complete payment transaction protection framework, built on two breakthrough technologies encompassing encryption and key management: Voltage Format-Preserving Encryption (FPE) and Voltage Identity-Based Encryption (IBE).

With Voltage Format-Preserving Encryption (FPE), credit card numbers and other sensitive data are protected without the need to change the data format or structure. In addition, data properties are maintained, such as a checksum, and portions of the data can remain in the clear.

With Voltage Identity-Based Encryption (IBE), the complexity of key management through traditional Public Key Infrastructure (PKI) systems and symmetric key systems is eliminated — because encryption keys are securely generated on demand and not stored, POS devices are not subject to key injection and key rotation.

4.3 Encryption Data

4.3.1 Encrypted Track and PAN Data

Depending on the configuration of your E3-capable card acceptance device, the E3 encrypted Track and PAN data will be formatted using one of two Track Encryption Protocol (TEP) algorithms, TEP1 or TEP2. TEP1 is whole track encryption, while TEP2 is structure preserving encryption.

Example: The following data was produced by an E3-capable device using Heartland's VISA test card:

Table 4-1 PAN Encryption

Cleartext	4012002000060016
TEP2	4012002650330016
TEP1	+++++++BWmfv/HUA

Table 4-2 Track 1 Encryption

Cleartext	%B4012002000060016^VI TEST CREDIT^251210118039000000000396?
TEP2	B4012007060016^VI TEST CREDIT^2512101XlWd91O5qOg+7Ftv+nLu
TEP1	3FLr83Ed5tiHN3r2CpT3kIndkhtiHRt3mtKQsozJ2rFQM8GE0ha2X7K6t

Table 4-3 Track 2 Encryption

Cleartext	;4012002000060016=25121011803939600000?
TEP2	4012007060016=2512101e3vdC5QhAEZa7UAN
TEP1	AsbjXkDWaRqLV0o5U33jffZqiPg

For TEP2, the following is guaranteed:

- The leading six digits of the original PAN are maintained in the clear.
- The trailing four digits of the original PAN are maintained in the clear.
- The middle digits are used for the ciphertext value, which is guaranteed to consist solely of digits.
- The Luhn check value is preserved so that a PAN with a valid zero (0) result, creates ciphertext that also checks as valid.

For TEP1, the device will provide a separate masked or obfuscated representation of the track data for processing that requires the first six or last four digits of the PAN, cardholder name, expiration date, Luhn check results, etc.

4.3.2 Encrypted Card Security Code

The Card Security Code (CSC) printed on the back of the card, referred to as CAV2, CVC2, CVV2, or CID depending on the card brand, can be optionally encrypted.

The value to be encrypted is constructed as follows:

- Length [1 digit]
- Random Filler [x digits]
- CSC [3 or 4 digits]

Table 4-4 Encrypted CSC Steps

Step	Example Data
1. Obtain the CSC value (either 3 or 4 digits)	572
2. Generate a random 3-digit number	413
3. Construct the value to be encrypted	3413572
4. Encrypt the value	9037662

Note: The total length of the encrypted CSC will always be seven digits. Typically, the device will randomly generate two or three digits of filler to ensure the CSC is seven digits.

4.3.3 Encryption Transmission Block

The Encryption Transmission Block (ETB), sometimes referred to as a Key Transmission Block (KTB), contains the IBE encrypted version of the device's randomly generated FPE key that was used to encrypt the card data. The ETB must be sent in the authorization requests so that the host can decrypt the card data.

Heartland's ETB must be Base64 encoded, and for TEP1 and TEP2 it must be 276 bytes.

For example:

```
/wECAQEEAoFGAgEH3gcOTDT6jRZwb3NAc2VjdXJlZXhjaGFuZ2UubmV0tmp15zBEIeyea
DRWB0I1bnWdMjK32V4QIJRoRIpu1Fm9w8fdoJt1gLt2jkkliD+0kvFORhspWh4dsDYvSH
GgdgetU3pfAx+iBS38Wq2KvTO0lueGvXcGe0y4G/DFVgT7zBHm1YS7cseYLEtADtoSnhB
UjasCci05ul9GhesvQo8Ah7NM8geDZdKN0QZZiLH8cmYhgHp8kamxSciDJHARUO9tFb+h
```

4.4 E3 Specific Requirements

4.4.1 Heartland Exchange

This section addresses specific requirements for E3 terminals using the Heartland Exchange Message Specification. All card types may be sent using E3 encryption.

4.4.1.1 Unique Transaction ID (UID)

Heartland's Unique Transaction ID (UID) is a software solution that eliminates the need for a POS application to store the account number or track data for subsequent processing such as Voids/Incrementals, and Batch Settlement. The UID is returned by the Heartland Exchange Host in the Authorization response messages. This application is not available on other Heartland Host platforms.

- **Voids/Incrementals:** The Account Data Source field will be 'Z' or 'z' to indicate that the UID is being used instead of track or Primary Account Number (PAN) data. The Customer Data field will contain the UID which is the Retrieval Reference Number (RRN) from the Authorization.
- **Batch Settlement:** The Primary Account Number field in the Batch Settlement Detail Record will be filled with all spaces to indicate that the UID is being used instead of PAN data. The Transaction Identifier field in the Batch Settlement Detail Record is the Transaction Identifier from the Authorization and it contains the UID.

4.4.1.2 Merchant ID Number (MID)

Merchant ID Number is a 12 character field that contains a unique number assigned by Heartland. If your E3 implementation encrypts the MID, then the E3 sub-encryption indicator in the Key Block Data field must indicate the MID is encrypted (**01** or **02** as appropriate).

4.4.1.3 Account Data Source

The Account Data Source field is used to indicate the source and format of the data contained in the Customer Data field. Refer to the Exchange Host Specification for a complete list of Account Data Source codes.

4.4.1.4 Customer Data

The Customer Data field contains the Key Block data and either the Cardholder Account data or the Unique Transaction ID. The Cardholder Account data may be either the encrypted Track 1, encrypted Track 2, or encrypted primary account number. The unique transaction ID is never encrypted. Refer to the Exchange Host Specification for the Customer Data format.

4.4.1.5 Retrieval Reference Number (RRN)

The Retrieval Reference Number field contains a value that uniquely identifies a transaction. The Retrieval Reference Number is sent in an authorization response. The POS then uses the RRN in voids and incrementals to identify the original transaction.

4.4.1.6 Transaction Identifier

The Transaction Identifier field contains the UID. The Transaction Identifier is sent in an authorization response.

4.4.1.7 Authorization Example

The following examples shows highlighted fields that are used in the POS message to Heartland messaging:

- Encrypted Track 1 Data
- Encrypted Track 2 Data
- KTB (Key Transmission Block)
- PAN (Primary Account Number)

Table 4-5 Authorization Examples

Request	Response
<p>For Encrypted Card Swipes:</p> <p>The following request fields require specific handling:</p> <ul style="list-style-type: none"> • MID (Merchant ID Number) – This field will be either the unencrypted, cleartext MID or the encrypted MID if supported. • Account Data Source – This field will indicate that either encrypted Track 1 or Track 2 data is being sent: <ul style="list-style-type: none"> – “h” = Encrypted Track 1 – “d” = Encrypted Track 2 • Customer Data – This field will be <Key Block Data><FS><Encrypted Track 1 or Track 2 Data>, where <Key Block Data> is “v” (Voltage encryption)+ “01”, “02”, or “03” as appropriate + KTB. <p>Example: v03/wECAQECAoFGAgEH2ggJTHLeIBZwb3NAc2 VjdXJIZXhjaGFuZ2UubmV0aFLXu2XTNLs6jlk3Bakt bFZrdJ26dX85BjkkngQnmk+3tOhXRvILvASHnfmao0y 15z7KNBx6Na7ekL+hryGQ3oPOcOVkEzei83Clsc 9QSfQJWB9ysAynGc6btccnrfjwyJn70KJ1cqQrw 623ASSWm57Hov2fMtWmPpYpQRr54oAoXZY jUajd0sRXcN5XeD5BhpE/Wzd4Ayn+342BGUL 0N7hWKm<FS>V2uvVFzWkBTNzcX7vcrWTi4 jV9AtG2bLYJkCOi+OA2aY2OiRmw/0ZSQcH</p>	<p>The following response fields require specific handling:</p> <ul style="list-style-type: none"> • RRN (Retrieval Reference Number) – This field will be used as the UID (Unique Transaction ID) for subsequent messages such as voids. • Transaction Identifier – This field will be used as the UID in the batch settlement detail record.
<p>For Encrypted Manual Entry from E3 PIN Pad:</p> <p>The following request fields require specific handling:</p> <ul style="list-style-type: none"> • Merchant ID Number – This field will be the unencrypted, cleartext MID. • Account Data Source – This field will indicate that an encrypted PAN is being sent: <ul style="list-style-type: none"> – n “x” = Encrypted, manually keyed PAN, Track 1 capable – n “t” = Encrypted, manually keyed PAN, Track 2 capable • Customer Data – This field will be <Key Block Data><FS><Encrypted Primary Acct Num><FS><Exp Date><FS>, where <Key Block Data> is “v” (Voltage encryption) + “03” (sub-encryption indicator that only PAN is encrypted, not MID) + KTB from the E3 PIN Pad. <p>Example: v03/wECAQECAoFGAgEH2ggJTHLeIBZwb3NAc 2VjdXJIZXhjaGFuZ 2UubmV0aFLXu2XTNLs6jlk3Ba ktbFZrdJ26dX85BjkkngQnm k+3 tOhXRvILvASHnfmao0yl5z7 KNBx6Na7ekL+hryGQ3oPOcOVkE zei83Clsc9QSf QJWB9ysAynGc6btccnrfjwyJn70KJ1 cqQrw623ASSWm57Hov2fMtWmPpYpQRr 54oAoXZYjUajd0sRXcOn5XeD5BhpE/Wzd4Ayn+3 42BGULON7hWKm<FS>+++++X8zr5YaCZ<FS>1012</p>	

Note:

- Refer to section Authorization Chapter in the Heartland Exchange specification for all other fields.
- UIDs are used to retrieve a transaction's account data for Voids, Incrementals, and Batch Settlement. This eliminates the need to store or send encrypted or unencrypted track, PAN, or KTB data once authorization has occurred.
- For refunds/returns, Purchase Return (Transaction Code **CR**) must be utilized so that the returned UID can be used for settlement.
- For voice authorizations, Online Forced Purchase (Transaction Code **5S**) must be utilized so that the returned UID can be used for settlement.

4.4.1.8 Void/Incremental Example

A Void is required to cancel a previously authorized transaction. Online Auth Void (Transaction Code **59**), PIN Debit: Purchase Void (Transaction Code **A3**), or PIN Debit: Purchase Return Void (Transaction Code **A4**) should be used depending on the type of the original authorization.

An Incremental Authorization is required in certain industries such as Hotel/Lodging when the final amount due is more than 15% higher than the originally authorized amount.

For Voids/Incremental Requests the fields below require specific handling:

- Merchant ID Number – This field will be the unencrypted, cleartext MID.
- Account Data Source – This field will indicate that the UID is being sent instead of track or PAN data:
 - “z” = Original authorization request contained encrypted track or PAN data.
- Customer Data – This field will be <Key Block Data><FS><UID>, where <Key Block Data> is just “v03” – the KTB is not required in this case since no encrypted data is being sent, and <UID> is the RRN from the original authorization response.

Note: Refer to the Heartland Exchange Specification for all other fields.

Void/Incremental Responses – No specific fields in the Exchange Host response require specific handling.

4.4.2 Settlements

Batch transactions consist of a number of record types and require both request and responses.

4.4.2.1 Header Record Field Requirements

- Merchant ID Number – This field will be the unencrypted, cleartext MID.
- Key Block – This field will be just “v03” – the KTB is not required in this case since no encrypted data is being sent.

4.4.2.2 Detail Record Fields Requirements

- Account Data Source – This field will be the same value as was used in the original authorization request.
- Primary Account Number – This field will be filled with 22 spaces to indicate that the UID will be used.
- Transaction Identifier – This field will be the Transaction Identifier from the original authorization response (it contains the UID).

4.4.2.3 Settlement Notes

UIDs must be used for settlement, all other record fields in both the request and responses follow those defined in the Exchange Host Specifications.

Note: The only alternative supported on Exchange for settling E3 encrypted transactions is to send the encrypted PANs in the detail records, but that option requires that all transactions in the batch share the same KTB.

4.4.3 POS 8583

This section addresses specific requirements for E3 terminals using the POS 8583 message specification. All card types may be sent using E3 encryption. All transactions utilizing E3 processing will include E3 data in DE 127: Forwarding Data.

These transactions require the following:

- E3 data must always appear in DE 127: Forwarding Data (using an Entry Tag value of **E3E**.)

Note: Then encrypted CVV and ETB are attached to the E3 Data Block, while the encrypted track data and/or encrypted PAN are placed in their normal position in the authorization message.

- An account number must be more than 13 characters, the encrypted account number data cannot exceed 19 characters.
- Encrypted Track 1 data will not exceed 79 bytes.
- Encrypted Track 2 data will not exceed 40 bytes.

Response codes specific to E3 transactions are:

- DE 39 = 952 (Failure for E3 terminals only – encryption error)
- DE 39 = 953 (Failure for E3 terminals only – too many queued / no connection)

Table 4-6 POS 8583 Data Fields

Field Name	Length	Value/Description
RECORD ID	2	E3
RECORD TYPE	3	001
KEY BLOCK DATA TYPE	1	v = Voltage
ENCRYPTED FIELD MATRIX	2	<ul style="list-style-type: none"> • 03 = CustomerData • 04 = CustomerData, Card Security Code
TEP TYPE	1	<ul style="list-style-type: none"> • 1 = TEP 1 • 2 = TEP 2
RESERVED	18	Blank-fill
CARD SECURITY CODE	7	Encrypted CVV data. Unencrypted bytes defined as: <ul style="list-style-type: none"> • 1 = Length of actual CVV data • 2–7 = CVV data, right-justified, random fill, numeric only
RESERVED	45	Blank-fill
ETB LLL	3	Length of ETB Block.
ETB BLOCK	Varies	ETB cannot exceed 276 bytes.

4.4.4 NTS

This section addresses specific requirements for E3 terminals processing on the NTS network platform. All card types may be sent via E3 encryption. All transactions using E3 processing append additional data items at the end of the record, which signals to the host that the transaction is E3 encrypted.

These transactions require the following:

- E3 data must always appear at the end of a transaction. The POS terminal will append a 0x1D at the end of the transaction followed by the E3 data. Refer to [Table 4-7 NTS Data Fields, pg. 81](#).

Note: Then encrypted CVV and ETB are attached to the E3 Data Block, while the encrypted track data and/or encrypted PAN are placed in their normal position in the authorization message.

- POS must send spaces in the CVN field. This encrypted CVN value will be in the E3 Data Block.
- An account number must not be less than 13 characters and the encrypted account number data will not exceed 19 characters.
- Encrypted Track 1 data will not exceed 79 bytes.
- Encrypted Track 2 data will not exceed 40 bytes.

Response codes specific to E3 transactions are:

- 52 (Failure for E3 terminals only – encryption error)
- 53 (Failure for E3 terminals only – too many queued / no connection)

Table below shows the data items that must be appended to the end of an E3 transaction.

Table 4-7 NTS Data Fields

Field Name	Length	Value/Description
FIELD SEPARATOR	1	0x1D Indicator for E3 transaction (Hex: Constant ASCII). Must be appended at end of E3 transaction.
RECORD ID	2	E3
RECORD TYPE	3	001
KEY BLOCK DATA TYPE	1	v = Voltage
ENCRYPTED FIELD MATRIX	2	<ul style="list-style-type: none"> • 03 = Customer Data • 04 = Customer Data, Card Security Code
TEP TYPE	1	<ul style="list-style-type: none"> • 1 = TEP 1 • 2 = TEP 2
RESERVED	18	Blank-fill
CARD SECURITY CODE	7	Encrypted CVV data. Unencrypted bytes defined as: <ul style="list-style-type: none"> • 1 = Length of actual CVV data • 2-7 = CVV data, right-justified, random fill numeric only
RESERVED	45	Blank-fill
ETB LLL	3	Length of ETB Block.
EBT BLOCK	Varies	ETB should not exceed 276 bytes.

4.4.5 Z01

This section addresses specific requirements for E3 terminals processing on the Z01 network platform. All card types may be sent via E3 encryption. All transactions using E3 processing will append additional data items at the end of the record, which will signal to the Host that the transaction is E3 encrypted.

These transactions require the following:

- E3 data must always appear at the end of a transaction. The POS terminal will append a 0x1D at the end of the transaction followed by the E3 data as specified in [Table 4-8 Z01 Data Fields, pg. 83](#).

Note: The encrypted CVV and ETB are attached to the E3 Data Block, while the encrypted track data and/or encrypted PAN are placed in their normal position in the authorization message.

- POS must send spaces in AVS RESULT AND CID RESULT. The encrypted values are in the E3 Data Block.
- An account number must not be less than 13 characters and the encrypted account number data will not exceed 19 characters.
- Encrypted Track 1 data will not include the field separator 0x1C.
- Encrypted Track 2 data will not exceed 37 bytes.

Response codes specific to E3 transactions are:

- URC = EG, SRC = 8 (Failure for E3 terminals only – encryption error)
- URC = EH, SRC = 8 (Failure for E3 terminals only – too many queued / no connection)

Note: E3 transactions are not supported for TDC batch uploads.

Table 4-8 Z01 Data Fields

Field Name	Length	Value/Description
FIELD SEPARATOR	1	0x1D. Indicator for E3 transaction (Hex: Constant ASCII). Must be appended at end of E3 transaction.
RECORD ID	2	E3
RECORD TYPE	3	001
KEY BLOCK DATA TYPE	1	v = Voltage
ENCRYPTED FIELD MATRIX	2	<ul style="list-style-type: none"> • 03 = Customer Data • 04 = Customer Data, Card Security Code
TEP TYPE	1	<ul style="list-style-type: none"> • 1 = TEP 1 • 2 = TEP 2
RESERVED	18	Blank-fill
CARD SECURITY CODE	7	Encrypted CVV data. Unencrypted bytes defined as: <ul style="list-style-type: none"> • 1 = Length of actual CVV data • 2-7 = CVV data, right-justified, random fill, numeric only
RESERVED	45	Blank-fill
ETB LLL	3	Length of ETB Block.
EBT BLOCK	Varies	ETB should not exceed 276 bytes.

4.5 E3 Hardware Devices

The following section describes two hardware devices that use E3 encryption technology that integrates with Heartland Hosts:

- E3 MSR Wedge (HPS-E3-M1)
- E3 PIN Pad (HPS-E3-P1)

4.5.1 E3 MSR Wedge (HPS-E3-M1)

- Hardware-encrypts card data upon swipe.
- Incorporates a Tamper-Resistant Security Module (TRSM) to physically protect data and encryption keys.
- Available with USB and RS232 connectors.

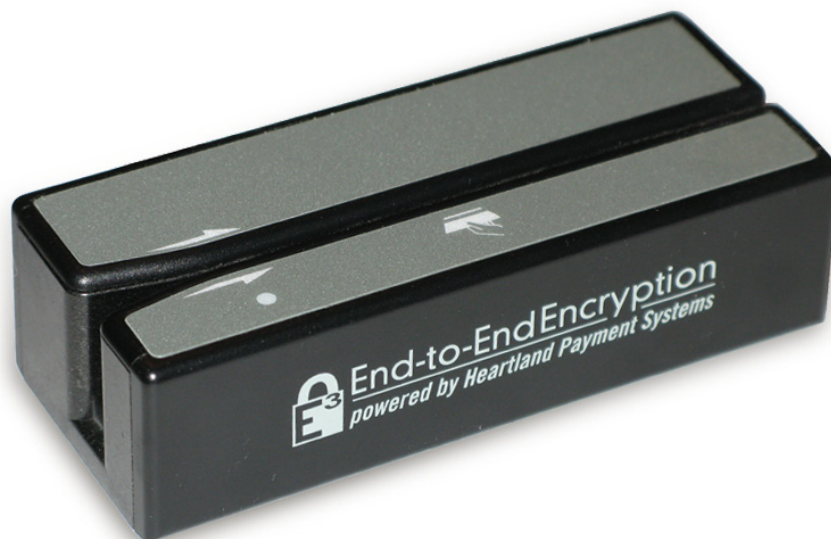


Figure 4-1 E3 MSR Wedge

4.5.2 E3 MSR Wedge Device Interface

Table 4-9 E3 MSR Wedge Operation Modes

Mode	Description
USB HID-KB	The POS system receives data from the E3 MSR Wedge as if sent from a standard USB keyboard. In this mode, you can see the output by opening a text editor such as Notepad and swiping a card. The output is in Format 2 per the programmer's manual.
USB HID-MSR	The POS system receives data from the E3 MSR Wedge via its native USB HID interface in Format 1. For this mode, an ActiveX control is available for web applications running on Internet Explorer and provides commands for obtaining the desired output components. Also, a command-line application is available that acquires and reformats the output as Format 2.
USB Virtual-COM or RS232	The POS system receives data from the E3 MSR Wedge via its native serial COM port interface, which outputs in Form 2. A virtual COM port driver is available for Windows. The RS232 wedge has a standard 9-PIN serial connector.

4.5.3 E3 MSR Wedge Example Output

See the following Format 2 example output from the E3 MSR Wedge:

```
<E1050711%B4012001000000016^VI TEST
CREDIT^251200000000000000000000?|
ycO0LNhgIU4XH7J1Lqg8BY6Vc25F3ft3qoTEeqk3wrx7KGh8JSrEUfAAW
|+++++++8q0sLWCB5|11;4012001000000016=25120000000000000000?|
7YIC67MkiJz1e6TL5Tdw90jCQ3F|+++++++8q0sLWCB5|00|||
/wECAQECAoFGAgEH1AESTDT6jRZwb3Nac2VjdXJlZXhjaGFuZ2UubmV0aXRuQf68kvJ3Sb
fATjjdctZ1BnX2gFQ3chN7Fq2s22bTq/rTVz17fLQ/j1CGGohcyB
vmmYxGs6ZLDyYL+8EWZFhhjQC7tIKaYMsdua4SxeYAg9wQGHczVI+tTKFXClWEQ8kCKZ6
zHkG5+jJzhjGpO2EWSe18DH3HiKMsDwM8Dca515b3GT+pc7XwwK8oEdU3gjOiRo4/fdPm
F/PPBxAET1z1PUq|>
```

4.6 E3 PIN Pad (HPS-E3-P1)

The E3 PIN Pad is compatible with standard PIN entry/encryption operations, but is also capable of functioning with MSR, Europay, MasterCard, and VISA (EMV) smart cards.

- Built-in MSR encrypts at the swipe and TRSM protects the data and keys.
- Hardware-encrypt manually-entered card numbers.
- Available with USB and RS232 connectors.



Figure 4-2 E3 PIN Pad

Table 4-10 E3 MSR Wedge Operation Modes

POS System	Direction	E3 PIN Pad
<STX>E1.3111219098025<ETX>[LRC]	→	“SWIPE CARD OR ENTER ACCOUNT #” is displayed on LCD.
	←	<ACK>
<STX>E2.030<ETX>[LRC]	→	
	←	<ACK>
	←	<p>If card is swiped...</p> <pre><STX>E3.11%B401200000000001 6^VI TEST CREDIT^25120000000 000000000000? V2uvVFzWkBT NzcX7vcrWTi4jV9AtG2bLYJkCO i+OA2aY2OiRmw/0ZSQcH ++++ +++X8zr5YaCZ<FS>11;4012000 000000016= 251 20000000000 000000? 7QjTe2v1Qy1L84Q+n6 zudfNOXf +++++++X8zr5YaCZ <FS>00 <FS>/wECAQ ECAoFGAgEH2ggJTHLeIBZwb3N Ac2VjdXJIZXhjaGFuZ2 UubmV0aFLxu2XTNLS6jlk3Baktb FZrdJ26dX85Bjkng Qnmk+3tOhX RVILvASHnfmao0yl5z7KNBx6Na 7ekL+hry GQ3oPOcOVkEzei8 3Clsc9QSfQJWB9ysAynGc6btccn fr fjwyJn70KJ1cqQrw623ASSWm 57Hov2fMtWmPpYpQRr54 oAoXZYjUajd0sRXCO5XeD5Bhp E/Wzd4Ayn+3 42BGUL0N7hWKm <ETX>[LRC]</pre> <p>or</p> <p>If card number is manually entered...</p> <pre><STX>E4.114012000000000016 <FS> +++++++X8zr5YCZ <FS>/wECAQECAoFGAgEH2g gJTHLeIBZwb3NA2VjdXJIZXhj aGFuZ2UubmV0aFLxu2XTNLS6 jlk3Baktb FZrdJ26dX85Bjkng Qnmk+3tOhXRvILvASHnfma o0yl5 z7KNBx6Na7ekL+hryGQ3 oPOcOVkEzei83Clsc9QSfQJW B9ysAynGc6btccnfrfjwyJn70KJ 1cqQrw623ASSWm57H ov2fM tWmPYpQRr54oAoXZYjUajd0 sRXCO5XeD5BhpE /Wzd4Ayn +342BGUL0N7hWKm<ETX>[LRC]</pre>

4.6.1 E3 PIN Pad Device Interface

The POS system transmits and receives data to/from the E3 PIN Pad via its native serial COM port interface. For the USB PIN pad, a virtual COM port driver is available for Windows. The RS232 PIN pad has a standard 9-PIN serial connector.

All messages are framed using standard VISA protocols:

- <STX>Message<ETX>[LRC]
- <SI>Message<SO>[LRC]

4.6.1.1 E3 PIN Pad Requests

The following messages are sent to the PIN pad to request E3 encrypted card data via card swipe and/or manual entry:

- <STX>E1.[entry_flag] [disp_flag] [mask_flag] [min len] [max len] [prompt1] [prompt2]<FS> [prossing_prompt]<ETX>[LRC]
- <STX>E2.[timeout]<ETX>[LRC]

4.6.1.2 E3 PIN Pad Responses

The following messages are returned from the PIN pad with E3 encrypted card data via card swipe or manual entry:

- Card Swipe: <STX>E3.[trk1]<FS>[trk2]<FS>[trk3]<FS>[ktb]<ETX>[LRC]
- Manual Entry: <STX>E4.[result] [luhn] [obf]<FS>[enc]<FS>[ktb]<ETX>[LRC]

4.6.2 Ingenico iPP300 and iSC Touch Series PIN Pads

You must sign up for an account at the [Ingenico Developer Portal](#) and mention that you are working with Heartland. Retail Base Application (RBA) Integration Kits, Software Development Kits (SDKs), and integration documentation for these devices can be downloaded from their portal.

The E3 encryption settings are contained in a digitally signed SECURITY.PGZ files. Work with Heartland to ensure that the appropriate file is loaded to your devices prior to certification testing or production deployment.

4.6.3 Equinox L4000 and L5000 Series PIN Pads

You must sign up for an account at the [Equinox Developer Portal](#) and mention that you are working with Heartland. Software Development Kits (SDKs) and integration documentation for these devices can be downloaded from their portal.

The E3 encryption settings are contained in XML files which must be specified for all forms (screens) from which card data is obtained, and the forms must be digitally signed. Equinox can provide a development key to sign the forms for use on a development device, but for production devices the forms will either need to be signed by Heartland, Equinox, or another entity that has the appropriate signing tools. Work with Heartland to ensure that the appropriate forms have been signed and loaded to your devices prior to certification testing or production deployment.

Chapter 5: EMV Processing Overview

5.1 Introduction

In 1996, **E**uropay, **M**asterCard, and **V**ISA first published the “EMV” specifications for the use of chip cards for payment. EMV[®] is now a registered trademark of EMVCo, LLC, an organization jointly owned and operated by American Express, Discover, JCB, MasterCard, UnionPay, and VISA.

EMVCo manages, maintains, and enhances the EMV Integrated Circuit Card Specifications to help facilitate global interoperability and compatibility of payment system integrated circuit cards and acceptance devices. EMVCo maintains and extends specifications, provides testing methodology, and oversees the testing and approval process.

The EMV Specifications provide a global standard for credit and debit payment cards based on chip card technology. Payment chip cards contain an embedded microprocessor, a type of small computer that provides strong security features and other capabilities not possible with traditional magnetic stripe cards.

Chip cards are available in two forms, contact and contactless.

- For contact, the chip must come into physical contact with the chip reader for the payment transaction to occur.
- For contactless, the chip must come within sufficient proximity of the reader (less than 4 cm) for the payment transaction to occur. Some cards may support both contact and contactless interfaces, and non-card form factors such as mobile phones may also be used for contactless payment.

Heartland recommends that vendors become familiar with general EMV processing prior to initial implementation at Heartland. A good overview of EMV is available from EMVCo at: http://www.emvco.com/best_practices.aspx?id=217.

5.2 EMV Migration

5.2.1 Enhanced Security

EMV is designed to significantly improve consumer card payment security by providing features for reducing fraudulent transactions that result from counterfeit and lost and stolen cards. Due to increased credit card breaches, this enhanced security has become a significant necessity.

The key security features are:

Table 5-1 Key Security Features

Key Security Feature	Description
Card Authentication	The terminal can authenticate the legitimacy of the card by using a public-key infrastructure (PKI) and Rivest, Shamir, and Adleman (RSA) cryptography to validate signed data from the card. The issuer can authenticate the legitimacy of the card by validating a unique cryptogram generated by the card for each payment transaction. These features will help protect against counterfeit fraud.
Risk Management	EMV introduces localized parameters to define the conditions under which the issuer will permit the chip card to be used and force transactions online for authorization under certain conditions such as offline limits being exceeded.
Transaction Integrity	Payment data such as purchase and cashback amounts are part of the cryptogram generation and authentication processing, which will help ensure the integrity of this data across authorization, settlement, and clearing.
Cardholder Verification	More robust cardholder verification processes and methods such as online PIN (verified online by issuer) and offline PIN (verified offline by card) will help protect against lost and stolen fraud.

5.2.2 Card Brand Mandates

Effective April 2013, acquirer processors and sub-processor service providers are required to support merchant acceptance of EMV chip transactions.

5.2.3 Fraud Liability Shifts

Effective October 2015 (or October 2017 for automated fuel dispensers), a merchant that does not support EMV assumes liability for counterfeit card transactions.

There are two types of liability shifts:

Table 5-2 Liability Shifts

Liability Shift	Description
Chip Liability Shift	An issuer may charge back a counterfeit fraud transaction that occurred at a non-EMV POS terminal if the valid card issued was a chip card.
Chip/PIN Liability Shift	An issuer may charge back a lost or stolen fraud transaction that occurred at an EMV POS terminal that was not PIN-capable if the card involved was a PIN-preferring chip card. A PIN-preferring chip card is defined as an EMV chip card that has been personalized so that a PIN CVM option (online PIN or offline PIN) appears in the card's CVM list with a higher priority than the signature option.

5.2.4 PCI Audit Waivers

Effective October 2012, the card brands will waive PCI DSS compliance validation requirements if the merchant invests in contact and contactless chip payment terminals. For example, VISA's Technology Innovation Program (TIP) provides PCI audit relief to qualifying merchants (Level 1 and Level 2 merchants that process more than 1 million VISA transactions annually) when 75 percent of the merchant's VISA transactions originate at a dual-interface EMV chip-enabled terminal. MasterCard offers a similar program.

5.3 EMV Specifications

This document provides guidelines for EMV integration, but it does not contain all the EMV requirements. It should be used in conjunction with the following documents:

5.3.1 Contact Specifications

For EMV contact card acceptance, device manufacturers and payment application developers **must** adhere to the following specifications:

Table 5-3 Contact Specifications

Source	Specification
EMVCo	<ul style="list-style-type: none"> • EMV Specifications v4.3 (Nov 2011) – http://www.emvco.com/specifications.aspx?id=223 <ul style="list-style-type: none"> – Book 1: Application Independent ICC to Terminal Interface Requirements – Book 2: Security and Key Management – Book 3: Application Specification – Book 4: Cardholder, Attendant, and Acquirer Interface Requirements
VISA	<ul style="list-style-type: none"> • Transaction Acceptance Device Guide v3.0 (May 2015) • Integrated Circuit Card Specification v1.5 (May 2009)
MasterCard	<ul style="list-style-type: none"> • U.S. Market Terminal Requirements (April 2014)
American Express	<ul style="list-style-type: none"> • AEIPS Terminal Implementation Guide v4.3 (April 2015) • AEIPS Terminal Technical Manual v4.3 (April 2015)
Discover	<ul style="list-style-type: none"> • Contact D-PAS Acquirer Implementation Guide v3.0 (Jan 2015) • D-PAS Terminal Specification v1.0 (Jun 2009)

5.3.2 Contactless Specifications

For EMV contactless card acceptance, device manufacturers and payment application developers **must** adhere to the following specifications:

Table 5-4 Contactless Specifications

Source	Specification
EMVCo	<ul style="list-style-type: none"> • EMV Contactless Specifications v2.5 (Mar 2015) – http://www.emvco.com/specifications.aspx?id=21 <ul style="list-style-type: none"> – Book A: Architecture and General Requirements – Book B: Entry Point – Books C [C-1, C-2, C-3, C-4, C-5, C-6, C-7]: Kernel Specifications – Book D: Contactless Communication Protocol
VISA	<ul style="list-style-type: none"> • Transaction Acceptance Device Guide v3.0 (May 2015) • Contactless Payment Specification v2.1 (May 2009)
MasterCard	<ul style="list-style-type: none"> • U.S. Market Terminal Requirements (Apr 2014) • Contactless Reader Specification v3.1 (Jun 2015)
American Express	<ul style="list-style-type: none"> • Contactless NFC Terminal Implementation Guide v1.0 (Mar 2014) • Expresspay Terminal Specification v3.0 (Feb 2012)
Discover	<ul style="list-style-type: none"> • Contactless D-PAS Acquirer Implementation Guide v1.0 • Contactless D-PAS Terminal Application Specification v1.0

5.3.3 Heartland Host Specifications

Information given in this document for each network platform is meant to be an overview only. The latest version of these Heartland platform specifications should be used for complete message requirements and formats:

Table 5-5 Heartland Host Specifications

Platform	Specification
Exchange	<ul style="list-style-type: none"> • Exchange Host Specifications
Portico	<ul style="list-style-type: none"> • Portico Developer Guide
NWS	<ul style="list-style-type: none"> • Z01 Specifications • POS 8583 Specifications • SpiDr Specifications Developer's Guide
VAPS	<ul style="list-style-type: none"> • Network Terminal Specifications (NTS) • POS 8583 Specifications • SpiDr Specifications Developer's Guide

5.4 EMV Online vs. Offline

In the magstripe world, the term “offline” is often associated with certain types of transactions that may occur when host communications are down, such as voice authorization, deferred authorization (i.e. store and forward), and forced acceptance (i.e. merchant/acquirer stand-in). Those same transactions can still occur in the EMV world as well, but there are several additional uses of the term “offline” for EMV.

5.4.1 Card Authentication

Table 5-6 Card Authentication

<u>Online</u> Card Authentication	vs.	<u>Offline</u> Card Authentication
The transaction is sent online to an issuer who authenticates the CVV in the track data for swiped transactions, or CVV2 on the back of the card for manually entered transactions.		The card may be authenticated offline by the terminal using a PKI and RSA cryptography to verify that certain static and/or dynamic data elements have been digitally signed by the legitimate card issuer.

5.4.2 Cardholder Verification

Table 5-7 Cardholder Verification

<u>Online</u> Cardholder Verification	vs.	<u>Offline</u> Cardholder Verification
The transaction is sent online to an issuer who verifies that the online PIN or AVS data is correct.		An offline PIN may be securely stored on the card, so the PIN entered on the PIN entry device may be sent to the card in plaintext or enciphered format to be validated by the card.

5.4.3 Authorization

Table 5-8 Authorization

<u>Online</u> Authorization	vs.	<u>Offline</u> Authorization
The transaction is sent online to an issuer who approves or declines the transaction.		Based on the amount of the transaction, and the risk management criteria established by the card and the terminal, a transaction may be approved or declined by the card on behalf of the issuer, either with or without attempt to go online to the issuer.

5.5 Full vs. Partial EMV Transactions and Flow

EMV POS solutions typically support both “full” EMV transactions and “partial” EMV transactions as follows:

Table 5-9 Full vs. Partial EMV Transactions and Flow

EMV Transaction	Description
Full EMV Transactions	Transactions such as Purchases and Pre-Authorizations where the full EMV transaction flow (i.e. the interaction between the card and terminal) is performed and the card participates in the authorization decision, whether online or offline.
Partial EMV Transactions	Transactions such as Returns and Reversals where the EMV transaction flow is only partially performed to the extent necessary to get the card data from the chip and the card does not participate in the authorization decision.

5.5.1 Full vs. Partial Transaction Flow

Table 5-10 Full vs. Partial Transaction Flow

EMV Transaction Step	Full EMV	Partial EMV	Notes
Card Acquisition	✓	✓	Card is inserted or tapped.
Application Selection	✓	✓	
Initiate Application Processing	✓	✓	
Read Application Data	✓	✓	
Offline Data Authentication	✓		
Processing Restrictions	✓		
Cardholder Verification	✓		
Terminal Risk Management	✓		
Terminal Action Analysis	✓	✓	For partial EMV transactions, the terminal requests an AAC at 1 st GENERATE AC to terminate card usage.
Card Action Analysis	✓	✓	For partial EMV transactions, the card always returns an AAC.
Online Processing	✓		
Issuer Authentication	✓		
Completion	✓		
Issuer Script Processing	✓		
Card Removal	✓	✓	Prompt to remove card if it was inserted.

5.5.2 Full vs. Partial Credit Transactions

Table 5-11 Full vs. Partial Credit Transactions

EMV Transactions	Full EMV	Partial EMV	Notes
Bill Payment	✓		
Card Verify	✓		
Cash Advance	✓		
Incremental Authorization			No chip data should be sent.
Offline Decline Advice	✓		AAC received at 1 st GENERATE AC or due to failed Issuer Authentication at 2 nd GENERATE AC.
Offline Purchase Advice	✓	✓	Full for EMV offline approvals where TC received at 1 st GENERATE AC or after failed host communications at 2 nd GENERATE AC. Partial for voice authorizations if PAN obtained from chip.
Online Purchase	✓		ARQC received at 1 st GENERATE AC.
Pre-Authorization	✓		
Pre-Auth Completion			No chip data should be sent.
Purchase Return		✓	To obtain PAN from chip if needed.
Reversal on Timeout			PAN and chip data from original authorization should be sent unless otherwise stated in the network specifications. (This is currently not applicable for the NTS platform.) Note: No EMV data will be returned in the response.
Void			PAN and chip data from original authorization should be sent. This should be the final chip data available from the original authorization. Typically, this would be from the 2 nd GEN AC for contact and from the 1 st GEN AC for contactless. Note: No EMV data will be returned in the response.

5.5.3 Full vs. Partial Debit Transactions

Table 5-12 Full vs. Partial Debit Transactions

EMV Transactions	Full EMV	Partial EMV	Notes
Offline Decline Advice	✓		AAC received at 1 st GENERATE AC or due to failed Issuer Authentication at 2 nd GENERATE AC.
Online Purchase	✓		ARQC received at 1 st GENERATE AC.
Pre-Authorization	✓		
Pre-Auth Completion			No chip data should be sent.
Purchase Return	✓		ARQC received at 1 st GENERATE AC.
Reversal on Timeout			PAN and chip data from original authorization should be sent. Note: No EMV data will be returned in the response.
Void			PAN and chip data from original authorization should be sent. This should be the final chip data available from the original authorization. Typically, this would be from the 2 nd GEN AC for contact and from the 1 st GEN AC for contactless. Note: No EMV data will be returned in the response for Void.

Chapter 6: EMV Development Overview

6.1 EMV Terminals

In order to develop an EMV POS solution, an approved EMV transaction acceptance device must be used. In this document all such devices, whether they are a countertop terminal, multi-function PIN pad, multi-lane signature capture device, automated fuel dispenser module, etc., will be referred as a 'terminal'.

6.1.1 Contact Devices

For EMV contact card acceptance, use any terminal if **all** of the following criteria apply:

- Contains an EMVCo Level 1 Contact approved Interface Module (IFM) evaluated against the EMV ICC Specifications, Book 1 v4.0 or later.
- Contains a MasterCard Terminal Quality Management (TQM) approved IFM.
- Is running an EMVCo Level 2 Contact approved application kernel evaluated against the EMV ICC Specifications v4.3 or later.
- Contains a PCI PTS 2.x, 3.x or 4.x approved PIN Entry Device (PED) or Encrypting PIN Pad (EPP), if you plan to support PIN.

6.1.2 Contactless Devices

For EMV contactless card acceptance, use any terminal if **all** of the following criteria apply:

- Contains an EMVCo Level 1 Contactless approved Proximity Coupling Device (PCD) evaluated against the EMV Contactless Specifications, Book D v2.2 or later.
- Contains a MasterCard TQM approved PCD.
- Is running a VISA approved payWave application kernel evaluated against the VISA Contactless Payment Specification v2.1.1 or later.
- Is running a MasterCard approved MasterCard Contactless application kernel approved against the MasterCard Contactless Reader Specification v3.0.1 or later.
- Is running an American Express approved Expresspay application kernel evaluated against the Expresspay Terminal Specification v3.0 or later.
- Is running a Discover approved D-PAS application kernel evaluated against the Contactless D-PAS Terminal Payment Application v1.0 or later.
- Contains a PCI PTS 2.x, 3.x or 4.x approved PED or EPP, if you plan to support PIN.

REQUIREMENT

An EMV POS Solution cannot be certified unless the EMVCo Level 1 and Level 2 Letters of Approval for your terminal(s) of choice are current and not about to expire.

6.1.3 Letters of Approval

The EMVCo and PCI approval numbers and/or Letters of Approval (LoAs) can be obtained from their respective websites:

- <http://www.emvco.com/approvals.aspx?id=83>
- https://www.pcisecuritystandards.org/approved_companies_providers/approved_pin_transaction_security.php

The other approval numbers and/or LoAs can be obtained from the device supplier or manufacturer.

6.2 EMV Solutions

The type of EMV POS solution to be developed is an important consideration as this will determine the level of expertise needed, the amount of time it will take and whether a full EMV certification will be required.

6.2.1 Integrated

Integrated solutions typically involve an Electronic Cash Register (ECR) that is connected to a terminal containing the EMV kernel and providing all EMV functionality including card acquisition and PIN entry.

Table 6-1 Integrated Solutions

Integrated Solution	Description
Fully Integrated	The terminal provides the EMV functionality, but the ECR still handles card data and host communication. Therefore, it is in scope for PCI and full EMV certification.
Semi-Integrated	The terminal not only provides the EMV functionality, but also handles the host communication, so the ECR does not see the card data. Therefore, the ECR is not in scope for PCI or full EMV certification. Only a minimal EMV validation script must be run for semi-integrated solutions.

6.2.2 Standalone

Standalone solutions consist of a terminal that runs the POS software, contains the EMV kernel and provides all EMV functionality. PIN entry occurs on an internal or external PIN pad and if contactless is supported, the reader may be integrated into the terminal or be a separate device. A standalone solution is in scope for PCI and full EMV certification.

6.3 EMV Certifications

Magstripe swiped and key entered transactions will continue to be certified directly through Heartland per the existing processes already in place. However, EMV requires additional certifications. Each card brand has its own proprietary chip applications that run on EMV cards bearing their brand. For that reason, each card brand has its own certification requirements that must be met and submitted for approval.

6.3.1 Test Requirements

The card brand certification requirements must be met for each distinct POS configuration that will be deployed, which is defined by a unique combination of:

- The **kernel software**, which includes the Level 2 Contact Application Kernel and/or Level 2 Contactless Application Kernel (payWave, MasterCard Contactless, Expresspay, etc.).
- The **terminal application software**, which includes the payment application software and the terminal-to-acquirer communication software.
- The **specific terminal configuration**, which includes use of a particular EMVCo Level 2 approved kernel configuration for the specific Terminal Type, Terminal Capabilities and other relevant terminal parameter settings.
- The **complete connection path** from the terminal to the card brand.

The card brand certification requirements must be met when any of the following occurs:

- A particular POS configuration is deployed for the first time.
- A major upgrade is made to an already deployed POS configuration.
- The terminal hardware and software is upgraded and the change is major according to the EMVCo Type Approval Bulletin No. 11 (<http://www.emvco.com/approvals.aspx?id=108>).
Note: Replacing the IFM with another approved IFM is not considered a major change.
- A contact terminal is upgraded to support contactless transactions.
- The terminal application software is upgraded to support additional payment related functionality such as the partial approval, purchase with cash back, purchase with gratuity, cardholder application selection, etc.
- The Level 2 kernel configuration is modified.
- The terminal is upgraded to support an additional AID.
- The acquirer modifies its network in such a way that it affects the transaction message mapping between the POS and the acquirer host that interfaces with the card brand networks.
- The card brand requests it, for instance, in the scope of the ad-hoc resolution of a field interoperability issue.

REQUIREMENT

If an EMV POS Solution supports multiple kernel configurations, multiple certifications will be required, one for each kernel configuration that will be used in production.

6.3.2 Test Plans

The following card brand test plans must be executed for full EMV certifications:

- [VISA Smart Debit/Credit \(VSDC\) Testing](#)
- [MasterCard Terminal Integration Process \(M-TIP\) Testing](#)
- [American Express Integrated Circuit Card Payment Specification \(AEIPS\) Testing](#)
- [Discover D-Payment Application Specification \(D-PAS\) Testing](#)

6.3.2.1 VISA Smart Debit/Credit (VSDC) Testing

Table 6-2 VSDC Testing

Test Plan	Description
Acquirer Device Validation Toolkit (AT) User Guide v6.1.1	Up to 32 test cases for EMV contact card acceptance.
qVSDC Device Module Test Cases v2.1	Up to 89 test cases for EMV contactless card acceptance. Required for stand-alone contactless readers. Optional for dual-interface (contact and contactless) integrated readers.
Contactless Device Evaluation Toolkit (CDET) User Guide v2.2	Up to 15 test cases for general contactless card acceptance.

6.3.2.2 MasterCard Terminal Integration Process (M-TIP) Testing

Table 6-3 M-TIP Testing

Test Plan	Description
M-TIP 2.0 Build 215 – M-TIP Subset	Up to 175 test cases for EMV contact card acceptance.
M-TIP 2.0 Build 215 – Field Interoperability Subset	Up to 89 test cases for EMV contact card acceptance.
M-TIP 2.0 Build 215 – Contactless Subset 6	Up to 23 test cases for EMV contactless card acceptance.
M-TIP 2.0 Build 215 – Contactless Subset 8	Up to 268 test cases for EMV contactless card acceptance.

6.3.2.3 American Express Integrated Circuit Card Payment Specification (AEIPS) Testing

Table 6-4 AEIPS Testing

Test Plan	Description
Global AEIPS Terminal Test Plan v6.2	Up to 34 test cases for EMV contact card acceptance.
Global Expresspay EMV Terminal End-to-End Test Plan v1.5	Up to 25 test cases for EMV contactless card acceptance.

6.3.2.4 Discover D-Payment Application Specification (D-PAS) Testing

Table 6-5 D-PAS Testing

Test Plan	Description
Contact D-PAS Acquirer-Terminal End-to-End Test Plan v1.3	Up to 52 test cases for EMV contact card acceptance.
Contactless D-PAS Acquirer-Terminal End-to-End Test Plan v1.2	Up to 33 test cases for EMV contactless card acceptance.

6.3.3 Test Tools

To successfully execute the test plans, you need the following:

1. The appropriate test cards.
2. A means of capturing, logging and validating the interaction between the terminal and cards.

One method to accomplish this is to order all of the required physical test cards from a company such as FIME, along with their Smartspy tools for logging the interaction. However, because there are hundreds of different test cases and test cards and the requirements often change for both, this approach is prohibitively impractical and expensive. Heartland recommends purchasing test tools instead.

Many EMV test tools are available on the market today that remove the need for physical test cards and rudimentary card spies. These tools emulate all the required test cards, facilitate execution of the test cases, capture the interaction between the terminal and the cards in a readable format, clearly indicate pass/fail results of the test cases and log the results in the format required for submission to the card brands.

You may use any test tool if it has been approved for use by a card brand for the purpose of meeting that brand's certification requirements. Each card brand maintains a list of approved test tools that have been verified to properly emulate the test cards and execute the test cases required for certification.

The following tools are approved by all four card brands for both contact and contactless EMV testing:

- ICC Solutions' **ICCSimTmat Test Manager**
- UL Transaction Security's **Collis Brand Test Tool**

You may choose to purchase either of these tools or any other tools approved for use by one or more card brands. Heartland uses the Collis Brand Test Tool for testing our internally developed applications. If you choose to purchase Collis, Heartland can apply knowledge and expertise of that tool toward facilitating your testing.

6.3.4 Test Environments

Heartland currently has two EMV test environments:

Table 6-6 Test Environments

Test Environment	Description
Pre-certification	This environment is used for executing the card brand test cases to ensure a 100% pass rate prior to moving to certification. This environment can also be used for generic EMV and non-EMV testing where certain dollar amounts trigger fixed responses from the host.
Certification	This environment is used for executing the card brand test cases for submission to the card brands for formal certification.

It is essential that you work with POS Integrations to insure you are pointed to the correct test environment based on the type of testing you are executing.

6.3.5 Test Process

You will need to work with our POS Integrations team to understand and follow their current certification procedures. The following is only a high-level overview of the process:

Table 6-7 Test Process

Test Process	Description
Certification Setup	A certification analyst will provide you with the appropriate certification request forms. Once those are returned and processed, the POS Integrations team will set up the required test accounts, point them to the appropriate environments, provide you with the corresponding credentials and provide test scripts as follows: <ul style="list-style-type: none"> • VISA – No script available. You must configure your test tool according to configuration being certified and it will specify test case applicability. • MasterCard – We provide a TSE file that contains your script and must be imported into your test tool. • American Express – We provide access to the AMEX Test System (ATS) which contains your script. • Discover – We provide a spreadsheet from UL that contains your script.
Card Brand Pre-Certification	Execute all card brand test cases in our pre-certification environment to ensure a 100% pass rate prior to moving to certification. Our certification analyst may request your terminal logs and transaction receipts if needed to help resolve issues.
Class B Certification	Execute the non-EMV test script provided by our certification analyst. The analysts will review the results and provide their analysis. Errors are corrected and test cases re-executed if necessary.

Table 6-7 Test Process (Continued)

Test Process	Description
Card Brand Certification	Execute all card brand test cases in our certification environment. The following actions must be completed depending on card brand: <ul style="list-style-type: none"> • VISA – Export XML file for upload to Chip Compliance Reporting Tool (CCRT). • MasterCard – Export TSEZ file containing terminal logs and validation, host logs and validation and receipts. • American Express – Complete user validations and upload terminal logs in ATS. • Discover – Indicate results and add comments as needed in provided spreadsheet.
Card Brand Submission	A certification analyst will ensure that all test cases have been completed then submit the results to the card brands for approval. The turnaround time for the card brands to review, approve and return a Letter of Approval is typically 10-15 business days.

REQUIREMENT

Your terminal(s) of choice must have EMVCo Level 2 approved kernel configurations that match each of the configurations specified in your certification request forms.

6.4 EMV Support

Our POS Integrations team is available from 9:00 AM to 5:00 PM Eastern to support EMV testing and can be reached at EMVDevSupport@e-hps.com.

Chapter 7: EMV Terminal Interface

7.1 EMV Terminal to Card Communication

7.1.1 Application Protocol Data Units (APDUs)

The terminal talks to the Integrated Circuit Card (ICC) using Application Protocol Data Unit (APDU) command-response pairs, which have the following formats:

- Command APDU Format

Table 7-1 Command APDU Format

Code	Description	Length
CLA	Class of instruction	1
INS	Instruction code	1
P1	Instruction parameter 1	1
P2	Instruction parameter 2	1
Lc	Number of bytes present in command data field	0 or 1
Data	String of data bytes send in command (= Lc)	var.
Le	Maximum number of data bytes expected in data field of response	0 or 1

- Response APDU Format

Table 7-2 Response APDU Format

Code	Description	Length
Data	String of data bytes received in response	var. (= Lr)
SW1	Command processing status	1
SW2	Command processing qualifier	1

Where...

- **SW1 SW2** = '9000' (Success)
- **SW1 SW2** = '6xxx' (Failure)

7.1.2 Tag, Length, Value (TLV) Data Objects

Data objects are BER-TLV coded, as defined in ISO/IEC 8825:

- The **T**ag field consists of one or more consecutive bytes. It indicates a class, a type, and a number. EMV tags are coded on one or two bytes.
- The **L**ength field consists of one or more consecutive bytes that indicate the length of the following value field.
 - If bit 8 of the most significant byte of the length field is set to **0**, the length field consists of only one byte. Bits 7 to 1 code the number of bytes of the value field, for lengths from 1 to 127.
 - If bit 8 of the most significant byte of the length field is set to **1**, the subsequent bits 7 to 1 code the number of subsequent bytes in the length field. The subsequent bytes code an integer representing the number of bytes in the value field. Two bytes are necessary to express lengths from 128 to 255.
- The **V**alue field indicates the value of the data object. If L = 00, the value field is not present.

7.1.3 Kernel Application Programming Interface (API)

Your terminal will come with a Software Development Kit (SDK) that provides an extraction layer/library built on top of the EMVCo Level 2 contact approved kernel application that allows your payment application to run EMV transactions. Discussion of the specific functions/methods that are part of the SDKs provided by the device manufacturers is outside of the scope of this document, although the intent of this document is to provide the background needed to successfully utilize any API.

7.2 EMV Data Elements

7.2.1 Data Conventions

The following sections describe the TLV data objects that come from the terminal, card, and issuer. The Value column uses the following format conventions:

Table 7-3 Data Conventions

Value	Description
a	Alphabetic data elements contain a single character per byte. The permitted characters are alphabetic only (a to z and A to Z, upper and lower case).
an	Alphanumeric data elements contain a single character per byte. The permitted characters are alphabetic (a to z and A to Z, upper and lower case) and numeric (0 to 9).
ans	Alphanumeric Special data elements contain a single character per byte. The permitted characters and their coding are shown in the Common Character Set table in Annex B of Book 4. There is one exception: The permitted characters for Application Preferred Name are the non-control characters defined in the ISO/IEC 8859 part designated in the Issuer Code Table Index associated with the Application Preferred Name.
b	These data elements consist of either unsigned binary numbers or bit combinations that are defined elsewhere in the specification. Binary example: The Application Transaction Counter (ATC) is defined as “b” with a length of two bytes. An ATC value of 19 is stored as Hex '00 13'. Bit combination example: Processing Options Data Object List (PDOL) is defined as “b” with the format shown in Book 3, section 5.4.
cn	Compressed numeric data elements consist of two numeric digits (having values in the range Hex '0'–'9') per byte. These data elements are left justified and padded with trailing hexadecimal 'F's. Example: The Application Primary Account Number (PAN) is defined as “cn” with a length of up to ten bytes. A value of 1234567890123 may be stored in the Application PAN as Hex '12 34 56 78 90 12 3F FF' with a length of 8.
n	Numeric data elements consist of two numeric digits (having values in the range Hex '0'–'9') per byte. These digits are right justified and padded with leading hexadecimal zeroes. Other specifications sometimes refer to this data format as Binary Coded Decimal (“BCD”) or unsigned packed. Example: Amount, Authorised (Numeric) is defined as “n 12” with a length of six bytes. A value of 12345 is stored in Amount, Authorised (Numeric) as Hex '00 00 00 01 23 45'.
var.	Variable data elements are variable length and may contain any bit combination. Additional information on the formats of specific variable data elements is available elsewhere.

7.2.2 Terminal Data

The following data comes from the terminal, payment application, or parameter management system:

Table 7-4 Terminal Data

Name	Tag	Length	Value	Description																																																																																	
ADDITIONAL TERMINAL CAPABILITIES	'9F40'	5	b	Indicates the data input and output capabilities of the terminal.																																																																																	
				Byte 1 – Transaction Type Capability																																																																																	
				<table border="1"> <thead> <tr> <th>b8</th> <th>b7</th> <th>b6</th> <th>b5</th> <th>b4</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Cash</td> </tr> <tr> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Goods</td> </tr> <tr> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Services</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Cashback</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>Inquiry</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>Transfer</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>Payment</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>Administrative</td> </tr> </tbody> </table>	b8	b7	b6	b5	b4	b3	b2	b1	Meaning	1	x	x	x	x	x	x	x	Cash	x	1	x	x	x	x	x	x	Goods	x	x	1	x	x	x	x	x	Services	x	x	x	1	x	x	x	x	Cashback	x	x	x	x	1	x	x	x	Inquiry	x	x	x	x	x	1	x	x	Transfer	x	x	x	x	x	x	1	x	Payment	x	x	x	x	x	x	x	1	Administrative
b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
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x	x	x	1	x	x	x	x	Cashback																																																																													
x	x	x	x	1	x	x	x	Inquiry																																																																													
x	x	x	x	x	1	x	x	Transfer																																																																													
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b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
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x	x	x	x	x	x	x	0	RFU																																																																													

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description								
				Byte 3 – Terminal Data Input Capability								
				b8	b7	b6	b5	b4	b3	b2	b1	Meaning
				1	x	x	x	x	x	x	x	Numeric keys
				x	1	x	x	x	x	x	x	Alphabetic and special character keys
				x	x	1	x	x	x	x	x	Command keys
				x	x	x	1	x	x	x	x	Function keys
				x	x	x	x	0	x	x	x	RFU
				x	x	x	x	x	0	x	x	RFU
				x	x	x	x	x	x	0	x	RFU
				x	x	x	x	x	x	x	0	RFU
				Byte 4 – Terminal Data Output Capability								
				b8	b7	b6	b5	b4	b3	b2	b1	Meaning
				1	x	x	x	x	x	x	x	Print, attendant
				x	1	x	x	x	x	x	x	Print, cardholder
				x	x	1	x	x	x	x	x	Display, attendant
				x	x	x	1	x	x	x	x	Display, cardholder
				x	x	x	x	0	x	x	x	RFU
				x	x	x	x	x	0	x	x	RFU
				x	x	x	x	x	x	1	x	Code table 10
				x	x	x	x	x	x	x	1	Code table 9
				Byte 5 – Terminal Data Output Capability								
				b8	b7	b6	b5	b4	b3	b2	b1	Meaning
				1	x	x	x	x	x	x	x	Code table 8
				x	1	x	x	x	x	x	x	Code table 7
				x	x	1	x	x	x	x	x	Code table 6
				x	x	x	1	x	x	x	x	Code table 5
				x	x	x	x	1	x	x	x	Code table 4
				x	x	x	x	x	1	x	x	Code table 3
				x	x	x	x	x	x	1	x	Code table 2
				X	X	X	X	X	X	X	1	Code table 1
				AMOUNT, AUTHORIZED (NUMERIC)	'9F02'	6	n 12	Authorized amount of the transaction (excluding adjustments).				

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description
AMOUNT, OTHER (NUMERIC)	'9F03'	6	n 12	Secondary amount associated with the transaction representing a cashback amount.
APPLICATION IDENTIFIER (AID) - TERMINAL	'9F33'	3	b	Identifies the application as described in ISO/IEC 7816-5. Consists of the Registered Application Provider Identifier (RID) + a Proprietary Application Identifier Extension (PIX).
APPLICATION SELECTION INDICATOR	—	At the discretion of the terminal. The data is not sent across the interface	See length	For an application in the ICC to be supported by an application in the terminal, the Application Selection Indicator indicates whether the associated AID in the terminal must match the AID in the card exactly, including the length of the AID, or only up to the length of the AID in the terminal. There is only one Application Selection Indicator per AID supported by the terminal.
APPLICATION VERSION NUMBER	'9F09'	2	b	Version number assigned by the payment system for the application.
AUTHORISATION RESPONSE CODE (ARC)	'8A'	2	an 2	Code that defines the disposition of a message. For online transactions, the terminal should generate the value as follows:
CARDHOLDER VERIFICATION METHOD (CVM) RESULTS	'9F34'	3	b	Indicates the results of the last CVM performed.
			Byte 1	CVM Performed Last CVM of the CVM List actually performed by the terminal: One-byte CVM Code of the CVM List as defined in Book 3 ('3F' if no CVM is performed).
			Byte 2	CVM Condition One-byte CVM Condition Code of the CVM List as defined in Book 3 or '00' if no actual CVM was performed.
			Byte 3	CVM Result Result of the (last) CVM performed as known by the terminal: 0 = Unknown (for example, for signature) 1 = Failed (for example, for offline PIN) 2 = Successful (for example, for offline PIN) or set to '1' if no CVM Condition Code was satisfied or if the CVM Code was not recognized or not supported.
CERTIFICATION AUTHORITY PUBLIC KEY CHECK SUM	—	20	b	A check value calculated on the concatenation of all 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.
CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	—	1 or 3	b	Value of the exponent part of the Certification Authority Public Key.
CERTIFICATION AUTHORITY PUBLIC KEY INDEX	'9F22'	1	b	Identifies the certification authority's public key in conjunction with the RID.

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description						
CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	—	N _{CA} (up to 248)	b	Value of the modulus part of the Certification Authority Public Key.						
DEFAULT DYNAMIC DATA AUTHENTICATION DATA OBJECT LIST (DDOL)	—	var.	b	DDOL to be used for constructing the INTERNAL AUTHENTICATE command if the DDOL in the card is not present.						
DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	—	var.	b	TDOL to be used for generating the TC Hash Value if the TDOL in the card is not present.						
ENCIPHERED PERSONAL IDENTIFICATION NUMBER (PIN) DATA	—	8	b	Transaction PIN enciphered at the PIN pad for online verification or for offline verification if the PIN pad and IFD are not a single integrated device.						
INTERFACE DEVICE (IFD) SERIAL NUMBER	'9F1E'	8	an 8	Unique and permanent serial number assigned to the IFD by the manufacturer.						
ISSUER SCRIPT RESULTS	'9F5B'	var. (up to 20)	b	Indicates the result of the terminal script processing.						
				<table border="1"> <tr> <td>Byte 1</td> <td>SCRIPT RESULT</td> <td> <p><u>Most significant nibble:</u> Result of the Issuer Script processing performed by the terminal:</p> <p>0 = Script not performed 1 = Script processing failed 2 = Script processing successful</p> <p><u>Least significant nibble:</u> Sequence number of the Script Command</p> <p>0 = Not specified 1 to E = Sequence number from 1 to 14 F = Sequence number of 15 or above</p> </td> </tr> <tr> <td>Byte 2–5</td> <td>SCRIPT IDENTIFIER</td> <td>Script Identifier of the Issuer Script received by the terminal, if available, zero filled if not. Mandatory if more than one Issuer Script was received by the terminal.</td> </tr> </table>	Byte 1	SCRIPT RESULT	<p><u>Most significant nibble:</u> Result of the Issuer Script processing performed by the terminal:</p> <p>0 = Script not performed 1 = Script processing failed 2 = Script processing successful</p> <p><u>Least significant nibble:</u> Sequence number of the Script Command</p> <p>0 = Not specified 1 to E = Sequence number from 1 to 14 F = Sequence number of 15 or above</p>	Byte 2–5	SCRIPT IDENTIFIER	Script Identifier of the Issuer Script received by the terminal, if available, zero filled if not. Mandatory if more than one Issuer Script was received by the terminal.
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Byte 2–5	SCRIPT IDENTIFIER	Script Identifier of the Issuer Script received by the terminal, if available, zero filled if not. Mandatory if more than one Issuer Script was received by the terminal.								
MAXIMUM TARGET PERCENTAGE TO BE USED FOR BIASED RANDOM SELECTION	—	1	n 2	Value used in terminal risk management for random transaction selection. This is the desired percentage of transactions “just below” the floor limit that will be selected to go online.						
POINT-OF-SERVICE (POS) ENTRY MODE	'9F39'	1	n 2	Indicates the method by which the PAN was entered, according to the first two digits of the ISO 8583:1987 POS Entry Mode.						
TARGET PERCENTAGE TO BE USED FOR RANDOM SELECTION	—	1	n 2	Value used in terminal risk management for random transaction selection. For transactions with amounts less than the Threshold Value for Biased Random Selection, the terminal shall generate a random number from 1 to 99, and if this number is less than or equal to this value, the transaction shall be selected to go online.						

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description																																																																																	
TERMINAL ACTION CODE (TAC) – DEFAULT	'FFC6'	5	b	Specifies the acquirer's conditions that cause a transaction to be rejected if it might have been approved online, but the terminal is unable to process the transaction online.																																																																																	
TERMINAL ACTION CODE (TAC) – DENIAL	'FFC7'	5	b	Specifies the acquirer's conditions that cause the denial of a transaction without attempt to go online.																																																																																	
TERMINAL ACTION CODE (TAC) – ONLINE	'FFC8'	5	b	Specifies the acquirer's conditions that cause a transaction to be transmitted online.																																																																																	
TERMINAL CAPABILITIES	'9F40'	3	b	Indicates the data input and output capabilities of the terminal.																																																																																	
Byte 1 – Card Data Input Capability																																																																																					
<table border="1"> <thead> <tr> <th>b8</th> <th>b7</th> <th>b6</th> <th>b5</th> <th>b4</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Manual key entry</td> </tr> <tr> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Magnetic stripe</td> </tr> <tr> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>IC with contacts</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>x</td> <td>x</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>x</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>RFU</td> </tr> </tbody> </table>					b8	b7	b6	b5	b4	b3	b2	b1	Meaning	1	x	x	x	x	x	x	x	Manual key entry	x	1	x	x	x	x	x	x	Magnetic stripe	x	x	1	x	x	x	x	x	IC with contacts	x	x	x	0	x	x	x	x	RFU	x	x	x	x	0	x	x	x	RFU	x	x	x	x	x	0	x	x	RFU	x	x	x	x	x	x	0	x	RFU	x	x	x	x	x	x	x	0	RFU
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x	1	x	x	x	x	x	x	Magnetic stripe																																																																													
x	x	1	x	x	x	x	x	IC with contacts																																																																													
x	x	x	0	x	x	x	x	RFU																																																																													
x	x	x	x	0	x	x	x	RFU																																																																													
x	x	x	x	x	0	x	x	RFU																																																																													
x	x	x	x	x	x	0	x	RFU																																																																													
x	x	x	x	x	x	x	0	RFU																																																																													
Byte 2 – CVM Capability																																																																																					
<table border="1"> <thead> <tr> <th>b8</th> <th>b7</th> <th>b6</th> <th>b5</th> <th>b4</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Plaintext PIN for ICC verification</td> </tr> <tr> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Enciphered PIN for online verification</td> </tr> <tr> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Signature (paper)</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Enciphered PIN for offline verification</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>No CVM Required</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>x</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>RFU</td> </tr> </tbody> </table>					b8	b7	b6	b5	b4	b3	b2	b1	Meaning	1	x	x	x	x	x	x	x	Plaintext PIN for ICC verification	x	1	x	x	x	x	x	x	Enciphered PIN for online verification	x	x	1	x	x	x	x	x	Signature (paper)	x	x	x	1	x	x	x	x	Enciphered PIN for offline verification	x	x	x	x	1	x	x	x	No CVM Required	x	x	x	x	x	0	x	x	RFU	x	x	x	x	x	x	0	x	RFU	x	x	x	x	x	x	x	0	RFU
b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
1	x	x	x	x	x	x	x	Plaintext PIN for ICC verification																																																																													
x	1	x	x	x	x	x	x	Enciphered PIN for online verification																																																																													
x	x	1	x	x	x	x	x	Signature (paper)																																																																													
x	x	x	1	x	x	x	x	Enciphered PIN for offline verification																																																																													
x	x	x	x	1	x	x	x	No CVM Required																																																																													
x	x	x	x	x	0	x	x	RFU																																																																													
x	x	x	x	x	x	0	x	RFU																																																																													
x	x	x	x	x	x	x	0	RFU																																																																													

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description								
				Byte 3 – Security Capability								
				b8	b7	b6	b5	b4	b3	b2	b1	Meaning
				1	x	x	x	x	x	x	x	SDA
				x	1	x	x	x	x	x	x	DDA
				x	x	1	x	x	x	x	x	Card capture
				x	x	x	0	x	x	x	x	RFU
				x	x	x	x	1	x	x	x	CDA
				x	x	x	x	x	0	x	x	RFU
				x	x	x	x	x	x	0	x	RFU
				x	x	x	x	x	x	x	0	RFU
TERMINAL COUNTRY CODE	'9F1A'	2	n 3	Indicates the country of the terminal, represented according to ISO 3166.								
TERMINAL FLOOR LIMIT	'9F1B'	4	b	Indicates the floor limit in the terminal in conjunction with the AID. Indicates the amount above which an online authorization is required for contact transactions.								
TERMINAL RISK MANAGEMENT DATA	'9F1D'	1–8	b	Application-specific value used by the card for risk management purposes.								
TERMINAL TYPE	'9F35'	1	n 2	Indicates the environment of the terminal, its communications capability, and its operational control.								
				Environment	Operational Control Provided by:							
					Financial Institution	Merchant	Cardholder					
				Attended								
				Online only	11	21						
				Online with offline capability	12	22						
				Offline only	13	23						
				Unattended								
				Online only	14	24	34					
				Online with offline capability	15	25	35					
				Offline only	16	26	36					

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description																																																																																	
TERMINAL VERIFICATION RESULTS (TVR)	'95'	5	b	Status of the different functions as seen from the terminal.																																																																																	
				Byte 1																																																																																	
				<table border="1"> <thead> <tr> <th>b8</th> <th>b7</th> <th>b6</th> <th>b5</th> <th>b4</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Offline data authentication was not performed</td> </tr> <tr> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>SDA failed</td> </tr> <tr> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>ICC data missing</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Card appears on terminal exception file</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>DDA failed</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>CDA failed</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>SDA selected</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>RFU</td> </tr> </tbody> </table>	b8	b7	b6	b5	b4	b3	b2	b1	Meaning	1	x	x	x	x	x	x	x	Offline data authentication was not performed	x	1	x	x	x	x	x	x	SDA failed	x	x	1	x	x	x	x	x	ICC data missing	x	x	x	1	x	x	x	x	Card appears on terminal exception file	x	x	x	x	1	x	x	x	DDA failed	x	x	x	x	x	1	x	x	CDA failed	x	x	x	x	x	x	1	x	SDA selected	x	x	x	x	x	x	x	0	RFU
b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
1	x	x	x	x	x	x	x	Offline data authentication was not performed																																																																													
x	1	x	x	x	x	x	x	SDA failed																																																																													
x	x	1	x	x	x	x	x	ICC data missing																																																																													
x	x	x	1	x	x	x	x	Card appears on terminal exception file																																																																													
x	x	x	x	1	x	x	x	DDA failed																																																																													
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b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
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x	1	x	x	x	x	x	x	Expired application																																																																													
x	x	1	x	x	x	x	x	Application not yet effective																																																																													
x	x	x	1	x	x	x	x	Requested service not allowed for card product																																																																													
x	x	x	x	1	x	x	x	New card																																																																													
x	x	x	x	x	0	x	x	RFU																																																																													
x	x	x	x	x	x	0	x	RFU																																																																													
x	x	x	x	x	x	x	0	RFU																																																																													
				Byte 3																																																																																	
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b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
1	x	x	x	x	x	x	x	Cardholder verification was not successful																																																																													
x	1	x	x	x	x	x	x	Unrecognized CVM																																																																													
x	x	1	x	x	x	x	x	PIN Try Limit exceeded																																																																													

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description								
				X	X	X	1	X	X	X	X	PIN entry required and PIN pad not present or not working
				X	X	X	X	1	X	X	X	PIN entry required, PIN pad present, but PIN was not entered
				X	X	X	X	X	1	X	X	Online PIN entered
				X	X	X	X	X	X	0	X	RFU
				X	X	X	X	X	X	X	0	RFU
Byte 4												
				b8	b7	b6	b5	b4	b3	b2	b1	Meaning
				1	x	x	x	x	x	x	x	Transaction exceeds floor limit
				x	1	x	x	x	x	x	x	Lower consecutive offline limit exceeded
				x	x	1	x	x	x	x	x	Upper consecutive offline limit exceeded
				x	x	x	1	x	x	x	x	Transaction selected randomly for online processing
				x	x	x	x	1	x	x	x	Merchant forced transaction online
				x	x	x	x	x	0	x	x	RFU
				x	x	x	x	x	x	0	x	RFU
				x	x	x	x	x	x	x	0	RFU
Byte 5 – Terminal Data Output Capability												
				b8	b7	b6	b5	b4	b3	b2	b1	Meaning
				1	x	x	x	x	x	x	x	Default TDOL used
				x	1	x	x	x	x	x	x	Issuer authentication failed
				x	x	1	x	x	x	x	x	Script processing failed
				x	x	x	1	x	x	x	x	Code table 5
				x	x	x	x	1	x	x	x	Code table 4
				x	x	x	x	x	1	x	x	Code table 3
				x	x	x	x	x	x	1	x	Code table 2
				x	x	x	x	x	x	x	1	Code table 1

Table 7-4 Terminal Data (Continued)

Name	Tag	Length	Value	Description
THRESHOLD VALUE FOR BIASED RANDOM SELECTION	—	4	b	Value used in terminal risk management for random transaction selection. Transactions with amounts less than this value will be subject to selection at random without further regard for the value of the transaction. Transactions with amounts equal to or greater than this value but less than the floor limit will be subject to selection with bias toward sending higher value transaction online more frequently (biased random selection).
TRANSACTION CURRENCY CODE	'5F2A'	2	n 3	Indicates the currency code of the transaction according to ISO 4217.
TRANSACTION CURRENCY EXPONENT	'5F36'	1	n 1	Indicates the implied position of the decimal point from the right of the transaction amount represented according to ISO 4217.
TRANSACTION DATE	'9A'	3	n 6 YYMMDD	Local date that the transaction was authorized.
TRANSACTION REFERENCE CURRENCY CODE	'9F3C'	2	n 3	Code defining the common currency used by the terminal in case the Transaction Currency Code is different from the Application Currency Code.
TRANSACTION REFERENCE CURRENCY CONVERSION	—	4	n 8	Factor used in the conversion from the Transaction Currency Code to the Transaction Reference Currency Code.
TRANSACTION REFERENCE CURRENCY EXPONENT	'9F3D'	1	n 1	Indicates the implied position of the decimal point from the right of the transaction amount, with the Transaction Reference Currency Code represented according to ISO 4217.
TRANSACTION TYPE	'9C'	1	n 2	Indicates the type of financial transaction, represented by the first two digits of the ISO 8583:1987 Processing Code. <ul style="list-style-type: none"> • 00 = Purchase or Card Verify • 09 = Purchase with Cashback • 20 = Purchase Return • 30 = Balance Inquiry
UNPREDICTABLE NUMBER	'9F37'	1	b	Value to provide variability and uniqueness to the generation of a cryptogram.

7.2.3 Card Data

The following data comes from the ICC:

Table 7-5 Card Data

Name	Tag	Length	Value	Description																																																																																	
APPLICATION CRYPTOGRAM	'9F26'	8	b	Cryptogram returned by the ICC in response of the GENERATE AC command.																																																																																	
Application Currency Code	'9F42'	2	n 3	Indicates the currency in which the account is managed according to ISO 4217.																																																																																	
Application Currency Exponent	'9F44'	1	n 1	Indicates the implied position of the decimal point from the right of the amount represented according to ISO 4217.																																																																																	
APPLICATION DISCRETIONARY DATA	'9F05'	1–32	b	Issuer or payment system specified data relating to the application.																																																																																	
APPLICATION EFFECTIVE DATE	'5F25'	3	n6 YYMMDD	Date from which the application may be used.																																																																																	
Application Expiration Date	'5F24'	3	n6 YYMMDD	Date after which application expires.																																																																																	
Application File Locator (AFL)	'94'	var. up to 252	var.	Indicates the location (SFI, range of records) of the AEFs related to a given application.																																																																																	
Application Dedicated File (ADF) Name	'4F'	5–16	b	Identifies the application as described in ISO/IEC 7816-5.																																																																																	
Application Interchange Profile	'82'	2	b	Indicates the capabilities of the card to support specific functions in the application.																																																																																	
				Byte 1																																																																																	
				<table border="1"> <thead> <tr> <th>b8</th> <th>b7</th> <th>b6</th> <th>b5</th> <th>b4</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>SDA supported</td> </tr> <tr> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>DDA supported</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>Cardholder verification is supported</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>x</td> <td>Terminal risk management is to be performed</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>x</td> <td>x</td> <td>Issuer authentication is supported</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>0</td> <td>x</td> <td>RFU</td> </tr> <tr> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>x</td> <td>1</td> <td>CDA supported</td> </tr> </tbody> </table>	b8	b7	b6	b5	b4	b3	b2	b1	Meaning	0	x	x	x	x	x	x	x	RFU	x	1	x	x	x	x	x	x	SDA supported	x	x	1	x	x	x	x	x	DDA supported	x	x	x	1	x	x	x	x	Cardholder verification is supported	x	x	x	x	1	x	x	x	Terminal risk management is to be performed	x	x	x	x	x	1	x	x	Issuer authentication is supported	x	x	x	x	x	x	0	x	RFU	x	x	x	x	x	x	x	1	CDA supported
b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
0	x	x	x	x	x	x	x	RFU																																																																													
x	1	x	x	x	x	x	x	SDA supported																																																																													
x	x	1	x	x	x	x	x	DDA supported																																																																													
x	x	x	1	x	x	x	x	Cardholder verification is supported																																																																													
x	x	x	x	1	x	x	x	Terminal risk management is to be performed																																																																													
x	x	x	x	x	1	x	x	Issuer authentication is supported																																																																													
x	x	x	x	x	x	0	x	RFU																																																																													
x	x	x	x	x	x	x	1	CDA supported																																																																													

Table 7-5 Card Data

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x	x	x	x	x	x	x	0	RFU																																																																													
Application Label	'50'	1–16	ans with the special character limited to space	Mnemonic associated with the AID according to ISO/IEC 7816-5.																																																																																	
Application Preferred Name	'9F12'	1–16	ans	Preferred mnemonic associated with the AID.																																																																																	
Application Primary Account Number (PAN)	'5A'	var. up to 10	cn var. up to 19	Valid cardholder account number.																																																																																	
Application Primary Account Number (PAN) Sequence Number	'5F34'	1	n 2	Identifies and differentiates cards with the same PAN.																																																																																	
Application Priority Indicator	'87'	1	b	Indicates the priority of a given application or group of applications in a directory.																																																																																	
Application Reference Currency	'9F3B'	2–8	n 3	1-4 currency codes used between the terminal and the ICC when the Transaction Currency Code is different from the Application Currency Code; each code is 3 digits according to ISO 4217.																																																																																	
Application Reference Currency Exponent	'9F43'	1–4	n 1	Indicates the implied position of the decimal point from the right of the amount, for each of the 1-4 reference currencies represented according to ISO 4217.																																																																																	
Application Transaction Counter (ATC)	'9F36'	2	b	Counter maintained by the application in the ICC (incrementing the ATC is managed by the ICC).																																																																																	
Application Usage Control	'9F07'	2	b	Indicates issuer's specified restrictions on the geographic usage and services allowed for the application.																																																																																	

Table 7-5 Card Data

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b8	b7	b6	b5	b4	b3	b2	b1	Meaning																																																																													
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x	x	x	x	x	x	0	x	RFU																																																																													
x	x	x	x	x	x	x	0	RFU																																																																													
APPLICATION VERSION NUMBER	'9F08'	2	b	Version number assigned by the payment system for the application.																																																																																	
CARD RISK MANAGEMENT DATA OBJECT LIST 1 (CDOL1)	'8C'	var. up to 252	b	List of data objects (tag and length) to be passed to the ICC in the first GENERATE AC command.																																																																																	
CARD RISK MANAGEMENT DATA OBJECT LIST 2 (CDOL2)	'8D'	var. up to 252	b	List of data objects (tag and length) to be passed to the ICC in the second GENERATE AC command.																																																																																	
CARDHOLDER NAME	'5F20'	2–26	ans	Indicates cardholder name according to ISO 7813.																																																																																	

Table 7-5 Card Data

Name	Tag	Length	Value	Description					
CARDHOLDER NAME EXTENDED	'9F0B'	27–45	ans	Indicates the whole cardholder name when greater than 26 characters using the same coding convention as in ISO 7813.					
CARDHOLDER VERIFICATION METHOD (CVM) LIST	'8E'	10–252	b	Identifies a method of verification of the cardholder supported by the application.					
CV Rule Byte 1									
	b8	b7	b6	b5	b4	b3	b2	b1	Meaning
	0								RFU
		0							Fail cardholder verification if this CVM is unsuccessful
		1							Apply succeeding CV Rule if this CVM is unsuccessful
			0	0	0	0	0	0	Fail CVM processing
			0	0	0	0	0	1	Plaintext PIN verification performed by ICC
			0	0	0	0	1	0	Enciphered PIN verified online
			0	0	0	0	1	1	Plaintext PIN verification performed by ICC and signature (paper)
			0	0	0	1	0	0	Enciphered PIN verification performed by ICC
			0	0	0	1	0	1	Enciphered PIN verification performed by ICC and signature (paper)
			0	x	x	x	x	x	Values in the range 000110-011101 reserved for future use by this specification
			0	1	1	1	1	0	Signature (paper)
			0	1	1	1	1	1	No CVM required
			1	0	x	x	x	x	Values in the range 10000-10111 reserved for use by the individual payment systems
			1	1	x	x	x	x	Values in the range 11000-11110 reserved for use by the issuer
			1	1	1	1	1	1	This value is not available for use

Table 7-5 Card Data

Name	Tag	Length	Value	Description																										
				CV Rule Byte 2																										
				<table border="1"> <thead> <tr> <th>Value</th> <th>Message</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>Always</td> </tr> <tr> <td>01</td> <td>If unattended cash</td> </tr> <tr> <td>02</td> <td>If not unattended cash and not manual cash and not purchase with cashback</td> </tr> <tr> <td>03</td> <td>If terminal supports the CVM</td> </tr> <tr> <td>04</td> <td>If manual cash</td> </tr> <tr> <td>05</td> <td>If purchase with cashback</td> </tr> <tr> <td>06</td> <td>If transaction is in the application currency and is under X value</td> </tr> <tr> <td>07</td> <td>If transaction is in the application currency and is over X value</td> </tr> <tr> <td>08</td> <td>If transaction is in the application currency and is under Y value</td> </tr> <tr> <td>09</td> <td>If transaction is in the application currency and is over Y value</td> </tr> <tr> <td>0A–7F</td> <td>RFU</td> </tr> <tr> <td>80–FF</td> <td>Reserved for card brands</td> </tr> </tbody> </table>	Value	Message	00	Always	01	If unattended cash	02	If not unattended cash and not manual cash and not purchase with cashback	03	If terminal supports the CVM	04	If manual cash	05	If purchase with cashback	06	If transaction is in the application currency and is under X value	07	If transaction is in the application currency and is over X value	08	If transaction is in the application currency and is under Y value	09	If transaction is in the application currency and is over Y value	0A–7F	RFU	80–FF	Reserved for card brands
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0A–7F	RFU																													
80–FF	Reserved for card brands																													
CERTIFICATION AUTHORITY PUBLIC KEY INDEX	'8F'	1	b	Identifies the certification authority's public key in conjunction with the RID.																										
CRYPTOGRAM INFORMATION DATA	'9F27'	1	b	Indicates the type of cryptogram and the actions to be performed by the terminal.																										
DEDICATED FILE (DF) NAME	'84'	5–16	b	Identifies the name of the DF as described in ISO/IEC 7816-4.																										
DIRECTORY DEFINITION FILE (DDF) NAME	'9D'	5–16	b	Identifies the name of a DF associated with a directory.																										
DYNAMIC DATA AUTHENTICATION DATA OBJECT LIST (DDOL)	'9F49'	var. up to 252	b	List of data objects (tag and length) to be passed to the ICC in the INTERNAL AUTHENTICATE command.																										
FILE CONTROL INFORMATION (FCI) TEMPLATE	'6F'	var. up to 252	var.	Identifies the FCI template according to ISO/IEC 7816-4.																										
ICC DYNAMIC NUMBER	'9F4C'	2–8	b	Time-variant number generated by the ICC, to be captured by the terminal.																										

Table 7-5 Card Data

Name	Tag	Length	Value	Description
INTEGRATED CIRCUIT CARD (ICC) PIN ENCIPHERMENT PUBLIC KEY CERTIFICATE	'9F2D'	N_I	b	ICC PIN Encipherment Public Key certified by the issuer.
INTEGRATED CIRCUIT CARD (ICC) PIN ENCIPHERMENT PUBLIC KEY EXPONENT	'9F2E'	1 or 3	b	ICC PIN Encipherment Public Key Exponent used for PIN Encipherment.
INTEGRATED CIRCUIT CARD (ICC) PIN ENCIPHERMENT PUBLIC KEY REMAINDER	'9F2F'	$N_{PE} - N_I + 42$	b	Remaining digits of the ICC PIN Encipherment Public Key Modulus.
INTEGRATED CIRCUIT CARD (ICC) PUBLIC KEY CERTIFICATE	'9F46'	N_I	b	ICC Public Key certified by the issuer.
INTEGRATED CIRCUIT CARD (ICC) PUBLIC KEY EXPONENT	'9F47'	1 to 3	b	ICC Public Key Exponent used for the verification of the Signed Dynamic Application Data.
INTEGRATED CIRCUIT CARD (ICC) PUBLIC KEY REMAINDER	'9F48'	$N_{IC} - N_I + 42$	b	Remaining digits of the ICC Public Key Modulus.
ISSUER ACTION CODE (IAC) – DEFAULT	'9F0D'	5	b	Specifies the issuer's conditions that cause a transaction to be rejected if it might have been approved online, but the terminal is unable to process the transaction online.
ISSUER ACTION CODE (IAC) – DENIAL	'9F0E'	5	b	Specifies the issuer's conditions that cause the denial of a transaction without attempt to go online.
ISSUER ACTION CODE (IAC) – ONLINE	'9F0F'	5	b	Specifies the issuer's conditions that cause a transaction to be transmitted online.
ISSUER APPLICATION DATA	'9F10'	var. up to 32	b	Contains proprietary application data for transmission to the issuer in an online transaction.
ISSUER CODE TABLE INDEX	'9F11'	1	n 2	Indicates the code table according to ISO/IEC 8859 for displaying the Application Preferred Name.
ISSUER COUNTRY CODE	'5F28'	2	n 3	Indicates the country of the issuer according to ISO 3166.

Table 7-5 Card Data

Name	Tag	Length	Value	Description
ISSUER PUBLIC KEY CERTIFICATE	'90'	N_{CA}	b	Issuer public key certified by a certification authority.
ISSUER PUBLIC KEY EXPONENT	'9F32'	1 to 3	b	Issuer public key exponent used for the verification of the Signed Static Application Data and the ICC Public Key Certificate.
ISSUER PUBLIC KEY REMAINDER	'92'	$N_I - N_{CA} + 36$	b	Remaining digits of the Issuer Public Key Modulus.
LANGUAGE PREFERENCE	'5F2D'	2–8	an 2	1-4 languages stored in order of preference, each represented by 2 alphabetical characters according to ISO 639.
LAST ONLINE APPLICATION TRANSACTION COUNTER (ATC) REGISTER	'9F13'	2	b	ATC value of the last transaction that went online.
LOWER CONSECUTIVE OFFLINE LIMIT	'9F14'	1	b	Issuer-specified preference for the maximum number of consecutive offline transactions for this ICC application allowed in a terminal with online capability.
PERSONAL IDENTIFICATION NUMBER (PIN) TRY COUNTER	'9F17'	1	b	Number of PIN tries remaining.
PROCESSING OPTIONS DATA OBJECT LIST (PDOL)	'9F38'	var.	b	Contains a list of terminal resident data objects (tags and lengths) needed by the ICC in processing the GET PROCESSING OPTIONS command.
SERVICE CODE	'5F30'	2	n 3	Service code as defined in ISO/IEC 7813 for Track 1 and Track 2.
SHORT FILE IDENTIFIER (SFI)	'88'	1	b	Identifies the AEF referenced in commands related to a given ADF or DDF. It is a binary data object having a value in the range 1 to 30 and with the three high order bits set to zero.
SIGNED DYNAMIC APPLICATION DATA	'9F4B'	N_{IC}	b	Digital signature on critical application parameters for DDA or CDA.
SIGNED STATIC APPLICATION DATA	'93'	N_I	b	Digital signature on critical application parameters for SDA.
STATIC DATA AUTHENTICATION TAG LIST	'9F4A'	var.	—	List of tags of primitive data objects defined in this specification whose value fields are to be included in the Signed Static or Dynamic Application Data.
TRACK 1 DISCRETIONARY DATA	'9F1F'	var.	ans	Discretionary part of Track 1 according to ISO/IEC 7813.

Table 7-5 Card Data

Name	Tag	Length	Value	Description
TRACK 2 DISCRETIONARY DATA	'9F20'	var.	cn	Discretionary part of Track 2 according to ISO/IEC 7813.
TRACK 2 EQUIVALENT DATA	'57'	var. up to 19	b n, var. up to 19 b n 4 n 3 n, var. b	Contains the data elements of Track 2 according to ISO/IEC 7813, excluding start sentinel, end sentinel, and Longitudinal Redundancy Check (LRC), as follows: <ul style="list-style-type: none"> • Primary Account Number • Field Separator (Hex 'D') • Expiration Date (YYMM) • Service Code • Discretionary Data (defined by individual payment systems) • Pad with one Hex 'F' if needed to unsure whole bytes
TRANSACTION CERTIFICATION DATA OBJECT LIST (TDOL)	'97'	var. up to 252	b	List of data objects (tag and length) to be used by the terminal in generating the TC Hash Value.
UPPER CONSECUTIVE OFFLINE LIMIT	'9F23'	1	b	Issuer-specified preference for the maximum number of consecutive offline transactions for this ICC application allowed in a terminal without online capability.

7.2.4 Issuer Data

The following data comes from the issuer:

Table 7-6 Issuer Data

Name	Tag	Length	Value	Description
AUTHORIZATION RESPONSE CRYPTOGRAM (ARPC)	—	4 or 8	b	Cryptogram generated by the issuer and used by the card to verify that the response came from the issuer.
CARD STATUS UPDATE (CSU)	—	4	b	Contains data sent to the ICC to indicate whether the issuer approves or declines the transaction, and to initiate actions specified by the issuer. Transmitted to the card in Issuer Authentication Data.
ISSUER AUTHENTICATION DATA	'91'	8-16	b	Data sent to the ICC for online issuer authentication.
ISSUER SCRIPT COMMAND	'86'	var. up to 261	b	Contains a command for transmission to the ICC.
ISSUER SCRIPT IDENTIFIER	'9F18'	4	b	Identification of the Issuer Script.
ISSUER SCRIPT TEMPLATE 1	'71'	var.	b	Contains proprietary issuer data for transmission to the ICC before the second GENERATE AC command.
ISSUER SCRIPT TEMPLATE 2	'72'	var.	b	Contains proprietary issuer data for transmission to the ICC after the second GENERATE AC command.
PROPRIETARY AUTHENTICATION DATA	—	var. up to 8	b	Contains issuer data for transmission to the card in the Issuer Authentication Data of an online transaction.

7.3 Contact Transaction Flow

The EMV transaction flow for contact EMV cards consists of up to 13 steps, each of which consist of a set of interactions between the card, terminal, and/or issuer. See [Figure 7-1](#).

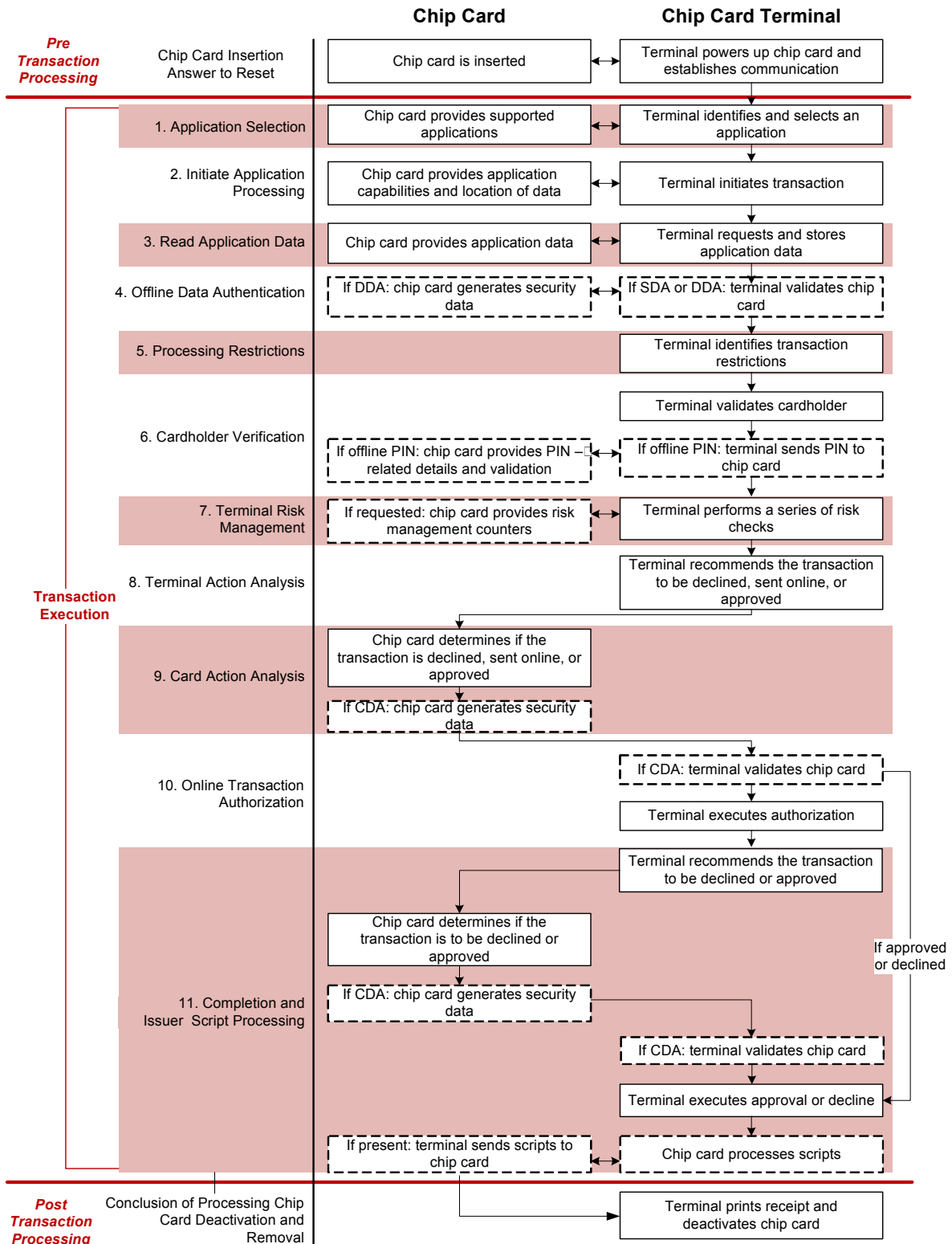


Figure 7-1 Contact Transaction Flow

7.3.1 Tender Processing

For EMV transactions, the transaction amount requiring authorization must be known prior to card entry and the Amount, Authorised (Tag '9F02') that is used for cryptogram generation must be set to this amount. This amount would include the base amount plus any of the following additional amounts:

Table 7-7 Tender Processing

Additional Amounts	Description
Cashback	If cashback is allowed and entered, Amount, Other (Tag '9F03') must be set to the cashback amount and this amount must be included in Amount, Authorised (Tag '9F02').
Surcharges	Any surcharges (e.g. taxes, fees, etc.) that are applied must be included in Amount, Authorized (Tag '9F02').
Tips	<p>For pay-at-the-counter and pay-at-the-table environments, where the cardholder has access to the PIN pad, it is recommended that the tip amount be specified prior to card entry and be included in Amount, Authorized (Tag '9F02'). The cardholder would be handed the PIN pad and they would enter their tip, confirm the total, insert/tap their card, enter their PIN if prompted, and wait for transaction completion before removing their card and handing back the PIN pad.</p> <p>For table service environments, the cardholder may still write in their tip later on the receipt and sign for authorization, in which case the Amount, Authorized (Tag '9F02') would not include the tip amount.</p>

There are circumstances where the final amount requiring authorization may be adjusted after setting Amount, Authorised (Tag '9F02') and after the cryptogram has been generated, such as subtracting items from the sale amount that are not allowed for purchase with certain types of cards. In this case, it is acceptable that the final authorization amount specified elsewhere in the host messaging does not match the amount specified in Tag '9F02'.

REQUIREMENT

The Amount, Authorised (Tag '9F02') must be set to the transaction amount known at the time of card acquisition and is used for cryptogram generation. This amount must not be changed even if the final amount submitted for authorization is different due to adjustments that may have been applied after cryptogram generation.

7.3.2 Card Acquisition

7.3.2.1 Card Swipe

Merchants have not been mandated to accept EMV cards nor have issuers been mandated to issue EMV cards, so the full migration to EMV may not be completed for several years or decades. Therefore, EMV chip cards will continue to have magnetic stripes into the foreseeable future so that they can continue to be used at magstripe only terminals.

If a card is swiped on an EMV terminal, the terminal software **must** parse the three-digit service code from the Track 1 or Track 2 data and examine the first digit. If the first digit of the service code is a **2** or a **6** indicating that the card is a chip card, the terminal must not normally allow the transaction to be processed using the magstripe data, but rather must prompt the merchant or customer to insert or tap the card instead.

An appropriate message such as “SWIPE NOT ALLOWED FOR CHIP CARD – INSERT CARD” should be displayed on the terminal.

REQUIREMENT

EMV solutions must continue to support magnetic stripe transactions, but must force chip usage if the service code in the Track 2 data is '2xx' or '6xx'.

7.3.2.2 Fallback Processing

When a chip card is presented, the card should normally be inserted or tapped and if swiped, the terminal should prompt to insert the card as described above. However, there are circumstances where the chip cannot be used and the magnetic stripe may be used instead. This is referred to as “fallback” and there are two scenarios under which it is allowed:

Table 7-8 Fallback Processing

Fallback Scenario	Description
Technical Fallback	Unable to read chip card due to chip or chip reader failure.
Non-Technical Fallback	Empty application selection candidate list due to no mutually supported AIDs.

Fallback is **not** allowed in the following scenarios:

- The transaction is declined by the card or the issuer.
- The fallback transaction cannot be online-authorized.
- The card is blocked.
- All applicable AIDs on the chip are blocked.
- The card is withdrawn before the transaction is completed.
- The transaction is canceled or times out before completion.

When waiting for a fallback card swipe:

- If an EMV card is inserted or tapped, fallback processing must be canceled and the transaction must be processed as an EMV transaction.
- If the swiped card does **not** have a service code of '2xx' or '6xx', fallback processing must be canceled and the transaction must be processed as a regular magstripe transaction.

REQUIREMENT

For fallback transactions, EMV solutions must set the appropriate fallback indicators in the authorization request message and must otherwise process the transaction as a standard magnetic stripe transaction.

7.3.3 Application Selection

EMV chip cards are capable of running multiple payment applications. For example, a single EMV card could be used to make payments from three different credit accounts, two different debit accounts, two different gift card accounts, and one loyalty account.

Application Identifiers (AIDs) are used to identify and select the application to use, and the terminal must be loaded with a list of supported AIDs. AIDs consist of three components:

Table 7-9 Application Selection

Component	Description
Registered Application Identifier (RID)	Each card brand has one or more RIDs Example: A000000003 is VISA's RID.
Proprietary Application Identifier Extension (PIX)	Each card brand has one or more PIXs to represent a particular payment application type. Example: 1010 is VISA's PIX for their global credit/debit application.
Issuer Suffix	Trailing digits that may be added by the issuer, and must be added if there are multiple applications on the card that share the same RID and PIX. Example: A000000003101001 for a VISA credit account and A000000003101002 for a VISA debit account on the same card.

The terminal selects the appropriate application to use for the current transaction as follows:

1. The terminal builds a candidate list of mutually supported applications using one of two methods:

Table 7-10 Supported Application Methods

Method	Description
Payment System Environment (PSE) Method	The terminal sends a SELECT command to the card requesting a file name of "1PAY.SYS.DDF01", and if the card supports PSE it will return a directory of supported applications.
List of AIDs Method	It is recommended that the terminal always try the PSE method first to increase transaction speed. If the card does not support PSE, the terminal sends a SELECT command to the card for each AID supported by the terminal to determine if the card also supports the AID.

2. If there is more than one mutually supported application in the candidate list, the terminal either automatically selects an application from the list based on predetermined preference or displays the list to the cardholder for selection. If displaying the candidate list:
 - Display the list in the order specified by the issuer in the Application Priority Indicator (Tag '87') if present, otherwise display in the order received from the card.
 - Display the Application Preferred Name (Tag '9F12') if present and if the Issuer Code Table Index (Tag '9F11') is present and supported by the terminal.
 - Display the Application Label (Tag '50') if present and the Application Preferred Name is not present or cannot be displayed.
 - Display a default application name assigned by the EMV POS Solution if the Application Preferred Name and Application Label are not present or cannot be displayed.
3. If the terminal automatically selects an application, or if there is only one mutually supported application in the candidate list, and the Application Priority Indicator (Tag '87') returned by the card indicates that use of the application must be confirmed, the terminal must prompt the cardholder for confirmation.
4. The terminal sends a final SELECT command to the card to indicate the selected application.
5. The card returns the Processing Options Data Object List (PDOL) for the selected application.

REQUIREMENT

Partial selection must be supported for all AIDs. This ensures that all supported applications are available for selection even if they contain an issuer assigned suffix at the end of the AID.

7.3.3.1 Available AIDs

The AIDs that may be available for selection on U.S.-issued cards include the following:

	Name	AID	Description
Global Credit/Debit	American Express	A00000002501	Used for global credit transactions routed to American Express on the credit rails.
	Discover/Diners	A0000001523010	Used for global credit and signature debit transactions routed to Discover on the credit rails.
	Discover Zip	A0000003241010	Used for global legacy contactless magnetic stripe mode credit transactions routed to Discover on the credit rails.
	JCB	A0000000651010	Used for global credit transactions routed to Discover on the credit rails.
	MasterCard	A0000000041010	Used for global credit and signature debit transactions routed to MasterCard on the credit rails.
	VISA	A0000000031010	Used for global credit and signature debit transactions routed to VISA on the credit rails.
	VISA Electron	A0000000032010	Used for global credit and signature debit transactions routed to VISA on the credit rails.
Global PIN Debit	MasterCard Maestro	A0000000043060	Used for global PIN debit transactions routed to MasterCard on the PIN debit rails.
	VISA Interlink	A0000000033010	Used for global PIN debit transactions routed to VISA on the PIN debit rails.
U.S. Common Debit	Debit Network Alliance (DNA) Shared Debit	A0000006200620	Used for U.S. PIN debit transactions routed to any participating U.S. debit network on the PIN debit rails. Note: Not supported at this time.
	Discover U.S. Common Debit	A0000001524010	Used for U.S. PIN debit transactions routed to any participating U.S. debit network on the PIN debit rails. Can also be used for signature debit transactions routed to Discover on the credit rails. Note: Not supported for PIN debit at this time.
	MasterCard U.S. Maestro	A0000000042203	Used for U.S. PIN debit transactions routed to any participating U.S. debit network on the PIN debit rails. Can also be used for signature debit transactions routed to MasterCard on the credit rails.
	VISA U.S. Common Debit	A0000000980840	Used for U.S. PIN debit transactions routed to any participating U.S. debit network on the PIN debit rails. Can also be used for signature debit transactions routed to VISA on the credit rails.

7.3.3.2 Debit AIDs

The presence of **both** of the following data elements identifies the AID as relating to a debit or prepaid program:

- ISSUER COUNTRY CODE (two digit alpha) (Tag '5F55') with a value '5553' ("US")
- ISSUER IDENTIFICATION NUMBER (IIN) (Tag '42')

If two or more AIDs have the same IIN, the terminal may assume they access the underlying funding account and can eliminate all but one of the AIDs with the same IIN from the candidate list. Which AIDs are eliminated in this case should be configurable. For example, a merchant might specify their preference such that U.S. Common Debit AIDs will always remain in the candidate list if present.

If two or more AIDs with different IINs or no specified IINs still remain in the candidate list after eliminating AIDs with duplicate IINs, the EMV POS Solution must display the list the cardholder for selection as described in the Application Selection section above.

7.3.4 Initiate Application Processing

Once an application has been selected, the terminal begins processing an EMV transaction with the card as follows:

1. The terminal sets all the bits in the Transaction Status Information (TSI) and Terminal Verification Results (TVR) to **0**.
2. The terminal sends a GET PROCESSING OPTIONS command to the card to let it know that the processing of a new transaction is beginning and to provide the card with the terminal-related data requested by the card in the PDOL.
3. The card returns the Application Interchange Profile (AIP) and the Application File Locator (AFL).
 - The AIP specifies the functions supported by the card, such as offline data authentication, cardholder verification, issuer authentication, etc.
 - The AFL specifies the location of all the data that is relevant to the current transaction that should be read by the terminal.

7.3.5 Read Application Data

Once the application processing has begun and the terminal has received the AFL from the card, it sends READ RECORD commands to the card to retrieve all of the TLV data objects specified in the AFL.

If the following sensitive cardholder data is read from the card, it must **not** be included in authorization request messages sent to the host:

- 57 – Track 2 Equivalent Data
- 5A – Application PAN
- 5F20 – Cardholder Name
- 5F24 – Application Expiration Date
- 99 – Transaction PIN Data
- 9F0B – Cardholder Name Extended
- 9F1F – Track 1 Discretionary Data
- 9F20 – Track 2 Discretionary Data

REQUIREMENT

Sensitive cardholder data objects must not be sent to the host in authorization or settlement messages even if received from the card and terminal.

7.3.6 Offline Data Authentication

Once all of the application data has been read, if both the card and the terminal support Offline Data Authentication, the terminal authenticates the legitimacy of the card.

Based on the AIP received from the card and the capabilities of the terminal, the most secure mutually supported card authentication method is performed. The available methods from least to most secure are as follows:

Table 7-11 Offline Data Authentication

Authentication Method	Description
Static Data Authentication (SDA)	The terminal uses a PKI and public key cryptography to authenticate the digital signature of static data retrieved from the card.
Dynamic Data Authentication (DDA)	The terminal uses a PKI and public key cryptography to authenticate the digital signature of dynamic data retrieved from the card.
Combined DDA / Application Cryptogram Generation (CDA)	The terminal uses a PKI and public key cryptography to authenticate the digital signature of dynamic data retrieved from the card which includes the application cryptogram.

Bits in the Terminal Verification Results (TVR) are set based on the outcome of the Offline Data Authentication step.

7.3.7 Processing Restrictions

Once the card has been legitimized, the terminal determines the degree of compatibility with the card by performing the following checks:

Table 7-12 Processing Restrictions

Restriction	Description
Application Version Number	Is the version of the card application supported by terminal?
Application Usage Control	Is the card allowed for the transaction, e.g. is a domestic, international, or cashback transaction allowed?
Application Effective/Expiration Dates	Is the card application not yet effective or already expired?

Bits in the TVR are set based on the outcome of the Processing Restrictions step.

7.3.8 Cardholder Verification

Once the processing restrictions have been analyzed, the terminal processes the Cardholder Verification Method (CVM) list returned by the card and attempts to perform the first CVM in the list that is also supported by the terminal. The following CVMs are supported by EMV cards:

Table 7-13 Cardholder Verification

Verification Method	Description
Signature	This method prompts the cardholder to provide a signature that must match the signature on the back of the card.
Online Enciphered PIN	This method requires the cardholder to enter a PIN that is encrypted at the PIN entry device before being sent to Heartland (and subsequently out to the issuer) for validation.
Offline Enciphered PIN	This method requires the cardholder to enter a PIN that is encrypted at the PIN entry device before being sent to the chip card for validation.
Offline Enciphered PIN and Signature	This method requires the cardholder to enter a PIN that is encrypted at the PIN entry device before being sent to the chip card for validation, and that the cardholder provide a signature that must match the signature on the back of the card.
Offline Plaintext PIN	This method requires the cardholder to enter a PIN that is not encrypted before being sent to the chip card for validation.
Offline Plaintext PIN and Signature	This method requires the cardholder to enter a PIN that is not encrypted before being sent to the chip card for validation, and that the cardholder provide a signature that must match the signature on the back of the card.
No CVM Required	This method requires no checks to verify the cardholder.

Bits in the TVR are set based on the outcome of the Cardholder Verification step.

REQUIREMENT	The U.S. Common Debit AIDs support Online PIN and No CVM. If Online PIN is obtained, the transaction must be sent as a PIN debit transaction. If the CVM result is No CVM due to PIN bypass, the transaction must be sent as a credit (i.e. signature debit) transaction, and a signature must be obtained unless the transaction qualifies as a no signature required transaction.
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7.3.8.1 PIN Support

From a security and fraud liability standpoint, it is typically in the best interest of the merchant and cardholder that PIN be prompted and entered if the card is a PIN-preferring card, but there are circumstances under which PIN entry may be avoided or skipped:

Table 7-14 PIN Support

PIN Support	Description
PIN Disablement	If PIN entry is not feasible because the merchant does not have a customer facing PIN pad, then all the PIN CVMs should be disabled on the terminal so that it does not prompt for PIN. In order to deploy this "No PIN" kernel configuration, it would need to have EMVCo Level 2 approval, and it would have to be certified with the card brands. If this functionality is supported, PIN entry is typically enabled/disabled via parameter setting.
PIN Entry Bypass	This is the EMVCo defined process where the terminal prompts for PIN, but at the direction of the merchant or cardholder the PIN is bypassed and not entered. In this case, the 'PIN entry required, PIN pad present, but PIN was not entered' bit in the TVR is set to 1, which the Issuer may consider when making its authorization decision. If this functionality is supported, PIN bypass is typically enabled/disabled via parameter setting.
PIN Prompt Bypass	This is typically used for small ticket VEPS/QPS transactions where no CVM is required. The terminal must have a selectable kernel where it can automatically switch to a "No CVM" configuration if the amount is under the limit. If this functionality is supported, the CVM required limit is typically specified per card brand or AID via parameter settings. PIN Prompt Bypass could also be invoked at the direction of the merchant or cardholder by pressing a "Credit" or "Signature" button on the terminal.

7.3.9 Terminal Risk Management

Once the cardholder has been verified, the terminal performs the following steps to protect the acquirer, issuer, and system from fraud:

Table 7-15 Terminal Risk Management

Risk Management	Description
Floor limit Checking	Transactions over the floor limit should be sent to host for online authorization.
Random transaction Selection	A certain percentage of transactions under the floor limit (which are normally eligible for offline authorization by terminal and card) should be randomly selected to go online.
Velocity Checking	After a certain number of consecutive offline transactions are performed using a particular card, the next transaction using that card should go online.

Bits in the TVR are set based on the outcome of the Terminal Risk Management step.

7.3.10 Terminal Action Analysis

Once the terminal has completed the previous 4 steps and has set the appropriate bits in the TVR accordingly, the terminal makes the initial decision as to the disposition of the transaction based on a bit-by-bit comparison of the TVR with the Terminal Action Codes (TACs) and Issuer Action Codes (IACs), and sends a GENERATE APPLICATION CRYPTOGRAM (AC) command to card accordingly:

Table 7-16 Terminal Action Analysis

Scenario	Terminal Action
For each bit in the TVR set to 1,	
If the corresponding bit in the IAC-Denial or TAC-Denial is set to 1,	It indicates that the issuer or acquirer wishes the transaction to be rejected offline without attempt to go online. The terminal requests an Application Authorization Cryptogram (AAC) in this case.
If the corresponding bit in the IAC-Online or TAC-Online is set to 1,	It indicates that the issuer or acquirer wishes the transaction to be completed online. The terminal requests an Authorization Request Cryptogram (ARQC) in this case.
If the corresponding bit in the IAC-Default or TAC-Default is set to 1,	It indicates that the issuer or acquirer wishes the transaction to be rejected offline if it might have been approved online but the terminal is for any reason unable to process the transaction online. The terminal requests an AAC in this case.
If there are no corresponding bits in the TVR set to 1,	The terminal may request an ARQC or Transaction Certificate (TC) depending on the other circumstances of the transaction.

7.3.11 Card Action Analysis

Once the terminal has made its initial decision, the card makes the final decision as to the disposition of the transaction based on the issuer's proprietary card risk management criteria and responds to the GENERATE AC command accordingly:

- Returns a TC to approve the transaction offline. This option is not available to the card if the terminal has made a preliminary decision to reject the transaction or complete it online.
- Returns an ARQC to complete the transaction online. This option is not available to the card if the terminal has made a preliminary decision to reject the transaction.
- Returns an AAC to reject the transaction.

Note: If the card returns a TC or AAC cryptogram, the transaction is complete and the remaining steps are not performed. If the card returns a TC to approve the transaction offline, the terminal must ensure that the offline approval is sent to the host for settlement.

7.3.12 Online Processing

Once the card has made its final decision, the terminal goes online for processing if the card returns an ARQC cryptogram in response to the first GENERATE AC command.

Online processing is performed to ensure that the issuer can review and authorize or reject transactions that are outside acceptable limits of risk defined by the issuer, the payment system, or the acquirer.

In general, online processing of EMV transactions is the same as online processing of magstripe transactions except for the addition of the ARQC cryptogram and other chip card data sent in the request, and the Authorization Response Cryptogram (ARPC), issuer scripts, and other chip card data that may be received in the response.

7.3.12.1 Offline Authorization

If the card returns an ARQC to go online but the issuer cannot be reached, the merchant may elect to inform that card that it cannot go online and ask for an offline approval. This is typically accomplished by setting the Authorisation Response Code to **Y3**, although there may some other way to indicate this desire based on your terminal's specific API/SDK. The terminal will perform the Completion step below.

If the card returns a TC cryptogram, the transaction is offline approved and the terminal must ensure that the offline approval is sent to the host for settlement. No additional store-and-forward or stand-in processing is required. If the card returns an AAC cryptogram, the transaction is not offline approved and the merchant may elect to proceed with the store-and forward or stand-in processing as described below.

7.3.12.2 Deferred Authorization (Store-and-Forward)

If the card returns an ARQC to go online but the issuer cannot be reached, the merchant may elect to store the transaction and submit it later for authorization. The merchant does so at their own risk as the transaction may be later declined, ask your merchants if they want to support this functionality.

It is recommended that the Offline Authorization step above be performed first to see if the card will approve offline. However, if the merchant does not support offline authorizations or if the card returns an AAC cryptogram indicating that it is unwilling to approve offline, the following store-and-forward process may be followed:

1. The terminal stores the transaction details including the original ARQC cryptogram and associated chip data.
2. Later, the terminal uploads its batch of authorization requests that include the ARQCs.
3. The acquirer submits the authorization requests, most of which are approved online.
4. Repeated attempts at authorization for declined transactions are permitted, but declined transactions must eventually be discarded.
5. The acquirer submits a clearing record for each approved transaction, using the ARQC for online approved transactions and the authorization response code returned in the authorization response.

7.3.12.3 Forced Acceptance (Stand-In)

If the card returns an ARQC to go online but the issuer cannot be reached, the merchant may elect to stand-in for the transaction and submit it for settlement. The merchant does so at their own risk as the transaction may not clear or may incur a chargeback due to no authorization, ask your merchants if they want to support this functionality.

It is recommended that the Offline Authorization step above be performed first to see if the card will approve offline. However, if the merchant does not support offline authorizations or if the card returns an AAC cryptogram indicating that it is unwilling to approve offline, the following stand-in process may be followed:

1. Check if the transaction amount is below the Stand-in Floor Limit for this card type. Proceed if the transaction amount is below the Stand-in Floor Limit; otherwise, do not stand-in.
2. Check if the card is domestic (i.e., U.S.-issued). This can be determined by ensuring that the Issuer Country Code (Tag 5F28) = "840". International cards pose a higher risk and should not be approved via stand-in authorization. Proceed if card is domestic; otherwise, do not stand-in.
3. Apply the TVR Mask to the transaction's Terminal Verification Results (Tag 95) value. If any of the bits in the TVR match the corresponding bits in the TVR Mask, then a condition exists that indicates the transaction should not be approved via stand-in authorization. The recommended TVR Mask is "FC 50 FC 20 00" which means that if any of the following conditions exists, the transaction should not be approved via stand-in authorization:

Byte	Bit	Value
1	8	Offline data authentication was not performed
1	7	SDA failed
1	6	ICC data missing
1	5	Card appears on terminal exception file
1	4	DDA failed
1	3	CDA failed
2	7	Expired application
2	5	Application not yet effective
3	8	Requested service not allowed for card product
3	7	Unrecognized CVM
3	6	PIN Try Limit exceeded
3	5	PIN entry required and PIN pad not present or not working
3	4	PIN entry required, PIN pad present, but PIN was not entered
3	3	Online PIN entered
4	6	Upper consecutive offline limit exceeded

Proceed if a bitwise AND of the TVR and TVR Mask bits are all zero; otherwise, do not approve the transaction.

- Use the TSI Mask and the transaction's Transaction Status Indicator (Tag '9B') value to check that the required EMV transaction steps were performed. If any of the bits in the TSI are zero in the corresponding bits of the TSI Mask, then a required EMV transaction step was not performed. The recommended TSI Mask is "E8 00" which means that the following transaction steps were performed:

Byte	Bit	Value
1	8	Offline data authentication was performed
1	7	Cardholder verification was performed
1	6	Card risk management was performed
1	4	Terminal risk management was performed

Proceed if a bitwise AND of the TSI and TSI Mask equals the TSI Mask; otherwise, do not approve the transaction.

- If all of the above steps pass, approve the transaction and submit it for settlement; otherwise, decline the transaction and/or proceed with Voice Authorization.

7.3.13 Issuer Authentication

The authorization response message from the issuer may contain Issuer Authentication Data (Tag '91'), which contains the ARPC.

If the Issuer Authentication Data is received in the authorization response message and the AIP indicates that card supports issuer authentication, the Issuer Authentication Data is sent to card in the EXTERNAL AUTHENTICATE command.

Bits in the TVR are set based on outcome of issuer authentication.

7.3.14 Issuer-to-Card Script Processing

The issuer may provide command scripts to be delivered to the card by the terminal to perform functions that are not necessarily relevant to the current transaction but are important for continued functioning of the card application.

Multiple scripts may be provided with an authorization response and each may contain any number of Issuer Script Commands.

Two separate script tags are available for use by the issuer.

- Issuer scripts with Tag '71' are processed prior to issuing the final GENERATE AC command.
- Issuer scripts with Tag '72' are processed after issuing the final GENERATE AC command.

Bits in the TVR are set based on outcome of issuer-to-card script processing and Issuer Script Results are made available for sending for reversals or settlement.

REQUIREMENT

If issuer scripts are received in the host response, they must be processed whether the transaction was approved or declined.

7.3.15 Completion

Whether the terminal receives an authorization response message as a result of online processing or whether it receives an approval or rejection for a transaction that was unable to go online based on TAC/IAC-Default, it completes the transaction by requesting either a TC (if an approval was obtained), or an AAC (if the issuer's instruction is to reject the transaction) from the card by a second GENERATE AC command.

The Authorization Response Code (Tag '8A') should be set by the terminal based on the online or offline disposition as follows:

Table 7-17 Online or Offline Disposition

Disposition	ASCII	Hex	Notes
Online approved	"00"	'3030'	Should be sent to card at 2nd GENERATE AC if the host response code indicates any approval, including partial approvals or card verifications.
Online declined	"05"	'3035'	Should be sent to card at 2nd GENERATE AC if the host response code indicates any decline, i.e. anything that is not an approval. Also used if a partial approval from the host is rejected at the terminal.
Offline approved	"Y1"	'5931'	Should be sent to host in offline approval advice if the card approves offline at 1st GENERATE AC before attempt to go online.
Offline declined	"Z1"	'5A31'	Should be sent to host in offline decline advice if card declines offline at 1st GENERATE AC before attempt to go online, or at 2nd GENERATE AC due to bad ARPC cryptogram.

Table 7-17 Online or Offline Disposition (Continued)

Disposition	ASCII	Hex	Notes
Unable to go online, offline approved	"Y3"	'5933'	Should be sent to card at 2nd GENERATE AC to request offline approval after failed attempt to go online. Should be sent to host in offline approval advice if the card approves offline at 2nd GENERATE AC.
Unable to go online, offline declined	"Z3"	'5A33'	Should be sent to host in offline decline advice if the card declines offline at 2nd GENERATE AC after failed attempt to go online and the transaction is not eligible for store-and-forward or stand-in processing.

The card will respond to the 2nd GENERATE AC command as follows:

- If a TC was requested, the card returns either a TC or an AAC.
- If an AAC was requested, the card returns an AAC.

REQUIREMENT

The Authorisation Response Code (Tag '8A') is not returned by the issuer or card brands, and thus is not included in the authorization response message from the host. The terminal must set Tag '8A' based on the disposition of the transaction, whether online or offline.

7.3.16 Card Removal

When the transaction flow is complete, the cardholder should be prompted to remove their card before receipts are printed. It is recommended that the terminal also beep at regular intervals until the card is removed as an audible reminder to the cardholder to remove their card.

REQUIREMENT

If the card is removed prematurely before transaction flow completion, the transaction must be canceled, and if the transaction was approved online a reversal must be sent.

7.4 Contactless Transaction Flow

The major difference between EMV contactless transactions and EMV contact transactions is transaction speed. The information transmitted between the chip card and POS terminal is done in a more succinct manner and many of the transaction flow steps are performed either before or after the card leaves the proximity of the reader. See [Figure 7-2](#).

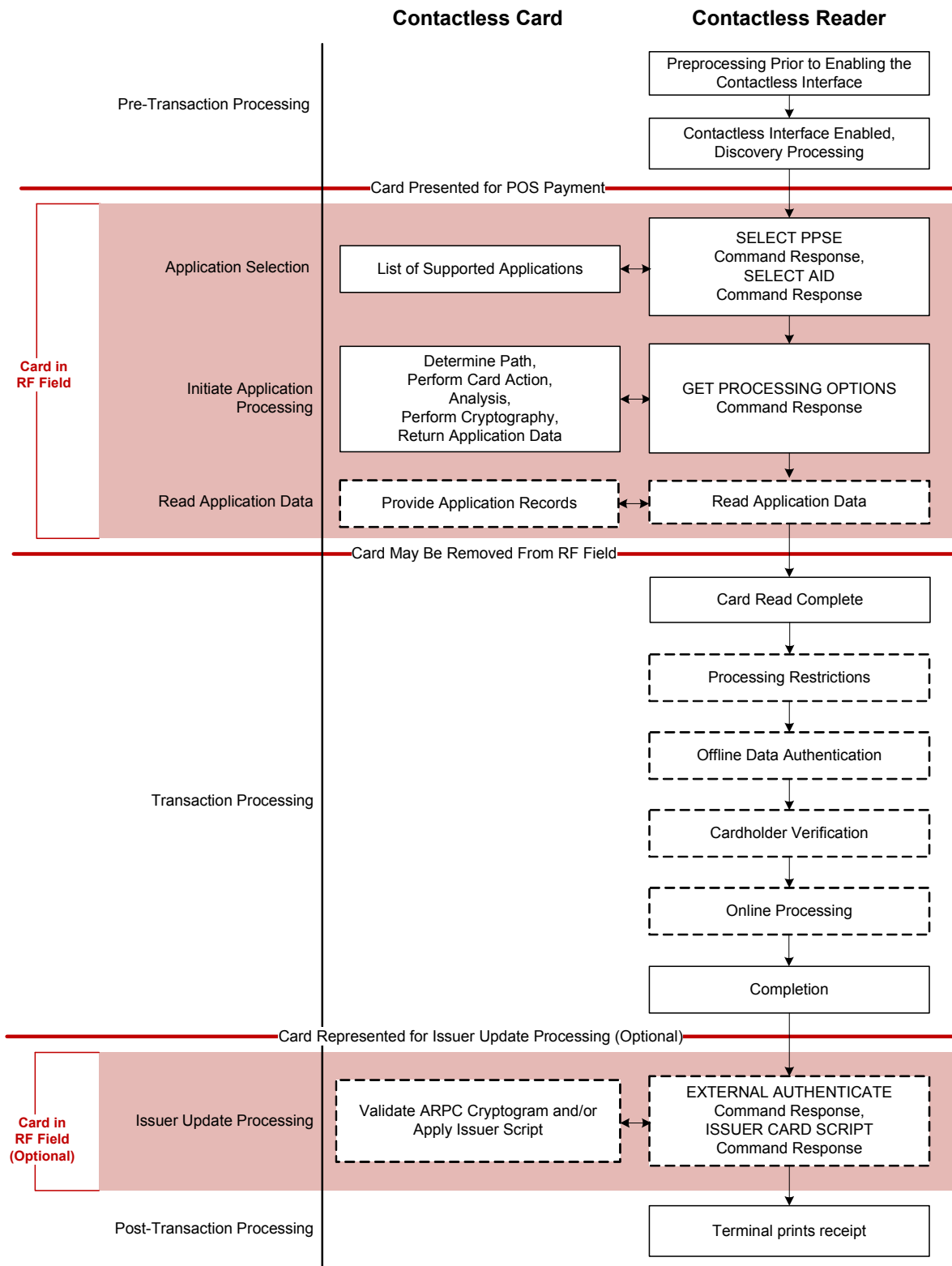


Figure 7-2 Contactless Transaction Flow

The focus of the following sections is to highlight some of the specific differences from the contact EMV flow. A summary of the differences is as follows:

Table 7-18 Contact EMV Flow Differences

Step Name	Description
Application Selection	The highest priority mutually supported application is automatically selected by the contactless card reader.
Initiate Application Processing	This step includes the Terminal Risk Management, Terminal Action Analysis, and Card Action Analysis processing.
Read Application Data	The chip card may be removed from the proximity of the reader after this step.
Cardholder Verification	The offline enciphered/plaintext PIN CVMs are not supported for contactless transactions.
Issuer Update Processing	This is an optional step that encompasses the Issuer Authentication and Issuer-to-Card Script processing, and would require re-presentation of the card into the proximity of the reader. This is currently not supported.

7.4.1 Pre-Processing

To minimize the duration in which the card must remain within the reader's radio frequency (RF) field, the reader may obtain the transaction amount and perform some risk management checks prior to prompting for card presentment. This pre-processing is performed prior to powering on the contactless interface.

7.4.2 Discovery Processing

Discovery Processing is performed by the reader to poll for the presence of contactless cards that may have entered the reader's Radio Frequency (RF) field.

7.4.3 Application Selection

Similar to contact EMV, but the terminal builds a candidate list of mutually supported applications using the mandatory Proximity Payment System Environment (PPSE) method, whereby the terminal sends a SELECT command to the card and the card returns a directory of supported applications. The List of AIDs method is not used for contactless.

If there is more than one mutually supported application in the candidate list, the terminal automatically selects an application from the list based on predetermined preference, which may be to choose the application of highest priority according the Application Priority Indicator (Tag '87') returned by the card.

7.4.4 Initiate Application Processing

This step includes:

- [Path Determination](#)
- [Terminal Risk Management](#)
- [Terminal Action Analysis](#)
- [Card Action Analysis](#)

7.4.4.1 Path Determination

The contactless path(s) that are mutually supported by the card and reader are determined and a contactless path (EMV mode or magstripe mode) is chosen to process the transaction. Subsequent transaction processing is performed according to the requirements of the contactless path chosen.

7.4.4.2 Terminal Risk Management

Similar to contact EMV, but only floor limit checking is performed for contactless transactions. Random transaction selection and velocity checking is not performed for contactless transactions.

7.4.4.3 Terminal Action Analysis

Same as contact EMV, except that the TACs and IACs may be different for contactless.

7.4.4.4 Card Action Analysis

Same as contact EMV.

7.4.5 Read Application Data

Same as contact EMV.

7.4.6 Card Read Complete

The card may be removed from the reader's RF field at this point. The reader determines whether all mandatory data elements for the transaction were returned by the card, and terminates the transaction if they were not.

All of the remaining steps are performed after the card has left the proximity of the reader.

7.4.7 Processing Restrictions

Same as contact EMV.

7.4.8 Offline Data Authentication

Similar to contact EMV, but with some variances. For example, Visa uses Fast Dynamic Data Authentication (fDDA) and MasterCard does not support SDA or DDA for contactless.

7.4.9 Cardholder Verification

Similar to contact EMV, but the offline enciphered/plaintext CVMs are not supported for contactless. In addition, contactless includes support for a new CVM which occurs on a separate device such as a mobile phone that is used to emulate a contactless card.

Each card brand has a different term for this new CVM:

Table 7-19 Card Verification

Card Brand	Description
VISA	Consumer Device CVM
MasterCard	On Device CVM
American Express	Mobile CVM
Discover	Confirmation Code (Mobile) CVM

7.4.10 Online Processing

Same as contact EMV.

7.4.11 Completion

Similar to contact EMV, except that there is no request for a TC or AAC after online processing since the card has already been removed from the proximity of the reader.

7.4.12 Issuer Update Processing

This optional step to validate the ARPC cryptogram and apply issuer scripts to the card would require re-presentation of the card into the proximity of the reader and is not currently supported by most cards or readers.

7.5 EMV Receipts

7.5.1 Approval Receipts

In addition to the magstripe receipt requirements, the following additional items must be included on EMV receipts:

Table 7-20 Receipt Requirements

Receipt Item	Description
APPLICATION NAME	Use Application Preferred Name (Tag '9F12') if available and printer supports the corresponding character set as specified in Issuer Code Table Index (Tag '9F11'), else use Application Label (Tag '50').
APPLICATION IDENTIFIER (AID)	Use Tag '4F' if available, else Tag '84' if available, else Tag '9F06'.
APPLICATION CRYPTOGRAM TYPE	Use "ARQC", "TC", or "AAC" based on the final cryptogram generated for the transaction.
APPLICATION CRYPTOGRAM	Contents of Tag '9F26' for the final cryptogram generated for the transaction.
CARDHOLDER VERIFICATION METHOD (CVM)	Based on the CVM Results (Tag '9F34'), either print a signature line, "PIN VERIFIED", and/or "NO SIGNATURE REQUIRED". If the CVM Results indicate a failure, or "No CVM Required" when that was not the expected result, a signature line should be printed.
CARD ENTRY METHOD	Use "INSERT", "TAP", "SWIPE", "MANUAL", or equivalent text based on the source of the card data.

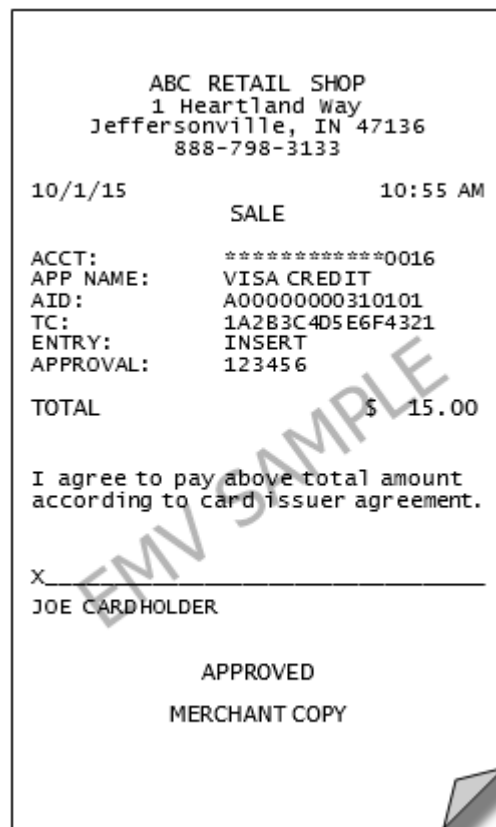


Figure 7-3 EMV Receipt Example

7.5.2 Decline Receipts

There are no card brand requirements to print decline receipts and no requirements for EMV information that should be included on such receipts. Heartland has an Offline Decline Advice message for capturing EMV decline data, so a detailed decline receipt is unnecessary.

If you choose to print decline receipts, then, in addition to the information required on approval receipts, it is recommended that the following tags be printed if available:

- TERMINAL VERIFICATION RESULTS (Tag '95')
- CVM RESULTS (Tag '9F34')
- ISSUER ACTION CODE (IAC) – DENIAL (Tag '9F0E')
- ISSUER APPLICATION DATA (Tag '9F10')

Chapter 8: EMV Parameter Interface

8.1 Introduction

A table-driven EMV Parameter Data Load (EMV PDL) is available and required for all terminals processing EMV transactions. These tables consist of various terminal capabilities, supported applications and keys used for processing EMV. The Heartland network will maintain five Tables of EMV PDL information:

Table 8-1 EMV PDL Tables

Table-ID	Description
Table-ID 10	EMV Table-ID Versions and Flags for Data Tables
Table-ID 30	Terminal Data
Table-ID 40	Contact Card Data
Table-ID 50	Contactless Card Data
Table-ID 60	Public Key Data

The network will relay to the POS which table data it needs to download by sending Table Versions and Flags to it in Table-ID 10.

Note: A Table Version of ### and Flag of @ indicate that the table is not applicable to the POS terminal and that the table must not be requested by the POS terminal.

The EMV PDL system was designed to maintain a specific set of data for each EMV card acceptance device based on the particular certified configuration of that device being utilized by the merchant. The data set is linked to the following identifiers:

Platform	Merchant/Company ID	Location/Unit ID	Terminal/Device ID
Exchange/Portico	12-digit Merchant ID Number	N/A	4-digit Terminal Number
NWS	4-char Company ID	15-char Terminal Location ID	4-char Unique Device ID
VAPS	4-digit Company Number	11-digit Unit Number	2-digit Terminal ID

In practice, a merchant location could have multiple devices that are the same and are using the same certified configuration, so it is not necessary to request an EMV PDL for each of these devices.

For example, a site may be able to set up one PDL for the inside terminals and one PDL for the outside terminals and the POS controller/aggregator could pull those two PDLs from the host and subsequently push the data out to all the devices as appropriate.

The approach for sending EMV PDLs to each device or groups of devices must be managed by the customer working with Heartland.

8.2 Exchange

EMV Parameter Download Notification is indicated when Group III Version 090 contains a value of **Y**. After the EMV Parameter Download Notification is received by the POS Terminal, an EMV Parameter Download request should be sent after the current batch is closed. The EMV Parameter Download Notification Request (Transaction Code = EP) with Group III Version 091 containing the following values:

- PDL-EMV Parameter Type = 06
- PDL-EMV Table ID field = 10
- PDL-EMV Card Type = space-filled
- PDL-EMV Parameter Version = 001
- PDL-EMV Block Sequence Number = 00

The response for Table-ID 10 will contain the latest version number and the download flag for Table-ID 30, 40, 50 and 60.

8.3 POS 8583

The EMV Parameter Download Notification is sent in a response message in DE 48.12 (Administratively Directed Task) with a value of **3**. After the EMV Parameter Download Notification is received by the POS Terminal, an EMV Parameter Download request should be sent after the current batch is closed. The EMV Parameter Download Request (MTI = 1300, DE 24 = 304, DE 25 = 3718, DE 72.1 = EPDL) including the following values:

- PDL-EMV Parameter Type = 06
- PDL-EMV Table ID field = 10
- PDL-EMV Card Type = space-filled
- PDL-EMV Parameter Version = 001
- PDL-EMV Block Sequence Number = 00

The response for Table-ID 10 will contain the latest version number and the download flag for Table-ID 30, 40, 50 and 60.

8.4 NTS

- Terminal will receive notification of a pending EMV PDL via a value of **3** in the PENDING REQUEST INDICATOR field of a Host authorization response.
- Terminal must send a MESSAGE CODE **21**, with an EMV PDL PARAMETER TYPE of **06** to request EMV download information.
- Terminal must send a MESSAGE CODE **21**, with an EMV PDL PARAMETER TYPE of **07** to confirm receipt of each complete EMV table.

8.5 Z01

- Terminal will receive notification of a pending EMV PDL via a value of **E** in the MULTIPLE INQUIRY FLAG of a Host authorization response (**Z01 06** and **Z01 14** response maps only).
- Terminal must send an EMV PDL Request format with RESPONSE FORMAT CODE of **E1**, REQUEST FORMAT CODE of **E1**, TRANSACTION TYPE **80** and EMV PDL PARAMETER TYPE of **06** to request EMV download information.
- Terminal must send an EMV PDL Request format with RESPONSE FORMAT CODE of **E1**, REQUEST FORMAT CODE of **E1**, TRANSACTION TYPE **80** and EMV PDL PARAMETER TYPE of **07** to confirm receipt of each complete EMV table.

8.6 Portico

EMV Parameter Download Notification is indicated in the response Header of the following Portico Transaction Services. The notification will be included in the response Header once per day until the download is confirmed or the download flag is reset in the parameter download system.

- CreditAdditionalAuth
- CreditAccountVerify
- CreditIncrementalAuth
- DebitSale
- CreditAuth
- CreditSale

Parameter Downloads may be retrieved and confirmed through the Portico “ParameterDownload” service. See the Portico SDK for additional information.

8.7 SpiDr

A POS terminal performs an EMV Parameter Data Load after receiving notification, DE 48~12 Administratively Directed Task, in a response message.

The EMV Parameter Data Load request is sent after a batch close in a file download request message (MTI = 1300, DE 24 = 304, DE 25 = 3718) with the following values:

- PDL-EMV Parameter Type = 06
- PDL-EMV Table ID field = 10
- PDL-EMV Card Type = space-filled
- PDL-EMV Parameter Version = space-filled
- PDL-EMV Block Sequence Number = 00

The response for table 10 will contain the latest version number and the download flag for tables 30, 40, 50 and 60.

- A PDL-EMV Table ID Flag value of **Y** will direct the POS to request the data for that table in a subsequent PDL request.
- A PDL-EMV Table ID Flag value of **N** indicates that the table is utilized by the POS terminal, but there is no new data to download at this time.

The POS terminal sends a request for each Table-ID with a Flag value of **Y** using the indicated PDL-EMV Table Version and PDL-EMV Card Type values.

Some of the tables must be downloaded in multiple blocks, and the POS must keep track of the Block Sequence Number it needs and increment it appropriately until all blocks are successfully received. When the POS receives a PDL-EMV End-Of-Table Flag of **Y**, it sends a PDL-EMV Parameter Type of **07** to confirm receipt of that table.

Use the SpiDr transaction type PDL.

Appendices

This Appendix contains the following:

- [Appendix A: Card Association BIN Ranges, pg. 157](#)
- [Appendix B: Industry Codes, pg. 250](#)
- [Appendix C: Receipt Requirements, pg. 289](#)
- [Appendix D: State Codes / Region Codes, pg. 292](#)
- [Appendix E: EMV Field Definitions, pg. 295](#)
- [Appendix F: EMV PDL Data Examples, pg. 320](#)
- [Appendix G: Glossary, pg. 364](#)
- [Appendix H: Revision History, pg. 388](#)

Appendix A: Card Association BIN Ranges

Note: BIN ranges are subject to change without notice. The following lists represent the ranges available at publication time.

- [A.1 VISA BIN Ranges, pg. 158](#)
- [A.2 MasterCard BIN Ranges, pg. 235](#)
- [A.3 American Express BIN Ranges, pg. 243](#)
- [A.4 Discover IIN Ranges, pg. 244](#)
- [A.5 PayPal IIN Ranges, pg. 244](#)
- [A.6 Fleet Card BIN Ranges, pg. 245](#)
- [A.7 Stored Value Solutions \(SVS\) BIN Ranges, pg. 246](#)
- [A.8 Centego Prepaid BIN Ranges, pg. 247](#)
- [A.9 Drop Tank, pg. 247](#)
- [A.10 Debit BIN Ranges, pg. 247](#)
- [A.10 Debit BIN Ranges, pg. 247](#)
- [A.11 EBT BIN Ranges, pg. 247](#)

A.1 VISA BIN Ranges

All VISA cards fall in BIN ranges 4XXXXX–4XXXXX.

The following VISA Purchasing, VISA Fleet, VISA Corporate or Business, and VISA Readylink BIN ranges are subsets of the VISA card BIN range.

- [A.1.1 VISA Purchasing BIN Ranges, pg. 158](#)
- [A.1.2 VISA Fleet BIN Ranges, pg. 161](#)
- [A.1.3 VISA Corporate or Business BIN Ranges, pg. 162](#)
- [A.1.4 VISA ReadyLink BIN Ranges, pg. 229](#)

A.1.1 VISA Purchasing BIN Ranges

Table A-1 VISA Purchasing BIN Ranges

Account Length up to 19
405607
415928
418308
424604
427533
430736
433085
434868–434873
443085
448410
448419
448421
448452
448461–448462
448469
448483
448485–448486
448489
448491
448499–448501
448506–448507

Table A-1 VISA Purchasing BIN Ranges (Continued)

Account Length up to 19
448515
448517
448524
448535
448546
448548
448557
448559–448560
448562
448564–448565
448569
448598
448600–448604
448606–448607
448609
448620–448622
448626
448672–448673
448676–448679
448692–448693
452072
461422
461426–461429
461431
461437
461470–461471
461481
461487–461488
461490
471500
471503
471508
471511
471515–471516

Table A-1 VISA Purchasing BIN Ranges (Continued)

Account Length up to 19
471522
471524–471526
471529
471539
471545–471546
471552–471553
471556
471563–471564
471569
471573
471575
471578
471586
471592
471596
471630
471640
480406–480408
480411–480413
480420–480421
480423–480424
480439
480452
480455
480458
480470
480722–480723
480725
480824
485901
485910
485915
485948
485983

Table A-1 VISA Purchasing BIN Ranges (Continued)

Account Length up to 19
485986
485997
485999
486509
486511–486512
486516–486517
486521–486523
486524–486528
486535
486550–486552
486554–486555
486560
486576
486580
486583
486588–486591
486640
486670
486690
489629

A.1.2 VISA Fleet BIN Ranges

Table A-2 VISA Fleet BIN Ranges

Account Length up to 19
448460–448611
448613–448615
448617–448674
448676–448686
448688–448699
461400–461499
480700–480899

A.1.3 VISA Corporate or Business BIN Ranges

Table A-3 VISA Corporate or Business BIN Ranges

Account Length up to 19
400137
400157
400180
400229
400255
400266
400275
400294
400337–400338
400345
400365–400368
400371
400374–40375
400379–40038
400382–40383
400387
400390
400398
400611
400664
400755–400756
400759
400772
400774
400776–400778
400781
400783–400784
400786–400787
400813
400824
400848
400872–400873

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
400930–400931
400983
400988
401138
401156
401315–401316
401338
401340
401376
401386–401388
401600
401617
401620–401621
401633–401634
401747–401748
401806
401854
401867
401903
401906
401922
401925
401943
401947
401958
401962–401963
401966
401991
401994
402019
402053
402082
402085
402089

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
402099
402102
402309
402416
402441–402452
402463
402465–402467
402469
402471
402480
402492
402495
402819
402834
402879
402884
403146
403154
403270
403289
403298
403300
403302
403411
403424
403486–403497
403574
403607
403622–403623
403634
403639
403646–403647
403684
403706

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
403716
403939
404043
404061–404062
404063
404076
404079–404080
404085
404092
404223
404300
404514
404544
404570
404601–404602
404658
404669
404687
404697
404804
404956
404958
404975
404982
404984
404993
404996
405034
405046
405048
405075
405079
405219
405301

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
405304
405322
405336
405345
405351
405383–405384
405403
405426
405429
405432
405467
405469
405589
405593
405616
405710
405716
405718
405723
405729–405730
405800
405983
406031
406044
406050
406064
406066
406085
406630
406640
406875–406876
406879
406885
406888

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
406890
406892–406893
407070
407109
407201
407207
407210
407226
407239
407250
407335
407818
407821
407918
407922
407936–407937
407946–407948
407950
408014
408044
408058
408081
408083–408084
408090
408094
408097
408116
408119
408141–408143
408175
408184
408190
408508
408525–408528

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
408537
408540
408555
408564
408592
408600
409116
409158–409159
409198
409214
409379
409479
409759
409914
409938
409951
409955
409982
410103
410108
410117
410119
410252
410257–410258
410260
410267
410270–410274
410277
410281
410294
410400–410401
410447
410450
410460

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
410474
410601
410878
410880
410882
410893
410899
411103
411110
411113
411115–411116
411122
411125–411126
411129
411204
411248
411280
411352
411373
411376
411381
411389–411390
411408
411414
411458
411474–411475
411503
411507
411564
411803
411917
411920
412001
412056–412057

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
412064
412107
412120
412154
412167
412173
412178
412190
412192
412228–412229
412236
412248
412253
412271–412273
412297
412299
412418
412448
412628
412631
412635
412645
412662
412664–412665
412672
412677
412687
412694–412695
412698
412713
412900
412914
412935
413083

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
413111
413120
413122
413124
413127
413136
413138–413139
413149
413158
413247–413248
413372
413433
413485
413497
413556
413571–413580
413731
413765
413783
413905
413933
413954
414008
414016
414058
414062
414066
414096
414117
414121–414123
414131–414132
414200
414245
414248

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
414311
414317–414318
414324
414428–414430
414437–414439
414460
414472
414512
414519
414527
414540
414548
414552
414569
414573
414576–414578
414589
414597
414898
414981
415089
415093
415101
415110
415222
415228
415245
415251
415284–415285
415392
415411
415417
415424
415443

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
415453
415456
415459
415487–415488
415538
415542–415545
415587
415685
415782
415785
415835
415850–415851
415892
415911
415933
415980
415983
416058
416440
416459
416485
416504
416617–416618
416619
416625
416728
416760
416766
416769
416775
416780–416781
416783
416785
416789

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
416805
416823
416830
416840
416905–416907
416947
417008
417305
417707
417709
417804–417805
417813
417903
417908
417911
417931
417934
418000–418001
418010
418013
418017
418025
418027
418032
418035
418185
418187
418192
418198
418200–418202
418208–418209
418271–418273
418283
418289

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
418291
418301
418303–418304
418309
418406
418435
418447
418465
418524
418581
418623
418627
418630
418633
418640–418641
418644–418645
418648–418649
418656
418659
418663
418700–418701
418704
418707
418709
419051–419053
419056
419061
419069
419071–419074
419081
419094
419099
419200
419303

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
419310
419481
420007
420011
420039
420089
420655
420712
420738
420740–420741
420747
420749
420752
420754
420765
420781–420782
420936
420975
421032
421063
421071
421709
421713
421754
421786
422307
422322
422341
422383
422439
422493
422504
422510
422512

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
422514
422517
422519
422536
422547
422550
422558
422564
422569
422573
422625
422649
422740
422886
423100
423103–423104
423119
423130
423182–423183
423239
423242
423252
423254–423257
423259
423289
423343
423348
423352
423380
423399
423509
423542
423611
423655

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
423680
423694–423695
423778
423793
423825
423835
423842
423869
423884
423959
424162
424164
424253–424255
424506
424631
424636
424650
424662
424673
424690
424698
425001
425013
425017
425022
425029
425037
425115
425123–425124
425136
425204
425250
425253
425324

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
425351
425429
425637–425653
425702
425801
425809
425829
425831
425839
425907–425909
425909
425914
425925
425959
425962–425963
425964
425973
425988
426246
426266–426267
426270
426279
426407
426435
426497
426516
426520
426603
426627
426654
426691
426707
426715–426716
426719

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
426722
426751
426758
426771
426775–426777
426780
426783
426788–426789
426792
426950
427021
427026
427032
427048
427084
427152
427176
427186
427518
427524
427531–427532
427535
427545
427555–427556
427565
427580
427586
427722
427748
428045–428046
428048
428715
428731
428940

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
428974
428987
429120
429129
429131
429202–429206
429208–429211
429213
429215–429223
429228–429230
429234–429235
429237–429243
429249–429251
429253–429254
429256
429260–429262
429264–429265
429267
429272
429275–429277
429281–429283
429285
429287–429289
429291–429293
429295–429299
429374
429423
429456
429475
429537
429541
429546
429548
429822

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
429841
429844
429847
429856–429857
429859–429860
429862
429867
429884
429888–429889
429911
429975
429977–429978
429982
429984
429988
429997–429998
430055
430099
430211
430213–430214
430224
430331
430412
430649
430738
430741
430743
430750
430752
430755–430757
430780–430781
430784
430828
430847

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
430854
430862
430926
431011
431180
431183
431231
431241
431247
431447
431470
431536
431575
431577–431578
431598
431645
431656
431747
431779
431796
431805–431808
432016
432027
432426
432590
432615
432664
432693
432702
432723–432724
432732–432736
432771
432815
432841

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
432890
432894
432946
432953
432964
433040
433043
433050–433051
433053
433056
433069
433074
433076
433078
433080–433081
433093–433094
433099
433119
433127
433156–433158
433166
433202
433217
433225
433229–433230
433439
433522
433526
433681
433694
433818
433904
433993
433999

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
434012–434014
434016
434020
434025
434028
434030–434032
434034–434036
434042
434048
434124
434139
434142
434144
434171
434203
434228
434233
434248
434255
434271
434274–434275
434277
434280
434282
434313–434314
434329
434367
434378
434392–434393
434398
434628
434642
434801
434803

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
434809
434821–434822
434829
434853
434862
434875
434893
434898
435111
435123
435129
435131
435134
435145
435170–435171
435189
435194–435195
435200
435255
435266
435510–435518
435520–435529
435536–435540
435573–435575
435579
435582
435585–435588
435592
435596
435622
435632
435642
435656
435694

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
435760
435817
435823
435830
435843–435844
435851
435853
435856
435860
435873
435882
435893
435896
435898
435914
435940
435942
435944–435947
435948
435950
435962–435963
435964–435966
435968
435971
435986
435990
435992
435995
436104
436134
436155
436188
436190
436628–436629

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
436644
436647
436651–436655
436674
436691
436703
436707
436709
436721–436722
436725
436727
436756
436765
436864
436866–436868
436870–436871
436876
436880
436892–436894
437820
437824
437827
438441–438442
438683
438689
438699
438714
438732
438765–438766
438802
438831
438839
438842
438850

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
438863
438889
438950–438954
438974
439119
439337
439348
439366
439455–439456
439459
439790–439792
439794–439795
439799
439870
439882
439898
439914–433915
439917–439919
439966–439968
439977
439979
439982
439984
440021
440027
440101–440107
440109–440113
440115–440120
440134
440165–440168
440181
440186
440196
440249

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
440266
440442–440443
440497
440670
440702
440779
440887
441131
441137–441138
441201–441202
441205
441207
441212–441213
441215
441218
441222–441225
441229
441234
441245
441248–441249
441265
441268
441276
441291
441294
441300
441434
441499
441526
441603
441634–441635
441668
441673
441675

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
441688
441720
441822
441836
441859
441886
441893
441989
442033–442034
442047
442212
442256
442284
442313
442377
442405
442504
442514–442515
442627–442628
442632
442683
442704
442707–442709
442723
442732
442741–442742
442746
442754
442763
442776
442833
442852–442853
442865
442872–442873

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
442879
443016
443095
443109
443603
443692
443696
443831–443832
443836
443838
443850
443860
443902–443904
444203
444205–444206
444294
444324
444358
444389
444395
444526–444528
444540
444547
444549
444554
444557
444561
444600
444704
444712
444714–444715
444723
444725
444731

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
444736
444738
444740
444745
444751
444756–444757
444777
444791–444792
444794–444795
444809–444814
444928
444943
444959
444991
445116–445117
445166
445200
445313–445314
445318
445321
445323
445335
445352
445357
445363–445364
445371
445385
445389–445391
445394
445396
445422
445441
445450
445463

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
445603
445607
445643
445647
445713
445725
445750
445755
445758
445767
445963
446001
446056
446063
446084
446089
446108
446175
446400–446401
446409–446410
446413–446414
446461
446466–446467
446474–446475
446492
446495
446545
446547
446558
446736
446848
446871
447011
447017

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
447034
447092
447207
447241
447250
447256
447261
447428
447448
447619–447620
447716
447825
447827
447863–447864
448039
448049
448159
448179
448238
448734
448736
448779
448813–448814
448848
448854–448855
448864
448880
448897–448898
448908
449010
449078
449082
449084
449089–449090

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
449092
449094–449097
449135
449143
449186
449207
449405
449446
449450
449453
449457
449493
449740
449829
449923
449926
450004–450005
450107
450281–450282
450289–450292
450298
450870
450941
450982
451003
451035–451036
451038–451039
451086
451088
451310
451336–451338
451405
451506
451604–451607

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
451646
451650
451652
451656
451659
451663–451664
451666
451669
451672–451673
451675
451679–451680
451684–451685
451691
451695
451704
451706
452070–452071
452073
452102–452103
452107–452109
452179
452197
452221–452222
452284–452286
452289
452513
452553
452559
452564
452566
452570–452572
452924
452928–452929
452931

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
452933
452939
452942
452944–452945
452948–452949
452989
453048
453080
453092
453298
453533–453541
453543
453545–453548
453550–453551
453660–453661
453673
453711
453713–453715
453717–453726
453728
453730
453750
453806
453809
453818
453825
453828
453846
454032
454407
454566
454568
454592
454608

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
454694
454698
454763
454823
454909
454967
455069–455070
455106
455142
455190
455354
455406
455595
455616
455624
455799
456331–456333
456521
456531
456569–456570
456574
456892
458144
458150
458156–458157
458874
458883
458887
458889
458895
458899
459103
459109
459112

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
459117
459119
460103–460104
460124–460127
460130
460137
460148–460149
460163
460350–460369
460390
460445
460493
460515
460601–460606
460609–460620
460641–460642
460650
460652
460691
460693
460695
460729–460730
460752
460769
460774
460793
460847–460848
460852–460854
460856–460857
460859
460861
460863
460868–460872
460874

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
460876–460877
460881
460886
460891–460895
460898
461026
461057
461075
461081
461223–461228
461270
461324
461381
461633
461641
461644
461646
461656
461691–461692
461698
462123
462133
462138
462142
462155
462158–462159
462166–462167
462190
462194
462501
462510
462557
462590
462596

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
462668
462701
462788
462805
462905–462906
462912–462913
462915
462917
463026
463038
463103
463105
463107–463108
463110
463113
463116
463119
463124
463132–463133
463135–463137
463145
463156
463272–463290
463440–463455
463457–463459
463508
463550–463552
463555
463570
463572–463589
463592
463837
463902
463942

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
463945–463946
463950–463952
463957
463964
463971
463976
463992
463996
463998–463999
464011
464046
464048
464206–464207
464320
464330–464338
464340–464349
464371
464399
464509
464704
464738
464745
464747
464764
464771
464773
464801
464807
464860
464862
464865
464871–464890
464919
464921

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
465003
465009
465108
465232
465287–465298
465301–465302
465304–465305
465307–465309
465338–465339
465344
465346–465353
465357–465358
465381
465390
465393
465398–465399
465500
465532
465539
465548
465550
465615
465652
465703
465707
466108
466110
466134
466172
466185
466191
466194
466202
466205

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
466208
466215
466392
466528
467001
467003
467147
467160
467162–467166
467173
467175
467194
467201
467204–467205
467208
467251
467253
467261
467266
467271
467283
467285–467287
467289
467400
467470
467472
467482
467531
467542
467555
467559
467992
468092
468094

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
468232
468239
468263
468274
468299
468406
468408
468413
468419
468422
468430
468433
468436
468441
468452
468455
468462–468463
468468
468477
468479
468489
468491
468493
468700
468704
468718
468721
468810–468811
468859
469044
469055
469059
469061–469063
469065

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
469068
469074
469080
469083
469094
469224
469301
469305–469306
469309
469313–469314
469316
469318–469319
469321–469322
469324
469326
469328
469401
469410
469419
469425
469429
469433
469436
469440
469444
469448
469453
469457
469462
469469
469475
469477–469478
469480–469482
469484

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
469487–469488
469493–469494
469506
469513
469517
469560
469569
469604–469606
470010
470012–470013
470016
470021
470038
470043–470044
470412
470420
470423
470508
470516
470527
470706
470708
470712
470745–470746
470764–470765
470768
470789–470790
471536
471719–471721
471726–471728
471752
471755
471760
471773

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
471777–471778
471781–471783
471785
471787–471792
471796–471797
471808
471811–471813
471833
471844
471853
471855
471866
471870
471873–471874
471877
471879
471894
471915
471917
471982
471985
471987
471989
471991–471992
471995
472000–472001
472003–472005
472012–472013
472015
472017
472022
472024
472026
472028

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
472030
472059
472175
472181
472350
472352
472358–472359
472364–472365
472368–472370
472374
472376
472378
472383
472385
472387–472388
472391
472396
472527
472715
472722
472724
472732
472742–472743
472745–472747
472749
472752
472754
472757
472766
472775
472780
472783
472787
472790

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
472961
472975
472977
472990
472993
472995
472997–472999
473073
473075
473077
473090
473132
473141
473150
473162
473341–473342
473349
473353
473367
473412
473499
473511
473550
473555
473583
473698–473699
473731
473804
473902–473903
473906
473908
473911
473913–473914
473916

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
473918–473919
473922
473924–473925
473926–473928
473934
473937–473938
473942–473945
473949
473951
473954–473955
473957
473959–473961
473963–473965
473966–473968
473970–473971
473973
473975–473976
473978
473982
473984
473988–473991
473992
473994–473996
474304–474305
474363
474378
474384–474385
474396–474397
474398
474596
474599–474600
474603
474622
474656

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
474662
474692–474693
474725
474871
474877
475026
475040
475044
475047–475048
475063
475074
475409
475413
475416
475426
475439
475442
475450
475452–475453
475457
475497–475499
475555
475570
475605
475658
475660
475672
475690
475700
475702
475704–475705
475707
475816
475832

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
475834
475857
476081–476082
476153
476435–476436
476447
476455
476466–476467
476490–476491
476497
476511
476514
476552
476595
476598
476706
476708
476710
476726
476734
476743
476753–476755
476757
476760
476765 476766
476771
476774
476778
476785
476799
476889
476900
477326–477328
477330–477332

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
477334–477337
477340–477341
477343–477344
477348
477401
477404
477406–477407
477410
477412–477415
477417
477419
477421
477424–477427
477431
477434
477436
477438
477440–477441
477446
477450–477451
477453–477455
477461–477463
477466–477467
477470
477474
477481
477486
477489
477493
477496–477498
477500
477536
477559
477724

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
477735
477757
477763
477769
477780–477781
477792
477800
477813
477848
477856
477865
477877
477879
477970
478251
478258
478315–478316
478319
478322
478326
478352–478353
478362
478364
478408
478417
478442
478453
478484–478485
478809
478816
478818
478821–478825
478842
478853

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
478860
478874
478917
478958
478988
479085
479124
479162
479425
479453
479456
479467
479516
479525–479526
479528–479529
479774
479804
479807–479810
479812
479815
479817
479819
479821
479826
479835
479845–479846
479849
479851
479853–479854
479859–479861
479879–479880
479921
480117
480119–480120

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
480132
480141
480169
480176–480195
480200
480203
480205–480206
480207
480209
480211
480213
480217–480219
480222–480223
480227–480228
480235–480236
480239
480243–480244
480245
480247
480251–480252
480255
480260–480263
480265–480271
480278–480285
480287–480288
480294
480298
480319
480328
480362
480384
480393
480437
480605

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
480615
480644
480673
480693
480933
480970–480971
480997
481112–481113
481165
481258
481260
481554
481558
481598
481600
481683
481756
481968
481975
481979
482097
482126
482151–482156
482871
482877
482879–482880
482882
482925
483321
483341
483349
483353
483368
483379

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
483391
483395
483397
483721
483724
483726
483728
483826
483912–483913
484008
484016
484022–484024
484026–484027
484103
484114
484213–484214
484220–484221
484227–484229
484235
484238
484272–484273
484275
484287
484317
484372
484386
484483
484615
484626
484724
484728
484738
485002
485022

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
485030
485083
485086
485088
485099
485106
485216
485218
485224
485228
485232
485240
485250
485252
485259
485261
485273–485276
485282–485284
485286
485291
485293–485297
485327
485336
485339
485345
485348
485354
485363
485412
485418
485423
485425
485427
485565

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
485573–485574
485580
485586–485588
485590
485592
485596
485602–485603
485604–485605
485611
485620–485622
485631
485637–485638
485644–485646
485653
485655–485656
485673
485705–485707
485712
485726
485729
485731
486003–486004
486154
486156
486158–486160
486162
486170
486172–486173
486176
486179
486181
486184
486192
486194–486197

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
486237–486239
486302
486304
486317
486462
486464
486734–486735
486737
486740
486743
486745
486795
486801–486802
486809
486815
486837
486871–486872
486900
486911
486920
486937
486946
486980
486985
486990–486993
486998–486999
487091
487283
487285
487292
487297
487299
487301
487311

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
487320
487323
487330–487331
487337
487342
487409
487449
487451–487452
487459
487496
488801–488802
488813
488815–488816
488823
488828
488831
488844–488845
488847
488849–488850
488853
488869
488879–488880
488882–488883
489208
489219
489225
489229–489230
489240
489293
489554
489556–489559
489609–489613
489618
489626

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
489634–489635
489637
489645
489651–489652
489655
489695–489696
489722
489738
489745
489748
489772
489780
489793
489909
489910
489960
490159
490202–490209
490217
490410
490425
490429
490434
490442–490445
490464
490482
490485–490487
490490
490494
490499
490607
490756
490787
490789

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
490802
490851
490854
490861
490871–490887
490894
490895
491229
491231
491239–491252
491303
491319
491379
491392
491419
491421
491435
491453
491468
491470
491479
491488
491496
491528
491535
491581
491645
491690
491723
491729
491766
491893
491895
491970

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
491980–491993
492302
493021–493022
493024–493039
493041–493045
493047–493058
493060
493121
493153
493167
493177
493187
493196
493426
493442
493445–493446
493450
493471
493784
493786
493819
493820–493821
493854
493855
494135–494140
494145–494177
494179
494315
494371
494397
496003
496007–496008
496647
496677

Table A-3 VISA Corporate or Business BIN Ranges (Continued)

Account Length up to 19
497984
498438
498481
498486
498812
498817
498865
498882
498893
499100
499104–499105
499106
499107
499109
499111–499115
499117
499123–499124
499126–499127
499130–499132
499134
499136–499139
499141–499142
499143–499146
499148
499152
499160–499161
499164–499165
499170
499174–499175
499185–499187
499190–499191
499937

A.1.4 VISA ReadyLink BIN Ranges

Table A-4 VISA ReadyLink BIN Ranges

Account Length up to 19
400029
400041
400046–400047
400123
400341
400403
400414
400421
400528
400540
400542
400544
400548
400564
400908
401128
401200 (TEST only)
401658
401707
401710
402188
402644
403169
403448
403544
403743
404051
404070
404094
404918
405397
405505

Table A-4 VISA ReadyLink BIN Ranges (Continued)

Account Length up to 19
406497
407635
407640
407904
407909
407911
407970
407991
408535
408594
408954
409920
410282
410489
410848
411064–411066
411449
411461
412407
414002
414830
416420
416422
417013
417014
418654
420592
420706
420719
420728
420775
420790
422311
422797

Table A-4 VISA ReadyLink BIN Ranges (Continued)

Account Length up to 19
423138
423145
424758
424793
425060
425062
425064
425312
427090
429375
430221
430223
430763–430764
432650
433701
434249
434470
435196–435197
435541–435542
435555–435556
435568
435581
435833
435877
436199
436733
436744
437317
437712
437817–437818
439331
439334
441820–441821
442029

Table A-4 VISA ReadyLink BIN Ranges (Continued)

Account Length up to 19
442044
442059
442744
442816
443021
443157
446053
447029
447470
447472
448093
449274
449733
452263
452561
453911
454801
454810
455918
455921
456436
456527
456534
456537
458424
458432
461235
461239
463497
465387
465391
466178
467321
467339

Table A-4 VISA ReadyLink BIN Ranges (Continued)

Account Length up to 19
467378–467379
468004
468292
468442–468443
469069
469201
469208
469498
470028
470198
471807
471867
471869
473618
473657
473807
475003–475005
475015
475019
475425
475429
475431
476046–476047
476084
476323
476334
477805
478491
478499
478655
479145
479269–479270
479349
481170

Table A-4 VISA ReadyLink BIN Ranges (Continued)

Account Length up to 19
481591
481663
481687
482163
483304
484056
484379
485214
485221
485237
487093
487300
487490
488885
489221–489222
489233
489614
490718
491072
491215
491244
491274
491349
493146–493147

A.2 MasterCard BIN Ranges

MasterCard transactions must be submitted to the Heartland for authorization. Bin ranges include:

- 222100-272099
- 510000-559999

The following MasterCard Purchasing, MasterCard Corporate, and MasterCard Fleet BIN ranges are subsets of the MasterCard BIN range.

- [A.2.1 MasterCard Purchasing BIN Ranges, pg. 235](#)
- [A.2.2 MasterCard Corporate BIN Ranges, pg. 237](#)
- [A.2.3 MasterCard Fleet BIN Ranges, pg. 243](#)

A.2.1 MasterCard Purchasing BIN Ranges

Table A-5 MasterCard Purchasing BIN Ranges

Account Length up to 19
513359–513360
513721–513722
513764
530249
540500–540501
540505–540511
540514–540515
540517
540520–540524
540526–540529
540531–540539
540542–540543
540546–540549
540554
540556–540558
540561–540562
540568–540580
540582–540583
540586–540590
540592–540596

Table A-5 MasterCard Purchasing BIN Ranges (Continued)

Account Length up to 19
540598
549297
552039
552587
552807
552902–552906
552908–552910
552913–552914
552916–552917
552924–552927
552929–552931
552934
552936
552936
552936–552937
552941–552942
552950
553424
553447
555000–555001
555003
555005–555006
555008–555011
555013–555014
555016
555018–555021
555024–555025
555027
555029
555033
555039–555042
555078
555109
555225

Table A-5 MasterCard Purchasing BIN Ranges (Continued)

Account Length up to 19
555951–555953
555957–555958
555962
556024
558301

A.2.2 MasterCard Corporate BIN Ranges

Table A-6 MasterCard Corporate BIN Ranges

Account Length up to 19
222100–272099
513285
513351–513357
513365–513366
513614
516315
516325
516328
516335
516345
516349
516355
516365
516369
516375
517794
517796
518718
520806
522118
522142
525016
525060
525880–525881

Table A-6 MasterCard Corporate BIN Ranges (Continued)

Account Length up to 19
525892
527500
528307
528311
528316
528360
528790
529602
530241–530242
530253
531210
531212
531214
531216
531218–531225
531228–531229
531291
531357
531454–531455
531712
531714–531717
531723–531727
532450
532458
532612
533501–533502
533509
535317
535319
541253
541306
541309
543793
547260

Table A-6 MasterCard Corporate BIN Ranges (Continued)

Account Length up to 19
547354–547355
547380
547407
547426–547428
547480
547512
547514
547562
547596
547629
547693
547735–547736
547817
547846
547876
547899
549296
549724
552501–552502
552503
552504
552506
552507
552508
552512–552522
552525
552527
552529–552534
552536–552542
552544–552547
552549–552553
552554
552556–552559
552561

Table A-6 MasterCard Corporate BIN Ranges (Continued)

Account Length up to 19
552563
552566
552569–552580
552583–552587
552587
552587–552588
552590
552592–552598
552659
552739–552740
552750–552762
552765–552767
552769–552770
552772–552774
552777
552780–552786
552788
552790
552793–552806
552810–552814
552816–552828
552830–552842
552844
552846–552849
552920
552936
552943
553108
553166
553381–553382
553384–553386
553388–553391
553396
553400–553401

Table A-6 MasterCard Corporate BIN Ranges (Continued)

Account Length up to 19
553403–553406
553408–553414
553416–553422
553422–553423
553425–553426
553428–553430
553432
553435
553438–553439
553440
553441
553442
553443–553446
553449–553450
553452
553454–553458
553460
553465
553471–553473
553475–553476
553478
553480
555004
555007
556101
556600–556601
556603
556605
556607–556608
556610–556617
556619–556620
556622–556626
556628
556630

Table A-6 MasterCard Corporate BIN Ranges (Continued)

Account Length up to 19
556633–556638
556641–556644
556646–556647
556650–556651
556653
556655–556659
556661–556666
556670–556673
556675–556676
556678–556682
556688–556689
558303
558308
558458
558469
558484
558685
558701–558703
558708
558710–558712
558717
558720–558722
558725
558729–558732
558735
558737–558740
558747
558749
558751–558752
558756–558757
558759
558761–558763
558767–558769
558771–558774

Table A-6 MasterCard Corporate BIN Ranges (Continued)

Account Length up to 19
558775
558778–558779
558781–558785
558787–558788
558791–558799
558872
558877

A.2.3 MasterCard Fleet BIN Ranges

Table A-7 MasterCard Fleet BIN Ranges

Account Length up to 19
553231–553380
556083–556099
556100–556599
556700–556999

A.3 American Express BIN Ranges

Table A-8 American Express BIN Ranges

Account Length up to 19
34XX
37XX

A.4 Discover IIN Ranges

Table A-9 Discover IIN Ranges

Account Length up to 19	
Description	IIN
Diner's Club International	30000000–30599999
	30950000–30959999
	36000000–36999999 (Length 14)
	38000000–39999999
Discover Network	60110000–60110399
	60110500–60110999
	60112000–60114999
	60117400–60117499
	60117700–60117999
	60118600–60119999
	64400000–65059999
	65060100–65060999
65061100–65999999	
JCB Bank	35280000–35899999
UnionPay	62212600–62292599
	62400000–62699999
	62820000–62889999

A.5 PayPal IIN Ranges

Table A-10 PayPal IIN Ranges

Account Length 16	
Description	IIN
PayPal	60110400–60110499
	65060000–65060099
	65061000–65061099

A.6 Fleet Card BIN Ranges

Table A-11 Voyager BIN Ranges

Account Length 19	
Description	BIN
Voyager	708885–708889

Table A-12 WEX BIN Ranges

Account Length 19	
Description	BIN
WEX	690046
	707138

Table A-13 FleetCor BIN Ranges

Account Length 17	
Description	BIN
FleetCor Fuelman Plus Card	707649
FleetCor GasCard	707685
FleetCor FleetWide Card	70768598
FleetCor Client-Specific only	556780
	556274

Table A-14 Fleet One BIN Range

Account Length 19	
Description	BIN
Fleet One	501486

Table A-15 Multi Service BIN Ranges

Account Length 19	
Description	BIN
Multi Service	70000 – 700000982
	70000099 – 700009
	708880 – 708884

Table A-16 AVCard BIN Range

Account Length 19 ^{max}	
Description	BIN
AVCard	601029

A.7 Stored Value Solutions (SVS) BIN Ranges

Table A-17 SVS BIN Ranges

Account Length 19	
Description	BIN
Stored Value	600649
	603261
	603571
	627600
	639470
Chockstone	502244
	627720
Heartland Gift Card	708355
ValueLink	601056
	603225

A.8 Centego Prepaid BIN Ranges

Table A-18 Centego Prepaid BIN Range

Account Length 19	
Description	BIN
Centego Prepaid Card	627921

A.9 Drop Tank

Table A-19 Drop Tank BIN Range

Account Length 18	
Description	BIN
Drop Tank	636497

A.10 Debit BIN Ranges

There are no defined BIN ranges for Debit.

A.11 EBT BIN Ranges

Table A-20 EBT BIN Ranges

Account Length up to 19	
State	BIN
AK	507695
AL	507680
AR	610093
AZ	507706
CA	507719
CO	507681
CT	600890
D.C.	507707
DE	507713
FL	508139

Table A-20 EBT BIN Ranges (Continued)

Account Length up to 19	
State	BIN
GA	508148
GUAM	578036
HI	507698
IA	627485
ID	507692
IL	601453
IN	507704
KS	601413
KY	507709
LA	504476
MA	600875
MD	600528
ME	507703
MI	507711
MN	610423
MO	507683
MS	507718
MT	507714
NC	508161
ND	508132
NE	507716
NH	507701
NJ	610434
NM	586616
NV	507715
NY	600486
OH	507700
OK	508147
OR	507693
PA	600760
RI	507682
SC	610470
SD	508132

Table A-20 EBT BIN Ranges (Continued)

Account Length up to 19	
State	BIN
TN	507702
TX	610098
UT	601036
VA	622044
VIRGIN ISLANDS	507721
VT	507705
WA	507710
WI	507708
WV	507720
WY	505349

Appendix B: Industry Codes

- [B.1 Conexus Product Codes](#)
- [B.2 MasterCard Purchasing Product Codes](#)
- [B.3 MasterCard Fleet Product Codes](#)
- [B.4 Heartland Product Codes for VISA Fleet Processing](#)
- [B.5 Voyager Product Codes](#)
- [B.6 WEX Supported Conexus Product Codes](#)

B.1 Conexus Product Codes

Note: While this section lists all of the available Conexus Product Codes, specific Fleet cards may only use a subset. Refer to the specific fleet provider's section for their accepted Product Code list. These codes are subject to change without notice.

Conexus Product Codes have the following ranges:

- 001–099 apply to purchases of dispensed motor fuels and additives.
- 100–149 apply to purchases of vehicle products / services.
- 150–174 apply to purchases of aviation fuels.
- 175–224 apply to purchases of aviation products and services.
- 225–249 apply to purchases of marine fuels.
- 250–299 apply to purchases of marine products and services.
- 300–399 apply to purchases of other dispensed fuel and metered products.
- 400–599 apply to purchases of merchandise.
- 600–624 apply to purchase of packaged fuels.
- 625–649 are reserved for Conexus future use.
- 650–699 apply to purchase of vehicle products/services (continued).
- 800–899 are reserved for proprietary use.
- 700–799 are reserved for Conexus future use.
- 800–899 are reserved for proprietary use.
- 900–949 apply to negative transactions.
- 950–999 apply to administrative.

Table B-1 Conexus Product Codes

Product Code	Description
000	Not Used
001–099	Dispensed Motor Fuels and Additives
001	Unleaded Regular
002	Unleaded Plus
003	Unleaded Super
004	Unleaded 4
005	Unleaded 5
006	<Deprecated> Unleaded Methanol (5.7% blend)
007	<Deprecated> Unleaded Plus Methanol (5.7% blend)
008	<Deprecated> Super Unleaded Methanol (5.7% blend)
009	<Deprecated> Unleaded Methanol (7.7% blend)
010	<Deprecated> Unleaded Plus Methanol (7.7% blend)
011	Unleaded Ethanol (5.7% blend)
012	Unleaded Plus Ethanol (5.7% blend)
013	Unleaded Super Ethanol (5.7% blend)
014	Unleaded Ethanol (7.7% blend)
015	Unleaded Plus Ethanol (7.7% blend)
016	<Deprecated> Methanol / Leaded
017	<Deprecated> Ethanol / Leaded
018	<Deprecated> Leaded
019	Regular Diesel #2
020	Premium Diesel #2
021	Regular Diesel #1
022	Compressed Natural Gas
023	Liquid Propane Gas
024	Liquid Natural Gas
025	<Deprecated> M-85
026	E-85
027	Unleaded - Reformulated 1
028	Unleaded - Reformulated 2
029	Unleaded - Reformulated 3
030	Unleaded - Reformulated 4
031	Unleaded - Reformulated 5

Table B-1 Conexus Product Codes

Product Code	Description
032	<Deprecated> Diesel Off-Road (#1 and #2 Non-Taxable)
033	<Deprecated> Diesel Off-Road (Non-Taxable)
034	Biodiesel Blend Off-Road (Non-Taxable)
035	<Deprecated> Biodiesel Blend Off-Road (Non-Taxable)
036	Racing Fuel
037	<Deprecated> Super Unleaded Methanol (7.7% Blend)
038	<Deprecated> Unleaded Methanol (10% Blend)
039	<Deprecated> Unleaded Plus Methanol (10% Blend)
040	<Deprecated> Super Unleaded Methanol (10% Blend)
041	Super Unleaded Ethanol (7.7% Blend)
042	Unleaded Ethanol (10% Blend)
043	Unleaded Plus Ethanol (10% Blend)
044	Super Unleaded Ethanol (10% Blend)
045	B2 Diesel Blend 2% Biodiesel
046	B5 Diesel Blend 5% Biodiesel
047	B10 Diesel Blend 10% Biodiesel
048	B11 Diesel Blend 11% Biodiesel
049	B15 Diesel Blend 15% Biodiesel
050	B20 Diesel Blend 20% Biodiesel
051	B100 Diesel Blend 100% Biodiesel
052	<Deprecated> Ultra Low Sulfur #1
053	<Deprecated> Ultra Low Sulfur #2
054	<Deprecated> Ultra Low Sulfur Premium Diesel #2
055	<Deprecated> Ultra Low Sulfur Biodiesel Blend 2%
056	<Deprecated> Ultra Low Sulfur Biodiesel Blend 5%
057	<Deprecated> Ultra Low Sulfur Biodiesel Blend 10%
058	<Deprecated> Ultra Low Sulfur Biodiesel Blend 11%
059	<Deprecated> Ultra Low Sulfur Biodiesel Blend 15%
060	<Deprecated> Ultra Low Sulfur Biodiesel Blend 20%
061	<Deprecated> Ultra Low Sulfur Biodiesel Blend 100%
062	DEF (Diesel Exhaust Fluid)
063	Premium Diesel #1
064	Unleaded Ethanol (15% Blend)
065	Unleaded Plus Ethanol (15% Blend)

Table B-1 Conexus Product Codes

Product Code	Description
066	Super Unleaded Ethanol (15% Blend)
067	Premium Diesel Blend <20% Biodiesel
068	Premium Diesel Blend >= 20% Biodiesel
069	B75 Diesel Blend 75% Biodiesel
070	B99 Diesel Blend 99% Biodiesel
071–098	Undefined Fuel—Reserved for Proprietary Use
099	Miscellaneous Fuel
100–149	Vehicle Products / Services
100	General Automotive Merchandise
101	Motor Oil
102	Car Wash
103	Oil Change
104	Oil Filter
105	Work Order
106	Anti-Freeze
107	Washer Fluid
108	Brake Fluid
109	Tires
110	Federal Excise Tax (Tires)
111	Tire Rotation
112	Batteries
113	Lube
114	Inspection
115	Labor
116	Towing
117	Road Service
118	Vehicle Accessories
119	Vehicle Parts
120	Preventative Maintenance
121	Air Conditioning Service
122	Engine Service
123	Transmission Service
124	Brake Service
125	Exhaust Service

Table B-1 Conexus Product Codes

Product Code	Description
126	Body Work
127	Vehicle Glass
128	Synthetic Oil
129	Lamps
130	Wipers
131	Hoses
132	Tire-related (Wheel Balance Valve Stem)
133	Repairs
134	Service Package
135	Vehicle Parking
136	Truck Tank Cleaning
137	Other Lubricants
138	Vehicle Fuel Additives/Treatment (Injected)
139	Vehicle Rental
140	Air Filter
141	Vehicle Prep
142	Fuel System
143–148	Undefined Vehicle Product/Services–Reserved for Proprietary Use
149	Miscellaneous Vehicle Products / Services
150–174	Aviation Fuels
150	Jet Fuel
151	Aviation Fuel Regular
152	Aviation Fuel Premium
153	Aviation Fuel JP8
154	Aviation Fuel 4
155	Aviation Fuel 5
156–167	Undefined Aviation Fuel–Reserved for Conexus Future Use
168–173	Undefined Aviation Fuel–Reserved for Proprietary Use
174	Miscellaneous Aviation Fuel

Table B-1 Conexus Product Codes

Product Code	Description
175–224	Aviation Products / Services
175	Storage
176	Aircraft Ground Handling
177	Aircraft Ground Power Unit
178	Aircraft Labor
179	Aircraft Work Order
180	Aircraft Maintenance
181	Aircraft Service
182	Transportation
183	De-icing
184	Ramp Fees
185	Catering
186	Hangar Fee
187	Landing Fee
188	Call Out Fee
189	Aircraft Rental
190	Instruction Fee
191	Flight Plans / Weather Brief
192	Charter Fee
193	Communication Fee
194	Aircraft Cleaning
195	Cargo Handling
196	Aircraft Accessories
197	Pilot Supplies
198	Aircraft Parking Fees
199	Aircraft Tie Down Fees
200	Aircraft Sanitation Fees
201	Aircraft Fuel Additive
202	AC Parts
203	Oxygen
204	De-fuel
205	Re-service
206	Static Dissipater Additive
207	Corrosion Inhibitor

Table B-1 Conexus Product Codes

Product Code	Description
208	Airport Fees
209	Overtime Fees
210	IT/Bladder
211	Ground Equipment Service Fees
212	Secure Fees
213	Flow Fee
214–215	Undefined Aviation–Reserved for Conexus Future Use
216–223	Undefined Aviation–Reserved for Proprietary Use
224	Miscellaneous Aviation Products/Services
225–249	Marine Fuels
225	Marine Fuel 1
226	Marine Fuel 2
227	Marine Fuel 3
228	Marine Fuel 4
229	Marine Fuel 5
230	Marine - Other
231–242	Undefined Marine Fuel–Reserved for Conexus Future Use
243–248	Undefined Marine Fuel–Reserved for Proprietary Use
249	Miscellaneous Marine Fuel
250–299	Marine Products / Services
250	Marine Service
251	Marine Labor
252	Marine Work Order
253	Launch Fee
254	Slip Rental
255–280	Undefined Marine Services–Reserved for Conexus Future Use
281–298	Undefined Marine Services–Reserved for Proprietary Use
299	Miscellaneous Marine Products/Services
300–399	Other Dispensed Fuels and Metered Products
300	Kerosene–Low Sulfur
301	White Gas
302	Heating Oil
303	<Deprecated> Bottled Propane
304	Other Fuel (Non-Taxable)

Table B-1 Conexus Product Codes

Product Code	Description
305	Kerosene–Ultra Low Sulfur
306	Kerosene–Low Sulfur (Non-Taxable)
307	Kerosene–Ultra Low Sulfur (Non-Taxable)
308	EVC-1–Level 1 charge = 110v 15 amp
309	EVC-2–Level 2 charge = 240v 15-40 amp
310	EVC-3–Level 3 charge = 480v 3 phase charge
311	Biodiesel Blend 2% Off-Road
312	Biodiesel Blend 5% Off-Road
313	Biodiesel Blend 10% Off-Road
314	Biodiesel Blend 11% Off-Road
315	Biodiesel Blend 15% Off-Road
316	Biodiesel Blend 20% Off-Road
317	Diesel #1 Off-Road
318	Diesel #2 Off-Road
319	Diesel #1 Premium Off-Road
320	Diesel #2 Premium Off-Road
321	Additive Dosage
322	Unleaded Ethanol Blends E16-E84
323	Low Octane Unleaded
324	Blended Diesel (#1 and #2)
325	Off-Road Unleaded Regular (Non-Taxable)
326	Off-Road Unleaded Plus (Non-Taxable)
327	Off-Road Unleaded Super (Non-Taxable)
328	Off-Road Unleaded 4 (Non-Taxable)
329	Off-Road Unleaded 5 (Non-Taxable)
330	Recreational Fuel (90 Octane)
331	Hydrogen H35
332	Hydrogen H70
333–380	Undefined Other Fuel–Reserved for Conexus Future Use
381–398	Undefined Other Fuel–Reserved for Proprietary Use
399	Miscellaneous Other Fuel

Table B-1 Conexus Product Codes

Product Code	Description
400–599	Merchandise
400	General Merchandise
401	General Ice
402–409	General Undefined–Reserved for Conexus Future Use
410	General Tobacco
411	Cigarettes
412	Tobacco - Other
413–417	Undefined Tobacco–Reserved for Conexus Future Use
418–419	Undefined Tobacco–Reserved for Proprietary Use
420	General Packaged Beverage
421	Packaged Beverages (non-alcoholic)
422	Packaged Juice
423	Other Packaged Beverages
424–427	Undefined Packaged Beverages–Reserved for Conexus Future Use
428–429	Undefined Packaged Beverages–Reserved for Proprietary Use
430	General Dispensed Beverage
431	Hot Dispensed Beverages
432	Cold Dispensed Beverages
433	Frozen Dispensed Beverages
434	Other Dispensed Beverages
435–437	Undefined Dispensed Beverages–Reserved for Conexus Future Use
438–439	Undefined Dispensed Beverages–Reserved for Proprietary Future
440	General Snacks
441	Salty Snacks
442	Alternative Snacks
443	Sweet Snacks - Packaged
444–447	Undefined Snacks–Reserved for Conexus Future Use
448–449	Undefined Snacks–Reserved for Proprietary Use
450	General Candy
451–457	Undefined Candy–Reserved for Conexus Future Use
458–459	Undefined Candy–Reserved for Proprietary Use

Table B-1 Conexus Product Codes

Product Code	Description
460	General Dairy
461	Fluid Milk Products
462	Packaged Ice Cream/Novelties
463	Other Dairy
464–467	Undefined Dairy–Reserved for Conexus Future Use
468–469	Undefined Dairy–Reserved for Proprietary Use
470	General Grocery
471	Groceries - Edible
472	Groceries - Non-Edible
473	Groceries - Perishable
474	Bread - Packaged
475	Frozen Foods
476–477	Undefined Grocery–Reserved for Conexus Future Use
478–479	Undefined Grocery–Reserved for Proprietary Use
480	General Alcohol
481	Beer - Alcoholic
482	Beer - Non-Alcoholic
483	Wine
484	Liquor
485–487	Undefined Alcohol–Reserved for Conexus Future Use
488–489	Undefined Alcohol–Reserved for Proprietary Use
490	General Deli
491	Packaged Sandwiches/Deli Products
492	Prepared Foods
493	Deli Items
494–497	Undefined Deli–Reserved for Conexus Future Use
498–499	Undefined Deli–Reserved for Proprietary Use
500	General Foodservice
501–507	Undefined Foodservice–Reserved for Conexus Future Use
08–509	Undefined Foodservice–Reserved for Proprietary Use

Table B-1 Conexus Product Codes

Product Code	Description
510	General Lottery
511	Lottery - Instant
512	Lottery - Online
513	Lottery - Other
514–517	Undefined Lottery–Reserved for Conexus Future Use
518–519	Undefined Lottery–Reserved for Proprietary Use
520	General Money Order
521	Money Order - Vendor Payment
522	Money Order - Payroll Check
523	Money Order - Gift Certificate
524	Money Order - Refund Check
525	Money Order - Official Check
526	Money Order - Rebate Check
527	Money Order - Dividend Check
528	Money Order - Utility Check
529	Undefined Money Order–Reserved for Conexus Future Use
530	General Store Service
531	Home Delivery
532	Prepaid Cards - Purchase
533	Prepaid Cards - Activation/Recharge
534	Membership/Loyalty
535–537	Undefined Store Services–Reserved for Conexus Future Use
538–539	Undefined Store Services–Reserved for Proprietary Use
540	General Health & Beauty Care
541–547	Undefined Health & Beauty Care–Reserved for Conexus Future Use
548–549	Undefined Health & Beauty Care–Proprietary Use
550	General Publications
551–557	Undefined General Publications– Reserved for Conexus Future Use
558–559	Undefined General Publications Reserved for Proprietary Use
558–559	Undefined General Publications Reserved for Proprietary Use

Table B-1 Conexus Product Codes

Product Code	Description
560–590	Prepaid and Bill Pay (Secondary Network)
560	PIN Activate Prepaid Card
561	PIN Return Prepaid Card
562	Enable Device/Handset Unlock
563	Disable Device/Handset Lock
564	3rd Party Prepaid Card Activate
565	3rd Party Prepaid Card Reload
566	Financial Prepaid Card Activate
567	Financial Prepaid Card Reload
568	Proprietary Prepaid Card Activate
569	Proprietary Prepaid Card Reload
570	General Purpose Activate
71	General Purpose Reload
572	Real Time Recharge
573	Wireless Real Time Recharge
574	Single Payee Bill Pay
575	Multiple Payee Bill Pay
576–583	Undefined Prepaid and Bill Pay–Reserved for Conexus Future Use
584–590	Undefined Prepaid and Bill Pay–Reserved for Proprietary Use
591–599	Undefined Merchandise–Reserved Proprietary Use
600–624	Packaged Fuels
600	DEF (Diesel Exhaust Fluid)
601	B99
602	B100
603	Additive
604	Kerosene
605	Propane
606–612	Undefined Packaged Fuels–Reserved for Conexus Future Use
613–623	Undefined Packaged Fuels–Reserved for Proprietary Use
624	Miscellaneous Packaged Fuels

Table B-1 Conexus Product Codes

Product Code	Description
625–649	Reserved for Conexus Future Use
650–699	Vehicle Products/Services (Continued)
650	Scales
651	Shower
652	Tire Repair
653	Lodging
654	Wash Out
655	Trailer Wash
656	RV Dump Fee
657	EV Charging Fee
658–689	Undefined Vehicle Product/Services–Reserved for Conexus Use
690–699	Undefined Vehicle Product/Services–Reserved for Proprietary Use
700–799	Reserved for Conexus Future Use
800–899	Reserved for Proprietary Use
900–949	Negative Transactions
900	Discount 1
901	Discount 2
902	Discount 3
903	Discount 4
904	Discount 5
905	Coupon 1
906	Coupon 2
907	Coupon 3
908	Coupon 4
909	Coupon 5
910	Lottery Pay Out - Instant
911	Lottery Pay Out - Online
912	Lottery Pay Out - Other
913	Split Tender
914	Tax Discount/Forgiven
915–940	Undefined Negative–Reserved for Conexus Future Use
941–948	Undefined Negative–Reserved for Proprietary Use
949	Miscellaneous Negative Administrative

Table B-1 Conexus Product Codes

Product Code	Description
950–999	Administrative
950	Tax 1
951	Tax 2
952	Tax 3
953	Tax 4
954	Tax 5
955	Cash Back
956	Cash Back Fee
957	Fee 1
958	Fee 2
959	Fee 3
960	Fee 4
961	Fee 5
962	Miscellaneous Aviation Tax
963	GST/HST (Canadian)/VAT 1
964	PST/QST (Canadian) VAT 2
965	SWT Rate (Canadian)
966	Tax 6
967	Tax 7
968	Tax 8
969	Jet Federal Excise Tax
970	AvGas Federal Excise Tax
971–990	Undefined Administrative–Reserved for Conexus Future Use
991–998	Undefined Administrative–Reserved for Proprietary Use
999	Miscellaneous Administrative

B.2 MasterCard Purchasing Product Codes

MasterCard Purchasing Product Codes have the following ranges:

- 001–029 apply to purchases for motor fuels for cars, trucks, and vans.
- 030–099 apply to purchases for automotive repairs, goods purchased from convenience stores, and other miscellaneous purchases.
- 100–149 apply to purchase aviation fuels.
- 150–199 apply to purchase marine fuels.
- 200–299 apply to purchases other fuels.
- 300–349 apply to purchases aviation repairs and services.
- 350–399 apply to purchase marine and boat repair/other.
- 400–999 undefined.

This section includes the following product codes:

- [B.2.1 MasterCard Purchasing Fuel Product Codes, pg. 264](#)
- [B.2.2 MasterCard Purchasing Non-Fuel Product Codes, pg. 266](#)

B.2.1 MasterCard Purchasing Fuel Product Codes

Table B-2 MasterCard Purchasing Fuel Product Codes

Product Codes	Description
000	Not Used
001	Unleaded Regular (86 or 87 Octane)
002	Unleaded Mid Grade (88 or 89 Octane)
003	Unleaded Premium (90 or 91 Octane)
004	Unleaded Super (92–94 Octane)
005	Methanol Unleaded Regular (86 or 87 Octane)
006	Methanol Unleaded Mid Grade (88 or 89 Octane)
007	Methanol Unleaded Premium (90 or 91 Octane)
008	Methanol Unleaded Super (92 or 94 Octane)
009	Methanol Regular Leaded
011	Regular Leaded Gasoline
012	Diesel
013	Diesel Premium
014	Kerosene
015	LPG

Table B-2 MasterCard Purchasing Fuel Product Codes (Continued)

Product Codes	Description
016	Compressed Natural Gas
017	M85 (Methanol 85%)
018	E85 (Ethanol 85%)
019	Ethanol Unleaded Regular (86 or 87 Octane)
020	Ethanol Unleaded Mid Grade (88 or 89 Octane)
021	Ethanol Unleaded Premium (90 or 91 Octane)
022	Ethanol Unleaded Super (92 or 94 Octane)
023	Ethanol Regular Leaded
024	Unleaded Reformulated (86 or 87 Octane)
025	Unleaded Mid Grade Reformulated (88 or 89 Octane)
026	Dyed Diesel
027	Gasohol
028	Biodiesel
029	Ultralow Sulfur Diesel (ULSD)
100	Aviation 100 Octane
101	Jet Fuel
102	Aviation Fuel
150	Marine Fuel
200	Miscellaneous Fuel
201	Liquid Natural Gas
202	White Gas
203	Racing Fuel

B.2.2 MasterCard Purchasing Non-Fuel Product Codes

Table B-3 MasterCard Purchasing Non-Fuel Product Codes

Product Codes	Description
030	Motor Oil
031	Oil Change
032	Engine Service
033	Transmission Service
034	Brake Service
035	Solvent
036	Brake Fluid
037	Miscellaneous Parts
038	Miscellaneous Labor
039	Miscellaneous Repairs
040	TBA (Tires, Batteries, Accessories)
041	Tires
042	Batteries
043	Automotive Accessories
044	Automotive Glass
045	Car Wash
046	Towing
070	Cigarettes/Tobacco
078	Health/Beauty Aid
079	Miscellaneous Food/Grocery
080	Soda
081	Beer/Wine
082	Milk/Juice
083	Restaurant
089	Miscellaneous Beverage
099	Miscellaneous Other
300	Aviation Maintenance
301	De-icing
302	APU or Aircraft Jump Start
303	Aviation Catering
304	Tie down or Hangar
305	Landing Fee

Table B-3 MasterCard Purchasing Non-Fuel Product Codes (Continued)

Product Codes	Description
306	Ramp Fee
307	Call Out Fee
308	Plane Rental
309	Instruction Fee
310	Miscellaneous Aviation
311	Flight Planning/Weather Fees
312	Charter Fees
313	Ground Handling
314	Communications Fees
315	Aircraft Cleaning
316	Cargo Handling
317	Aviation Accessories
350	Boat Service

B.3 MasterCard Fleet Product Codes

This section includes the following product codes:

- [B.3.1 MasterCard Fleet Fuel Product Codes, pg. 268](#)
- [B.3.2 MasterCard Fleet Non-Fuel Product Codes, pg. 269](#)

B.3.1 MasterCard Fleet Fuel Product Codes

Table B-4 MasterCard Fleet Fuel Product Codes

Product Code	Description
00	Not Used
01	Unleaded Regular (86 or 87 Octane)
02	Unleaded Mid Grade (88 or 89 Octane)
03	Unleaded Premium (90 or 91 Octane)
04	Unleaded Super (92–94 Octane)
05	Methanol Unleaded Regular (86 or 87 Octane)
06	Methanol Unleaded Mid Grade (88 or 89 Octane)
07	Methanol Unleaded Premium (90 or 91 Octane)
08	Methanol Unleaded Super (92 or 94 Octane)
09	Methanol Regular Leaded
11	Regular Leaded Gasoline
12	Diesel
13	Diesel Premium
14	Kerosene
15	LPG
16	Compressed Natural Gas
17	M85 (Methanol 85%)
18	E85 (Ethanol 85%)
19	Ethanol Unleaded Regular (86 or 87 Octane)
20	Ethanol Unleaded Mid Grade (88 or 89 Octane)
21	Ethanol Unleaded Premium (90 or 91 Octane)
22	Ethanol Unleaded Super (92 or 94 Octane)
23	Ethanol Regular Leaded
24	Unleaded Reformulated (86 or 87 Octane)
25	Unleaded Mid Grade Reformulated (88 or 89 Octane)
26	Dyed Diesel

Table B-4 MasterCard Fleet Fuel Product Codes (Continued)

Product Code	Description
27	Gasohol
28	Biodiesel
29	Ultralow Sulfur Diesel (ULSD)

B.3.2 MasterCard Fleet Non-Fuel Product Codes

Table B-5 MasterCard Fleet Non-Fuel Product Codes

Product Code	Description
30	Motor Oil
31	Oil Change
32	Engine Service
33	Transmission Service
34	Brake Service
35	Solvent
36	Brake Fluid
37	Miscellaneous Parts
38	Miscellaneous Labor
39	Miscellaneous Repairs
40	TBA (Tires, Batteries, Accessories)
41	Tires
42	Batteries
43	Automotive Accessories
44	Automotive Glass
45	Car Wash
46	Towing
70	Cigarettes/Tobacco
78	Health/Beauty Aid
79	Miscellaneous Food/Grocery
80	Soda
81	Beer/Wine
82	Milk/Juice
83	Restaurant
89	Miscellaneous Beverage
99	Miscellaneous Other

B.4 Heartland Product Codes for VISA Fleet Processing

The following Heartland product codes are to be used when processing VISA Fleet transactions for NTS, Z01 and POS 8583. These codes are converted by Heartland to the VISA Fleet product codes contained in VISA's Implementation Guide.

- Codes numbered 00–29 apply to fuel purchases for motor vehicles.
- Codes numbered 30–99 apply to purchases for automotive repairs, goods purchased from convenience stores, and other miscellaneous purchases.

This section includes the following product codes:

- [B.4.1 Fuel Product Codes, pg. 270](#)
- [B.4.2 Non-Fuel Product Codes, pg. 272](#)

B.4.1 Fuel Product Codes

Table B-6 Fuel Product Codes

Fuel Product Code	Description
00	Other
01	Unleaded Regular – 86
02	Unleaded Regular – 87
03	Unleaded Mid Grade – 88
04	Unleaded Mid Grade – 89
05	Unleaded Premium – 90
06	Unleaded Premium – 91
07	Unleaded Super – 92
08	Unleaded Super – 93
09	Unleaded Super – 94
10	RESERVED
11	Regular Leaded
12	Diesel
13	Diesel Premium
14	Kerosene
15	LPG
16	Gasohol
17	CNG
18	Methanol – 85
19	Methanol – 10

Table B-6 Fuel Product Codes

Fuel Product Code	Description
20	Methanol – 7
21	Methanol – 5
22	Ethanol – 85
23	Ethanol – 10
24	Ethanol – 7
25	Ethanol – 5
26	Jet Fuel
27	Aviation Fuel
28	Off-Road diesel
29	Marine

B.4.2 Non-Fuel Product Codes

Table B-7 Non-Fuel Product Codes

Non-Fuel Product Code	Description
30	Motor Oil
31	Oil Change
32	Engine Service
33	Transmission Service
34	Brake Service
35–38	Unassigned Repair Values
39	Miscellaneous Repairs
40	Tires, Batteries, and Accessories
41	Tires
42	Batteries
43	Automotive Accessories
44	Automotive Glass
45	Car Wash
46–69	Unassigned Automotive Products and Services
70	Cigarettes and Tobacco
71–77	Unassigned Food and Grocery Items
78	Health and Beauty Aids
79	Miscellaneous Grocery
80	Soda
81	Beer and Wine
82	Milk and Juice
83–89	Unassigned Beverage Items
90	Miscellaneous
91–99	Unassigned

B.5 Voyager Product Codes

This section includes the following product codes:

- [B.5.1 Voyager Fuel Product Codes, pg. 273](#)
- [B.5.2 Voyager Non-Fuel Product Codes, pg. 274](#)

B.5.1 Voyager Fuel Product Codes

Voyager Fuel Product Codes

Product Code	Description
01	UNLEADED
02	UNLEADED PLUS
03	FUTURE USE
04	SUPER UNLEADED
05	DIESEL
06	AVIATION
07	JET FUEL
08	MARINE
50	PROPANE
51	NATURAL GAS
52	METHANOL
53	ETHANOL
54	KEROSENE
55	10% GASOHOL
56	7.7% GASOHOL
57	5.7% GASOHOL
58	WHITE GAS
59	COMPR NAT GAS(CNG)
60	DUAL PROPANE/UNLDED
61	WIDE NOZZLE UNLEADED
62	SPECIAL MTR FUEL LPG
63	OTHER FUEL
64	M 85
65	DIESEL WITHOUT TAX
66	E 85
67	LIQUIFIED NATURAL GAS

Voyager Fuel Product Codes

Product Code	Description
68	UNLEADED WITHOUT TAX
D0 (zero)	BIO DIESEL
D1	5.7% UNLEADED BLEND
D2	7.7% UNLEADED BLEND
D3	10% UNLEADED BLEND
D4	5.7% UNLD PLUS BLEND
D5	7.7% UNLD PLUS BLEND
D6	10% UNLD PLUS BLEND
D7	5.7% UNLD SUPER BLND
D8	7.7% UNLD SUPER BLND
D9	10% UNLD SUPER BLND

B.5.2 Voyager Non-Fuel Product Codes**Voyager Non-Fuel Product Codes**

Product Code	Description
09	OIL
10	ACCESSORIES
11	COOLING SYSTEM
12	CHARGING SYSTEM
13	FLUIDS
14	FOOD
15	TIRE AND TUBE
16	TUBES
17	AVIONICS
18	OIL FILTER AND SERV
19	PARTS
20	REPAIRS
21	SERVICE
22	STORAGE
23	TIRES
24	TIRES AND TUBE REPAIR
25	LABOR
26	FEDERAL EX TAX TIRE

Voyager Non-Fuel Product Codes

Product Code	Description
27	WASH JOB
28	WASH AND LUBE
29	WASH AND POLISH
30	MAINTENANCE
31	LUBE
32	STATE INSPECTION
33	MISCELLANEOUS
34	SALES TAX
35	LOCATION DISCOUNT
36	PARTICIPANT DISCOUNT
37	AIR FILTERS
38	AUTO/MAN TRANS SERV
39	AIR CONDITION SERV
40	FUEL INJECT CLEAN SV
41	RADIATOR SERVICE
42	TIRE ROTATION
43	WIPER BLADE
44	BELTS-SERVICE&REPLACEMENT
45	FULL SERVICE OIL CHANGE
46	FRONT/REAR DIFF SERVICE
47	BREATHERS/PCV VALVES
48	AUTOMOTIVE GLASS
49	FUEL ADDITIVES
70	TOW
71	FLAT
72	NON-CONTRACTED SERV
73	BATTERY
74	GAS/ROADSIDE SERVICE
75	STALLED
76	LOCKOUT
77	NO SERVICE RENDERED
78	AMBULANCE
79	OTHER
80	AVIATION MAINTENANCE

Voyager Non-Fuel Product Codes

Product Code	Description
81	DE-ICING
82	APU OR AIRCRAFT JUMP SEAT
83	AVIATION CATERING
84	TIEDOWN OR HANGER
85	LANDING FEE
86	RAMP FEE
87	CALL OUT FEE
88	PLANE RENTAL
89	INSTRUCTIONAL FEE
90	MISCELLANEOUS AVIATION
91	FLIGHT PLANNING FEE
92	WEATHER FEE
93	CHARTER FEES
94	GROUND HANDLING
95	COMMUNICATION FEES
96	AIRCRAFT CLEANING
97	CARGO HANDLING
98	AVIATION ACCESSORIES
99	FUTURE USE
M0	CAB, CLIMATE CNTL & AERO
M1	AIR COND, HEATING & VENTI
M2	CAR & SHEET METAL
M3	INSTRUMENTS, GAUGE, WARNI
M4	AERODYNAMIC DEVICES
M5	CHASSIS GROUP
M6	AXLES - NON DRIVEN, FRONT
M7	AXLES - NON DRIVEN, REAR
M8	BRAKES
M9	FRAME
N0	STEERING
N1	SUSPENSION
N2	WHEELS RIMS HUBS & BEARIN
N3	AUTO/MANU CHASSIS LUBRICA
N4	DRIVE TRAIN GROUP

Voyager Non-Fuel Product Codes

Product Code	Description
N5	AXLES-DRIVEN, FRONT STEER
N6	AXLES-DRIVEN, REAR
N7	CLUTCH
N8	DRIVE SHAFTS
N9	TRANSFER CASE
O0	TRANSMISSION-MAIN, MANUAL
O1	TRANSMISSION-MAIN, AUTO
O2	AUXILIARY TRANSMISSION
O3	AUX SEC-MAIN TRANS, MANU
O4	ELECTRICAL GROUP
O5	CRANKING SYSTEM
O6	IGNITION SYSTEM
O7	LIGHTING SYSTEM
O8	MULTI-FUNC ELECT DEVICES
O9	ENGINE/MOTOR SYSTEMS
P0	AIR INTAKE SYSTEM
P1	EXHAUST SYSTEM
P2	FUEL SYSTEM
P3	POWER PLANT
P4	ELECTRIC PROPULSION SYSTE
P5	MUL SYS(40-46) FILTER KIT
P6	EXPANDABLE ITEMS
P7	HORNS & SIGNAL ALARMS
P8	CARGO HANDLING RESTRAINT
P9	POWER TAKE OFF
Q0	SPARE WHEEL MOUNTING
Q1	WINCH
Q2	VEHICLE COUPLING SYSTEM
Q3	SPECIAL APPLICATIONS GRP
Q4	TERMINAL EQUIPMNT-SYS & A
Q5	CONSTRU EQUIP-CHASSIS MOU
Q6	SATELLITE COMM SYSTEM
Q7	HYDRAULIC SYSTEMS - S APP
Q8	BODIES AND VESSELS GROUP

Voyager Non-Fuel Product Codes

Product Code	Description
Q9	BODY
R0	REAL WALL & DOOR
R1	TANK VESSEL-INNER SHELL
R2	TANK VESSEL-OUTER JACKET
R3	MANHOLES
R4	RINGS & BOLSTERS
R5	TRAILER FRAME & SUPPORT
R6	TRIM & MISC HARDWARE
R7	SAFTY DEVICES
R8	HEATING & REFRIGERATION G
R9	HEATING UNIT
S0	MECHANICAL REFRIG UNIT
S1	NITROGEN REFRIG UNIT
S2	HOLDOVER PLATE REFRIGERAT
S3	BULK PRODUCT TRANSFER SYS
S4	BLOWERS, CONVEYORS & VIBR
S5	COMPRESSOR-BULK PROD SYS
S6	ENGINE (AUXILIARY)
S7	LINES TUBES HOSES & ATTIN
S8	MANIFOLD
S9	POWER SHAFT-POWER TAKE OF
T0	PUMP-PRODUCT TRANSFER
T1	VALVES & CONTROLS-BULK PR
T2	SAFETY DEVICES,INSTRU & G
T3	RE-REFINED OIL
T4	DISPOSAL/WASTE FEE
T5	EMISSION TEST FEE
T6	TRANSMISSION
T7	DO NOT USE – REVERSE TRANS
T8	AUTO PAINT
T9	RADIO MAINT
U1	ALIGNMENT
U2	PREV MAINT
V1	KEY CHAINS

Voyager Non-Fuel Product Codes

Product Code	Description
V2	ACCOUNT SET UP
V3	ELECTRONIC FILE
V4	OVERNIGHT CARD
V5	CUSTOMIZED REPORT
V6	FLEET COMMANDER
V7	CUSTOMIZED QUERY
V8	MEDIA FEE
V9	BILLING REPRINT
VA	CARD REISSUE
VB	MOCHA ONLINE
W2	AUTO SIDE GLASS
W3	AUTO BACK GLASS
WI	AUTO WINDSHIELD GLASS

B.6 WEX Supported Conexus Product Codes

Table B-8 WEX Supported Conexus Product Codes

Product Code	Conexus Description	WEX Description
001	Unleaded Regular	Unleaded
002	Unleaded Plus	Unleaded Plus
003	Unleaded Super	Super Unleaded
004	Unleaded 4	N/A
005	Unleaded 5	N/A
006	Gas / Methanol 1	Unleaded 5.7 methanol blend
007	Gas / Methanol 2	Unleaded Plus 5.7% methanol blend
008	Gas / Methanol 3	Super Unleaded 5.7% methanol blend
009	Gas / Methanol 4	Unleaded 7.7% methanol blend
010	Gas / Methanol 5	Unleaded Plus 7.7% methanol blend
011	Gas / Ethanol 1	Unleaded 5.7 ethanol blend
012	Gas / Ethanol 2	Unleaded Plus 5.7% ethanol blend
013	Gas / Ethanol 3	Super Unleaded 5.7% ethanol blend
014	Gas / Ethanol 4	Unleaded 7.7% ethanol blend
015	Gas / Ethanol 5	Unleaded Plus 7.7% ethanol blend
016	Methanol / Leaded	Methanol / Leaded
017	Ethanol / Leaded	Ethanol / Leaded
018	Leaded	Leaded
019	Regular Diesel #2	Regular Diesel (Taxed)
020	Premium Diesel #2	Premium Diesel (Taxed)
021	Diesel #1	N/A
022	Compressed Natural Gas	Compressed Natural Gas
023	Liquid Propane Gas	Liquid Propane Gas
024	Liquid Natural Gas	Liquid Natural Gas
025	M-85	M-85
026	E-85	E-85
027	Unleaded - Reformulated 1	N/A
028	Unleaded - Reformulated 2	N/A
029	Unleaded - Reformulated 3	N/A
030	Unleaded - Reformulated 4	N/A
031	Unleaded - Reformulated 5	N/A

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
032	Diesel 1 Off-Road (#1 and #2 Non-Taxable)	Diesel Off Road / Farm Fuel
033	Ultra Low Sulfur Diesel Off-Road (Non-Taxable)	Diesel Refrigerator Fuel
034	Biodiesel Blend Off-Road (Non-Taxable)	N/A
035	Ultra Low Sulfur Biodiesel Blend Off-Road (Non-Taxable)	Other Farm Fuel or Refrigerator Fuel
036	Racing Fuel	Racing Fuel
037	Super Unleaded Methanol	Super Unleaded 7.7% methanol blend
038	Unleaded Methanol	Unleaded 10% methanol blend
039	Undefined Plus Methanol	Unleaded Plus 10% methanol blend
040	Super Unleaded Methanol	Super Unleaded 10% methanol blend
041	Super Unleaded Ethanol	Super Unleaded 7.7% ethanol blend
042	Unleaded Ethanol	Unleaded 10% ethanol blend
043	Unleaded Plus Ethanol	Unleaded Plus 10% ethanol blend
044	Super Unleaded Ethanol	Super Unleaded 10% ethanol blend
045	B2 Diesel Blend 2% Biodiesel	
046	B5 Diesel Blend 5% Biodiesel	
047	B10 Diesel Blend 10% Biodiesel	
048	B11 Diesel Blend 11% Biodiesel	
049	B15 Diesel Blend 15% Biodiesel	
050	B20 Diesel Blend 20% Biodiesel	
051	B100 Diesel Blend 100% Biodiesel	
052	Ultra Low Sulfur #1	
053	Ultra Low Sulfur #2	
054	Ultra Low Sulfur Premium Diesel #2	
055	Ultra Low Sulfur Biodiesel Blend 2%	
056	Ultra Low Sulfur Biodiesel Blend 5%	
057	Ultra Low Sulfur Biodiesel Blend 10%	
058	Ultra Low Sulfur Biodiesel Blend 11%	
059	Ultra Low Sulfur Biodiesel Blend 15%	
060	Ultra Low Sulfur Biodiesel Blend 20%	
061	Ultra Low Sulfur Biodiesel Blend 100%	
062	Diesel Exhaust Fluid	
063–070	Undefined Fuel – Reserved for Conexus Future Use	

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
071	Auth Only	Fuel, grade unknown at Auth
072	Auth Only	Diesel, grade unknown at Auth
073	Auth Only	Alt. Fuel grade unknown at Auth
074	Auth Only	Multi Fuel, grade unknown at Auth
075	Auth Only	Multi Product, product unknown at Auth
076–098	Undefined Fuel, reserved for Proprietary	Undefined Fuel, reserved for Proprietary
099	Miscellaneous Fuel	Miscellaneous Fuel
100	General Automotive Merchandise	General Automotive Merchandise
101	Motor Oil	Motor Oil
102	Car Wash	Car Wash
103	Oil Change	Oil Change
104	Oil Filter	Oil Filter
105	Work Order	Work Order
106	Anti-Freeze	Anti-Freeze
107	Washer Fluid	Washer Fluid
108	Brake Fluid	Brake Fluid
109	Tires	Tires
110	Federal Excise Tax (Tires)	Federal Excise Tax (Tires)
111	Tire Rotation	Tire Rotation
112	Batteries	Batteries
113	Lube	Lube
114	Inspection	Inspection
115	Labor	Labor
116	Towing	Towing
117	Road Service	Road Service
118	Auto Accessories	Auto Accessories
119	Auto Parts	Auto Parts
120	Preventive Maintenance	Preventive Maintenance
121	Air Conditioning Service	Air Conditioning Service
122	Engine Service	Engine Service
123	Transmission Service	Transmission Service
124	Brake Service	Brake Service
125	Exhaust Service	Exhaust Service
126	Body Work	Body Work

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
127	Automotive Glass	Automotive Glass
128	Synthetic Motor Oil	
129	Undefined Parts / Service	Lamps
130	Undefined Parts / Service	Wipers
131	Undefined Parts / Service	Hoses
132	Undefined Parts / Service	Tire related, Wheel Balance, Valve Stem
133	Undefined Parts / Service	Repairs or Service
134	Undefined Parts / Service	Service Package
135	Automotive Parking	Automotive Parking
136	Truck Tank Cleaning	Truck Tank Cleaning
137	Other Lubricants	Other Lubricants
138	Automotive Fuel Additives / Treatment (injected)	
139	Vehicle Rental	Car Rental
140	Air Filter	Filters
141	Vehicle Prep	Auto Detail
142	Fuel System	Service Package
143–148	Undefined Parts / Service	
149	Misc. Parts and Service	Front End, Shocks & Springs, Flush & Fill, or Automotive Detailing
150	Jet Fuel Regular	Jet Fuel A
151	Jet Fuel Premium	Jet Fuel A with Additives
152	Jet Fuel JP8	Jet Fuel B turbo
153	Aviation Fuel 3	Jet Fuel JP8
154	Aviation Fuel 4	Aviation Gas 100LL
155	Aviation Fuel 5	Aviation Gas 80LL
156–173	Undefined Aviation Fuel	
174	Miscellaneous Aviation Fuel	Miscellaneous Aviation Fuel
175	Storage	Storage
176	Aircraft Ground Handling	Aircraft Ground Handling
177	Aircraft Ground Power Unit	Aircraft Ground Power Unit
178	Aircraft Labor	Aircraft Labor
179	Aircraft Work Order	Aircraft Work Order
180	Aircraft Maintenance	Aircraft Maintenance

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
181	Aircraft Service	Aircraft Service
182	Transportation	Transportation
183	De-icing	De-icing
184	Ramp Fees	Ramp Fees
185	Catering	Catering
186	Hangar Fee	Hangar Fee
187	Landing Fee	Landing Fee
188	Call Out Fee	Call Out Fee
189	Aircraft Rental	Aircraft Rental
190	Instruction Fee	Instruction Fee
191	Flight Plans / Weather Brief	Flight Plans / Weather Brief
192	Charter Fee	Charter Fee
193	Communication Fee	Communication Fee
194	Aircraft Cleaning	Aircraft Cleaning
195	Cargo Handling	Cargo Handling
196	Aircraft Accessories	Aircraft Accessories
197	Undefined Aviation	Pilot Supplies
198	Undefined Aviation	Aircraft Parking Fees
199	Undefined Aviation	Aircraft Tie down Fees
200	Undefined Aviation	Aircraft Sanitation Fees
201	Undefined Aviation	Aviation Fuel Additive
202–223	Undefined Aviation	Undefined Aviation
224	Miscellaneous Aviation	Airline Fee, APT Airport Fees, or Miscellaneous Aviation
225	Marine Fuel 1	Marine Fuel 1
226	Marine Fuel 2	Marine Fuel 2
227	Marine Fuel 3	Marine Fuel 3
228	Marine Fuel 4	Marine Fuel 4
229	Marine Fuel 5	Marine Fuel 5
230	Marine - Other	Marine - Other
231–248	Unidentified Marine Fuel	Unidentified Marine Fuel
249	Miscellaneous Marine Fuel	Miscellaneous Marine Fuel
250	Marine Service	Marine Service
251	Marine Labor	Marine Labor

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
252	Marine Work Order	Marine Work Order
253	Launch Fee	Launch Fee
254	Slip Rental	Slip Rental
255–298	Undefined Marine Services	Undefined Marine Services
299	Miscellaneous Marine Service	Miscellaneous Marine Service
300	Kerosene – Low Sulfur	Kerosene
301	White Gas	White Gas
302	Heating Oil	Heating Oil
303	Bottled Propane	Bottled Propane
304	Other Fuel (Non-Taxable)	Other Fuel (Non-Taxable)
305	Kerosene – Ultra Low Sulfur	
306	Kerosene – Low Sulfur (non-taxable)	
307	Kerosene – Ultra Low Sulfur (non-taxable)	
308–398	Undefined Other Fuel	Undefined Other Fuel
399	Miscellaneous Other Fuel	Miscellaneous Other Fuel
400	General Merchandise	General Merchandise
401	General Ice	General Ice
402–409	General Undefined	General Unidentified
410	General Tobacco	General Tobacco
411	Cigarettes	Cigarettes
412	Tobacco - Other	Tobacco - Other
413–419	Undefined Tobacco	Unidentified Tobacco
420	General Packaged Beverage	General Packaged Beverage
421	Packaged Beverages (non-alcoholic)	Packaged Beverages (non-alcoholic)
422	Juice	Juice
423	Other Packaged Beverages	Other Packaged Beverages
424–429	Undefended Packaged Beverage	Undefended Packaged Beverage
430	General Dispensed Beverage	General Dispensed Beverage
431	Hot Dispensed Beverage	Hot Dispensed Beverage
432	Cold Dispensed Beverage	Cold Dispensed Beverage
433	Frozen Dispensed Beverage	Frozen Dispensed Beverage
434	Other Dispensed Beverage	Other Dispensed Beverage
435–439	Undefined Dispensed Beverage	Undefined Dispensed Beverage
440	General Snacks	General Snacks

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
441	Salty Snacks	Salty Snacks
442	Alternative Snacks	Alternative Snacks
443	Sweet Snacks - Packaged	Sweet Snacks - Packaged
444–449	Undefined Snacks	Undefined Snacks
450	General Candy	General Candy
451–459	Undefined Candy	Undefined Candy
460	General Dairy	General Dairy
461	Fluid Milk Products	Fluid Milk Products
462	Packaged Ice Cream/Novelties	Packaged Ice Cream/Novelties
463	Other Dairy	Other Dairy
464–469	Undefined Dairy	Undefined Dairy
470	General Grocery	General Grocery
471	Groceries - Edible	Groceries - Edible
472	Groceries - Non-Edible	Groceries - Non-Edible
473	Groceries - Perishable	Groceries - Perishable
474	Bread - Packaged	Bread - Packaged
475	Frozen Foods	Frozen Foods
476–479	Undefined Grocery	Undefined Grocery
480	General Alcohol	General Alcohol
481	Beer - Alcohol	Beer - Alcohol
482	Beer - Non-Alcoholic	Beer - Non-Alcoholic
483	Wine	Wine
484	Liquor	Liquor
485–489	Undefined Alcohol	Undefined Alcohol
490	General Deli	General Deli
491	Packaged Sandwiches/Deli Products	Packaged Sandwiches/Deli Products
492	Prepared Foods	Prepared Foods
493	Deli Items	Deli Items
494–499	Undefined Deli	Undefined Deli
500	General Food Service	General Food Service
501–509	Undefined Food Service	
510	General Lottery	General Lottery
511	Lottery - Instant	Lottery - Instant
512	Lottery - Online	Lottery - Online

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
513	Lottery - Other	Lottery - Other
514–519	Undefined Lottery	Undefined Lottery
520	General Money Order	General Money Order
521	Money Order - Vendor Payment	Money Order - Vendor Payment
522	Money Order - Payroll Check	Money Order - Payroll Check
523	Money Order - Gift Certificate	Money Order - Gift Certificate
524	Money Order - Refund Check	Money Order - Refund Check
525	Money Order - Official Check	Money Order - Official Check
526	Money Order - Rebate Check	Money Order - Rebate Check
527	Money Order - Dividend Check	Money Order - Dividend Check
528	Money Order - Utility Check	Money Order - Utility Check
529	Undefined Money Order	Undefined Money Order
530	General Store Services	General Store Services
531	Home Delivery	Home Delivery
532	Prepaid Cards - Purchase	Prepaid Cards - Purchase
533	Prepaid Cards - Activation/Recharge	Prepaid Cards - Activation/Recharge
534–539	Undefined Store Services	
540	General Health & Beauty Care	General Health & Beauty Care
541–549	Undefined Health & Beauty Care	
550	General Publications	General Publications
551–559	Undefined Publications	
560–599	Undefined Merchandise	Undefined Merchandise
600–799	Reserved for Future Use	
800	Reserved for Proprietary Use	WEX use only. Management Control Card Approved
801	Reserved for Proprietary Use	WEX use only. Replacement Card Fee (WEX generated; used for some Partner Billed Cobrands)
802	Reserved for Proprietary Use	WEX use only. Tax Exempt (WEX generated; used to populate OFFIS Trnx Detail).
803	Reserved for Proprietary Use	Environmental Disposal Fee
804	Reserved for Proprietary Use	Car Rental
805–899	Reserved - Proprietary Use	Reserved - Proprietary Use
900	Discount 1	Discount Fuel
901	Discount 2	Discount Non-Fuel

Table B-8 WEX Supported Conexus Product Codes (Continued)

Product Code	Conexus Description	WEX Description
902	Discount 3	Discount 3
903	Discount 4	Discount 4
904	Discount 5	Discount 5
905	Coupon 1	Coupon Fuel
906	Coupon 2	Coupon Non-Fuel
907	Coupon 3	Coupon 3
908	Coupon 4	Coupon 4
909	Coupon 5	Coupon 5
910	Lottery Pay Out - Instant	Lottery Pay Out - Instant
911	Lottery Pay Out - Online	Lottery Pay Out - Online
912	Lottery Pay Out - Other	Lottery Pay Out - Other
913	Auth Only	Split Tender
914–948	Undefined Negative	Undefined Negative
949	Miscellaneous Negative Administration	Miscellaneous Negative Administration
950	Tax 1	Sales Tax Non-Fuel
951	Tax 2	Federal Excise Tax (Non-Fuel)
952	Tax 3	StateTax (Aviation Only)
953	Tax 4	Federal Excise Tax (Aviation Only)
954	Tax 5	Miscellaneous Fuel Tax (Aviation Only)
957	Fee 1	Fee 1
958	Fee 2	Fee 2
959	Fee 3	Fee 3
960	Fee 4	Fee 4
961	Fee 5	Fee 5
962	Miscellaneous Aviation Tax	Miscellaneous Aviation Tax (Aviation Only)
963	GST/HST (Canadian) / VAT 1	GST/HST (Canadian) VAT 1
964	PST/QST (Canadian) / VAT 2	PST/QST (Canadian) VAT 2
965	SWT Rate (Canadian)	SWT Rate (Canadian)
966–998	Unidentified Administrative	Unidentified Administrative
999	Miscellaneous Administrative	Miscellaneous Administrative

Appendix C: Receipt Requirements

C.1 General Receipt Requirements

The following are industry requirements for all cards:

- Merchant Name and Location (city, state, and zip)
- Transaction Date and Time
- Account Number must be masked (no spaces), print last four digits
- Total Transaction Amount
- Surcharge or Fee, if charged
- Transaction Payment Type (VISA, MasterCard, AMEX, etc.)
- Transaction Receipt Type (Sale, Refund, Cash disbursement, etc.)
- Quantity and Description of goods or service returned or refunded.
- Authorization Code (same as Approval Number, Authorization Number, Authorization ID Response, and Approval Code)
- Signature line on the merchant copy, including return receipts (unless eligible for the No Signature Required Program or from an unattended terminal)
- Language to be printed under the signature line, such as "I agree to pay above amount according to card issuer agreement."
- Store Return Policy (near to the signature line)
- Remaining Balance (must be printed for face-to-face transactions when present in the authorization response)
- Wording indicating: Merchant Copy or Cardholder Copy

Note: The Expiration Date **must never** be printed.

C.2 Additional Receipt Requirements by Card Types

The following table lists additional requirements for specific card types. There may be other notations within the spec regarding receipts for these card types, for cards not listed in this section, or for private label cards. Additional receipt requirements may also be client-specified.

Table C-1 Additional Receipt Requirements by Card Types

Card Type	Additional Receipt Requirements
Centego	<ul style="list-style-type: none"> System Trace Audit Number (STAN) Activation receipt must indicate that the card has been activated and include the card balance.
Contact and Contactless Chip Card	<ul style="list-style-type: none"> See section 7.5 EMV Receipts, pg. 151.
Discover	<ul style="list-style-type: none"> Cash Over Amount Cardholder Name as it appears on the card, if present, and signature required
EBT	<ul style="list-style-type: none"> System Trace Audit Number (STAN) Purchase Type (Food Stamp or Cash Benefit) Debit Authorizer Cash Back Amount Product Description Ledger Balance (only if not zero) <p>Note: If multiple balances are returned to the POS, they should be printed.</p>
eCommerce	<ul style="list-style-type: none"> Merchant Online Address Unique Transaction Identification Number Purchaser Name Description of merchandise or service
FleetCor	<ul style="list-style-type: none"> Odometer Vehicle Card Number (last four or six digits) Items purchased, including: quantity, gallons, product description, price-per-gallon Receipt text if returned in the response message (must be printed at the bottom of the receipt) <p>Note: The Identification Number, Driver Number and Driver ID must never be printed.</p>
Fleet One	<ul style="list-style-type: none"> Odometer Items purchased, including: quantity, gallons, product description Price-per-gallon is optional <p>Note: The Driver ID and PIN Number must never be printed.</p>
Heartland Gift Card	<ul style="list-style-type: none"> For an inside sale, the remaining balance sent back to the terminal (in the HOST-RESP-AREA) must be printed on the receipt, as well as being displayed at the terminal. For an outside sale, the remaining balance printed on the receipt is calculated by subtracting the completed purchase from the balance sent back in the HOST-RESP-AREA. The format of the receipt must follow guidelines set forth by the customer.

Table C-1 Additional Receipt Requirements by Card Types (Continued)

Card Type	Additional Receipt Requirements
MasterCard Fleet	<ul style="list-style-type: none"> • Customer Name, if available • Items purchased, including: quantity, gallons, product description, price-per-gallon <p>Note: The Driver Number and ID Number must never be printed.</p>
PayPal	<ul style="list-style-type: none"> • Print "PayPal" on the receipt.
PIN Debit	<ul style="list-style-type: none"> • Account Type • Cash Back Amount • Network Name/Network Verbiage
Stored Value Systems (SVS)	<ul style="list-style-type: none"> • System Trace Audit Number (STAN) • Activation receipt must indicate that the card has been activated and include the card balance
ValueLink	<ul style="list-style-type: none"> • System Trace Audit Number (STAN) • Activation receipt must indicate that the card has been activated and include the card balance
VISA Fleet	<ul style="list-style-type: none"> • Items purchased, including: quantity, gallons, product description, price-per-gallon • Odometer <p>Note: The Driver ID, Driver Number and Vehicle ID must never be printed.</p>
VISA ReadyLink	<ul style="list-style-type: none"> • Load amount authorized • Load card service fee, if applicable <p>Note: If a Load transaction is unsuccessful, must indicate the reason the transaction failed. No response from the Host is a valid reason.</p>
Voyager Fleet	<ul style="list-style-type: none"> • Expiration Date • Invoice Number • Odometer must be printed on the receipt if prompted <p>Note: The Driver/Vehicle Identification Number or PIN Number must never be printed.</p>
WEX Fleet	<ul style="list-style-type: none"> • Account Number (masked with the first six digits and last four digits) • Approval Code • Expiration Date is optional • Fuel or Product Description (for non-fuel items, tax may be required) • Site Name • Physical Site Address, including: city, state/province and zip/postal code • Heartland Unit/Store Number • Heartland Terminal ID • Product Description (tax may be required for non-fuel items) • Price per unit of measure by Product Code • Quantity for each Product Code • Total amount by Product Code • Retrieval Reference Number • Vehicle Card Number / Purchase Device Sequence Number • Odometer (do not print any other prompt values)

Appendix D: State Codes / Region Codes

Non-alpha terminals use the numeric state code value.

Table D-1 State Codes

State	Numeric Value	Alpha Value
Alabama	01	AL
Alaska	02	AK
Arizona	04	AZ
Arkansas	05	AR
California	06	CA
Colorado	08	CO
Connecticut	09	CT
Delaware	10	DE
District of Columbia	11	DC
Florida	12	FL
Georgia	13	GA
Hawaii	15	HI
Idaho	16	ID
Illinois	17	IL
Indiana	18	IN
Iowa	19	IA
Kansas	20	KS
Kentucky	21	KY
Louisiana	22	LA
Maine	23	ME
Maryland	24	MD
Massachusetts	25	MA
Michigan	26	MI
Minnesota	27	MN
Mississippi	28	MS
Missouri	29	MO
Montana	30	MT
Nebraska	31	NE
Nevada	32	NV

Table D-1 State Codes (Continued)

State	Numeric Value	Alpha Value
New Hampshire	33	NH
New Jersey	34	NJ
New Mexico	35	NM
New York	36	NY
North Carolina	37	NC
North Dakota	38	ND
Ohio	39	OH
Oklahoma	40	OK
Oregon	41	OR
Pennsylvania	42	PA
Rhode Island	44	RI
South Carolina	45	SC
South Dakota	46	SD
Tennessee	47	TN
Texas	48	TX
Utah	49	UT
Vermont	50	VT
Virginia	51	VA
Washington	53	WA
West Virginia	54	WV
Wisconsin	55	WI
Wyoming	56	WY
Other US Related Codes		
American Samoa	60	AS
Guam	66	GU
Military	99	MM
Northern Mariana Island	80	MP
Puerto Rico	72	PR
Virgin Islands	78	VI

FIPS 10-4 is the source for the numeric code (n2). ISO 3166-2:1998 is the source for the alphabetic code (a2) and the description.

Table D-2 Region Codes: Canada (Province Codes)

Alpha Value (a2)	Numeric Value (n2)	Description
AB	01	Alberta
BC	02	British Columbia
MB	03	Manitoba
NB	04	New Brunswick
NF	05	Newfoundland
NS	07	Nova Scotia
NT	06	Northwest Territories
NU	13	Nunavut
ON	08	Ontario
PE	09	Prince Edward Island
QC	10	Quebec
SK	11	Saskatchewan
YT	12	Yukon Territory

Appendix E: EMV Field Definitions

This section provides a detailed definition of EMV Data fields passed between the terminal and the host when processing EMV transactions. The components of each field consist of the tag, length, and value (TLV) subfields and a field separator. The TLV fields may be in any order.

Note: Usage conditions are provided for each field (conditional, mandatory, etc.).

For all fields: If the field is received from the reader, the POS must send it to Heartland even if its usage is notated as conditional.

Differences in TLV Transmission to Host

The format of these fields is dependent upon the network platform you use (8583, Exchange, Portico, NTS, Z01, SpiDr).

Example: How do you send Amount, Authorised of \$1234.56 to the host?

The TLV would be 9F0206000000123456 (hex). See the binary and ASCII Hex examples below:

Binary Example

Table E-1 POS 8583: Binary Example

Format	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
hex	9F	02	06	00	00	00	12	34	56
decimal	159	2	6	0	0	0	22	52	86
binary	10011111	00000010	00000110	00000000	00000000	00000000	00010010	00110100	01010110

ASCII Hex Example

Table E-2 Exchange, Portico, NTS, Z01, SpiDr: ASCII Hex Example

Format	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
char	'9'	'F'	'0'	'2'	'0'	'6'	'0'	'0'	'0'
hex	39	46	30	32	30	36	30	30	30
decimal	57	70	48	50	48	54	48	48	48
Format	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17	Byte 18
char	'0'	'0'	'0'	'1'	'2'	'3'	'4'	'5'	'6'
hex	30	30	30	31	32	33	34	35	36
decimal	48	48	48	49	50	51	52	53	54

These are general definitions only. Refer to the network platform specifications for full usage requirements of these fields.

E.1 Additional Terminal Capabilities

Table E-3 Additional Terminal Capabilities

Tag:	9F40
Description:	This field contains the POS terminal input and output capabilities.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	0111 0000 0000 0000 1111 0000 1011 0000 0000 0001 (binary)
Example TLV:	9F40057000F0B001 (hex)

E.2 Amount, Authorised (Numeric)

Table E-4 Amount, Authorised (Numeric)

Tag	9F02
Description:	<p>The Amount, Authorised (Numeric) contains the authorized amount of the transaction. In the Authorization request message this is the amount known and sent to the card when calculating the Application Cryptogram. This amount may not always match the authorization amount specified elsewhere in the messaging outside of the DE55 EMV tag data if the amount was adjusted after cryptogram generation.</p> <p>It must contain numeric right-justified data with leading zeros. If the transaction includes a cashback amount, this field includes the purchase amount plus the cashback amount.</p>
Source:	POS Terminal
Usage:	Mandatory for EMV contact, EMV contactless, and MSD contactless transactions.
Format:	n 12
Binary Length:	6
ASCII Hex Length:	12
Example Value:	12345 (decimal)
Example TLV:	9F0206000000012345 (hex)

E.3 Amount, Other (Numeric)

Table E-5 Amount, Other (Numeric)

Tag:	9F03
Description:	This field contains the cashback amount used by the chip card when calculating the Application Cryptogram. It must contain numeric right-justified data with leading zeros. If the transaction does not include a cashback amount, the Amount, Other (Numeric) field must be all zeros.
Source:	POS Terminal
Usage:	Mandatory for EMV contact, EMV contactless, and MSD contactless transactions.
Format:	n 12
Binary Length:	6
ASCII Hex Length:	12
Example Value:	123456 (numeric)
Example TLV:	9F03060000004000 (hex)

E.4 Application Cryptogram

Table E-6 Application Cryptogram

Tag:	9F26
Description:	<p>This field contains the cryptogram returned by the chip card in response to the Generate AC command.</p> <p>There are four types of Application Cryptogram:</p> <ul style="list-style-type: none"> • ARQC (Authorization Request Cryptogram): Used in Online processing. This is a cryptogram requested by the POS and generated by the Chip Card at the end of the first round of Card Action Analysis step for transactions requiring <u>online</u> authorization. It is included in the authorization request or full financial request sent to the Issuer and it allows the Issuer to verify the validity of the Chip Card and message. When validated by the Issuer, the ARQC confirms that the Chip Card has not been copied or changed. • TC (Transaction Certificate): A type of cryptogram generated by the card for online and offline transactions to indicate that the transaction was completed and approved by the chip card. • AAC (Application Authentication Cryptogram): A type of cryptogram generated by the Chip Card when a transaction is <u>declined</u> (at the end of offline or online declined transaction) to indicate the card declined the transaction. • ARPC (Authorization Response Cryptogram): Used in Online processing. A cryptogram generated by the Issuer in response to an ARQC. It is sent in the authorization response back to the acquirer Host to the POS. The POS sends this cryptogram back to the Chip Card with a response code accepting or declining the transaction. The Chip Card's receipt and validation of the ARPC confirms approval response from the Issuer and ensures that it is communicating with the valid Issuer. This cryptogram is also typically used to allow the Chip Card to reset counters.
Source:	Chip Card

Table E-6 Application Cryptogram

Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	8
ASCII Hex Length:	16
Example Value:	0001 0010 0011 0100 0101 0110 0111 1000 1001 1010 1011 1100 1101 1110 1111 0001 (binary)
Example TLV:	9F2608123456789ABCDEF1 (hex)

E.5 Application Dedicated File (ADF) Name

Table E-7 Application Dedicated File (ADF) Name

Tag:	4F
Description:	<p>This field is used to address an application in the chip card. An ADF Name consists of a registered application provider identifier (RID) of five bytes, which is issued by the ISO/IEC 7816-5 registration authority. This is followed by a proprietary application identifier extension (PIX), which enables the application provider to differentiate between the different applications offered.</p> <p>The ADF Name is obtained during the application selection process. Previous versions of the EMVCo specifications refer to this tag as Application Identifier (AID) – ICC.</p>
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	5 to 16
ASCII Hex Length:	10 to 32
Example Value:	1010 0000 0000 0000 0000 0000 0000 0000 0000 0011 0001 0000 0001 0000 (binary)
Example TLV:	4F07A0000000031010 (hex)

E.6 Application Identifier (AID) – Terminal

Table E-8 Application Identifier (AID) – Terminal

Tag:	9F06
Description:	This field is used to address an application in the chip card. An AID consists of a registered application provider identifier (RID) of five bytes, which is issued by the ISO/IEC 7816-5 registration authority. This is followed by a proprietary application identifier extension (PIX) which enables the application provider to differentiate between the different applications offered. The AID is obtained during the application selection process.
Source:	POS Terminal
Usage:	Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	5 to 16
ASCII Hex Length:	10 to 32
Example Value:	1010 0000 0000 0000 0000 0000 0000 0000 0000 0011 0001 0000 0001 0000 (binary)
Example TLV:	9F0607A0000000031010 (hex)

E.7 Application Interchange Profile

Table E-9 Application Interchange Profile

Tag:	82
Description:	This field indicates the capabilities of the chip card to support specific functions in the application.
Source:	Chip Card
Usage:	Mandatory for EMV contact and EMV contactless transactions. Mandatory for MSD contactless transactions when available.
Format:	b
Binary Length:	2
ASCII Hex Length:	4
Example Value:	0111 1100 0000 0000 (binary)
Example TLV:	82027C00 (hex)

E.8 Application Label

Table E-10 Application Label

Tag:	50
Description:	The Application Label is the mnemonic associated with the AID according to ISO/IEC 7816-5.
Source:	Chip Card
Usage:	Conditional
Format:	ans
Binary Length:	1 to 16
ASCII Hex Length:	2 to 32
Example Value:	Credit
Example TLV:	5006437265646974 (hex)

E.9 Application Preferred Name

Table E-11 Application Preferred Name

Tag:	9F12
Description:	The Application Preferred Name is the mnemonic associated with the AID.
Source:	Chip Card
Usage:	Conditional
Format:	ans
Binary Length:	1 to 16
ASCII Hex Length:	2 to 32
Example Value:	Credit
Example TLV:	9F1206437265646974 (hex)

E.10 Application Primary Account Number (PAN) Sequence Number

Table E-12 Application Primary Account Number Sequence Number

Tag:	5F34
Description:	This field contains a counter maintained and supplied by the chip card. This field identifies the card when multiple chip cards are associated with a single account number. If the chip card does not contain an Application PAN Sequence Number, then the Application PAN Sequence Number value subfield must be set to 00.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions. Mandatory for MSD contactless transactions when available.
Format:	n 2
Binary Length:	1
ASCII Hex Length:	2
Example Value:	2 (numeric)
Example TLV:	5F340102 (hex)

E.11 Application Transaction Counter (ATC)

Table E-13 Application Transaction Counter (ATC)

Tag:	9F36
Description:	This field contains the counter value maintained by the chip card. The chip card increments this value for each transaction (including failed transactions).
Source:	Chip Card
Usage:	Mandatory for EMV contact and EMV contactless transactions. Mandatory for MSD contactless transactions when available.
Format:	b
Binary Length:	2
ASCII Hex Length:	4
Example Value:	0001 0010 0011 0100 (binary)
Example TLV:	9F36021234 (hex)

E.12 Application Usage Control

Table E-14 Application Usage Control

Tag:	9F07
Description:	This field indicates the Issuer's specified restrictions on the geographic usage and services allowed for the chip card application.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	2
ASCII Hex Length:	4
Example Value:	1111 1111 0000 0000 (binary)
Example TLV:	9F0702FF00 (hex)

E.13 Application Version Number (ICC)

Table E-15 Application Version Number (ICC)

Tag:	9F08
Description:	This field is the version number of the chip card application.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	2
ASCII Hex Length:	4
Example Value:	0000 1000 1010 0001 (binary)
Example TLV:	9F080208C1 (hex)

E.14 Application Version Number (Terminal)

Table E-16 Application Version Number (Terminal)

Tag:	9F09
Description:	The four-character numeric Application Version Number (Terminal) is the version number of the POS terminal payment application.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	2
ASCII Hex Length:	4
Example Value:	0001 0000 0000 0001 (binary)
Example TLV:	9F09021001 (hex)

E.15 Authorisation Response Code

Table E-17 Authorisation Response Code

Tag:	8A
Description:	<p>The two-character Authorisation Response Code (Tag 8A) defines the disposition of an authorization request.</p> <p>For online transactions, the terminal should generate the value as follows:</p> <ul style="list-style-type: none"> • 00 = Online approved. Should be sent to card at 2nd GENERATE AC if the host response code indicates any approval, including partial approvals or card verifications. • 05 = Online declined. Should be sent to card at 2nd GENERATE AC if the host response code indicates any decline, i.e. anything that is not an approval. Also used if a partial approval from the host is rejected at the terminal. <p>For offline transactions, the terminal should generate the value as follows:</p> <ul style="list-style-type: none"> • Y1 = Offline approved. Should be sent to host in offline approval advice if the card approves offline at 1st GENERATE AC before attempt to go online. • Z1 = Offline declined. Should be sent to host in offline decline advice if card declines offline at 1st GENERATE AC before attempt to go online, or at 2nd GENERATE AC due to bad ARPC cryptogram. • Y3 = Unable to go online, offline approved. Should be sent to card at 2nd GENERATE AC to request offline approval after failed attempt to go online. Should be sent to host in offline approval advice if the card approves offline at 2nd GENERATE AC. • Z3 = Unable to go online, offline declined. Should be sent to host in offline decline advice if the card declines offline at 2nd GENERATE AC and the transaction is not eligible for store-and-forward or stand-in processing.
Source:	POS Terminal

Table E-17 Authorisation Response Code

Usage:	Optional field. Mandatory for offline decline advice transactions and offline approvals.
Format:	an 2
Binary Length:	2
ASCII Hex Length:	4
Example Value:	00 (alphanumeric)
Example TLV:	8A023030 (hex)

E.16 Cardholder Verification Method (CVM) Results

Table E-18 Cardholder Verification Method (CVM) Results

Tag:	9F34
Description:	This field indicates the results of the last CVM performed.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions when the result of the last CVM performed is available.
Format:	b
Binary Length:	3
ASCII Hex Length:	6
Example Value:	1010 0100 0000 0000 0000 0010 (binary)
Example TLV:	9F3403A40002 (hex)

E.17 Cryptogram Information Data (CID)

Table E-19 Cryptogram Information Data (CID)

Tag:	9F27
Description:	This field indicates the type of cryptogram generated (TC, ARQC, or AAC), why the cryptogram was generated, and actions that the chip card instructed the POS terminal to perform.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	1
ASCII Hex Length:	2
Example Value:	1000 0000 (binary)
Example TLV:	9F270180 (hex)

E.18 Customer Exclusive Data

Table E-20 Customer Exclusive Data

Tag:	9F7C
Description:	This field contains issuer proprietary data for transmission to the issuer.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contactless transactions if available.
Format:	b
Binary Length:	1 to 32
ASCII Hex Length:	2 to 64
Example Value:	0001 0010 0011 0100 0101 0110 0111 1000 (binary)
Example TLV:	9F7C0412345678 (hex)

E.19 Dedicated File Name

Table E-21 Dedicated File Name

Tag:	84
Description:	This field identifies the name of the Dedicated File as described in ISO/IEC 7816-4.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions. Mandatory for MSD contactless transactions when available.
Format:	b
Binary Length:	5 to 16
ASCII Hex Length:	10 to 32
Example Value:	1010 0000 0000 0000 0000 0000 0000 0000 0000 0011 0001 0000 0001 0000 (binary)
Example TLV:	8407A0000000031010 (hex)

E.20 Form Factor Indicator (FFI)

Table E-22 Form Factor Indicator

Tag:	9F6E
Description:	This field indicates the form factor of the consumer payment device and the type of contactless interface over which the transaction was conducted. The Form Factor Indicator is both an implementation and issuer option.
Source:	Chip Card
Usage:	Conditional: Mandatory for VISA contactless transactions when available.
Format:	b
Binary Length:	4
ASCII Hex Length:	8
Example Value:	0000 0001 0000 0010 0000 0011 0000 0100 (binary)
Example TLV:	9F6E0401020304 (hex)

E.21 ICC Dynamic Number

Table E-23 ICC Dynamic Number

Tag:	9F4C
Description:	This field is a time-variant numerical value generated by the chip card.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contactless transactions.
Format:	b
Binary Length:	2 to 8
ASCII Hex Length:	4 to 16
Example Value:	0001 0010 0011 0100 0101 0110 0111 0100 (binary)
Example TLV:	9F4C0412345678 (hex)

E.22 Interface Device (IFD) Serial Number

Table E-24 Interface Device (IFD) Serial Number

Tag:	9F1E
Description:	This field contains a unique and permanent identification number assigned to the IFD by the manufacturer.
Source:	POS Terminal (from the chip card reader)
Usage:	Conditional: Mandatory for EMV contact transactions if available.
Format:	an 8
Binary Length:	8
ASCII Hex Length:	16
Example Value:	SERIAL12 (alphanumeric)
Example TLV:	9F1E0853455249414C3132 (hex)

E.23 Issuer Action Code – Default

Table E-25 Issuer Action Code – Default

Tag:	9F0D
Description:	This field specifies the issuer's conditions that cause a transaction to be rejected when the POS terminal is unable to process the transaction online (even when the transaction has already been approved online).
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact transactions.
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	1111 0000 0100 0000 0000 0000 1000 1000 0000 0000 (binary)
Example TLV:	9F0D05F040008800 (hex)

E.24 Issuer Action Code – Denial

Table E-26 Issuer Action Code – Denial

Tag:	9F0E
Description:	This field specifies the issuer's conditions that cause the denial of a transaction without an attempt to go online.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact transactions.
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	1111 1100 1111 1000 1111 1100 1111 1000 1111 0000 (binary)
Example TLV:	9F0E05FCF8FCF8F0 (hex)

E.25 Issuer Action Code – Online

Table E-27 Issuer Action Code – Online

Tag:	9F0F
Description:	This field specifies the issuer's conditions that cause a transaction to be transmitted online.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact transactions.
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	1111 1100 1111 1000 1111 1100 1111 1000 1111 0000 (binary)
Example TLV:	9F0F05FCF8FCF8F0 (hex)

E.26 Issuer Application Data

Table E-28 Issuer Application Data

Tag:	9F10
Description:	This field contains proprietary application data for transmission to the issuer.
Source:	Chip Card
Usage:	Mandatory for EMV contact and EMV contactless transactions. Mandatory for MSD contactless transactions when available.
Format:	b
Binary Length:	1 to 32
ASCII Hex Length:	up to 64
Example Value:	0000 0001 0000 1010 0000 0011 0110 0000 0000 0000 0000 0000 (binary)
Example TLV:	9F1006010A03600000 (hex)

E.27 Issuer Authentication Data

Table E-29 Issuer Authentication Data

Tag:	91
Description:	This field contains data delivered to the chip card including the ARPC cryptogram for online issuer authentication. The data is in the format required by the card.
Source:	Issuer
Usage:	Optional - may be returned in the authorization response message.
Format:	b
Binary Length:	8 to 16
ASCII Hex Length:	16 to 32
Example Value:	0010 0010 0110 0011 1100 1100 0001 1100 0010 1110 1001 1100 0100 0100 0010 0000 0000 0001 0011 (binary)
Example TLV:	91102263BCC1C2D9C4420013 (hex)

E.28 Issuer Country Code

Table E-30 Issuer Country Code

Tag:	5F28
Description:	This field indicates the country of the issuer according to ISO 3166.
Source:	Chip Card
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions. Mandatory for MSD contactless transactions when available.
Format:	n 3
Binary Length:	2
ASCII Hex Length:	4
Example Value:	840 (numeric)
Example TLV:	5F28020840 (hex)

E.29 Issuer Script Results

Table E-31 Issuer Script Results

Tag:	9F5B
Description:	This field contains the results of the card issuer script update to the chip card.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact transactions when an issuer script was returned in the authorization response message.
Format:	b
Binary Length:	varies
ASCII Hex Length:	up to 40
Example Value:	0010 0000 0000 0000 0000 0000 0000 0000 0000 0000 (binary)
Example TLV:	9F5B052000000000 (hex)

E.30 Issuer Script Template 1 & 2

Table E-32 Issuer Script Template 1 & 2

Tag:	71 or 72
Description:	The Issuer Script Template 1 contains proprietary issuer data for transmission to the chip card before the second GENERATE AC command. The Issuer Script Template 2 contains proprietary issuer data for transmission to the chip card after the second GENERATE AC command.
Source:	Issuer
Usage:	Conditional: Mandatory for EMV contact transactions when received in the response message.
Format:	b
Binary Length:	1 to 127
ASCII Hex Length:	2 to 254
Example Value:	1001 1111 0001 1000 0000 0100 0001 0000 0000 0000 0000 0000 0000 0000 1000 0110 0000 1101 1000 0100 0001 1000 0000 0000 0000 0000 0000 1000 0001 0110 0010 1100 11110 0001 0111 1000 0101 1111 1100 1111 0001 1010 0110 1000 (binary)
Example TLV:	72169F180410000000860D8418000008162CE1785FCF1A68 (hex)

E.31 POS Entry Mode

Table E-33 POS Entry Mode

Tag:	9F39
Description:	This field indicates the method by which the PAN was entered, according to the first two digits of the ISO 8583:1987 POS Entry Mode.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contactless transactions and MSD contactless transactions.
Format:	n 2
Binary Length:	1
ASCII Hex Length:	2
Example Value:	00 (numeric)
Example TLV:	9F390100 (hex)

E.32 Terminal Action Code – Default

Table E-34 Terminal Action Code – Default

Tag:	FFC6 (HPS proprietary tag identifier)
Description:	This field specifies the acquirer's conditions that cause a transaction to be rejected when the POS terminal is unable to process the transaction online (even when the transaction has already been approved online).
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact transactions declined offline.
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	0000 0101 1111 1110 0101 0000 1011 1100 1010 0000 0000 0000 (binary)
Example TLV:	FFC605FE50BCA000 (hex)

E.33 Terminal Action Code – Denial

Table E-35 Terminal Action Code – Denial

Tag:	FFC7 (HPS proprietary tag identifier)
Description:	This field specifies the acquirer's conditions that cause the denial of a transaction without an attempt to go online.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact transactions declined offline.
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	0000 0101 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 (binary)
Example TLV:	FFC7050000000000 (hex)

E.34 Terminal Action Code – Online

Table E-36 Terminal Action Code – Online

Tag:	FFC8 (HPS proprietary tag identifier)
Description:	This field specifies the acquirer's conditions that cause a transaction to be transmitted online.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact transactions declined offline.
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	0000 0101 1111 1110 0101 0000 1011 1100 1111 1000 0000 0000 (binary)
Example TLV:	FFC805FE50BCF800 (hex)

E.35 Terminal Capabilities

Table E-37 Terminal Capabilities

Tag:	9F33
Description:	This field indicates the card data input, the cardholder verification method (CVM), and the security capabilities supported by the POS terminal.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions. Mandatory for MSD contactless transactions if available.
Format:	b
Binary Length:	3
ASCII Hex Length:	6
Example Value:	0000 0001 0000 0001 0000 0001 (binary)
Example TLV:	9F3303010101 (hex)

E.36 Terminal Country Code

Table E-38 Terminal Country Code

Tag:	9F1A
Description:	This field indicates the country of the terminal, represented according to ISO 3166.
Source:	POS Terminal
Usage:	Mandatory for EMV contact, EMV contactless transactions. Mandatory for MSD contactless transactions if available.
Format:	n 3
Binary Length:	2
ASCII Hex Length:	3
Example Value:	840 (numeric)
Example TLV:	9F1A020840 (hex)

E.37 Terminal Type

Table E-39 Terminal Type

Tag:	9F35
Description:	The two-character numeric Terminal Type indicates the environment of the POS terminal, its communications capability, and its operational control.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	n 2
Binary Length:	1
ASCII Hex Length:	2
Example Value:	22 (numeric)
Example TLV:	9F350122 (hex)

E.38 Terminal Verification Results (TVR)

Table E-40 Terminal Verification Results (TVR)

Tag:	95
Description:	This field contains a series of indicators set by the POS terminal recording both offline and online processing results.
Source:	POS Terminal
Usage:	Mandatory for chip card transactions (contact and contactless)
Format:	b
Binary Length:	5
ASCII Hex Length:	10
Example Value:	0000 0000 0000 0000 0000 0100 1000 0000 0000 0000 (binary)
Example TLV:	95050000048000 (hex)

E.39 Third Party Data

Table E-41 Third Party Data

Tag:	9F6E
Description:	The Third Party Data contains proprietary data from a third party.
Source:	Issuer
Usage:	Mandatory for MasterCard contactless transactions when available.
Format:	b
Binary Length:	5 to 32
ASCII Hex Length:	10 to 64
Example Value:	0001 0010 0011 0100 0101 0110 0111 1000 1001 1010 (binary)
Example TLV:	9F6E05123456789A (hex)

E.40 Transaction Currency Code

Table E-42 Transaction Currency Code

Tag:	5F2A
Description:	This field contains the currency code of the transaction according to ISO 4217.
Source:	POS Terminal
Usage:	Mandatory for EMV contact and EMV contactless transactions.
Format:	n 3
Binary Length:	2
ASCII Hex Length:	4
Example Value:	840 (numeric)
Example TLV:	5F2A020840 (hex)

E.41 Transaction Date

Table E-43 Transaction Data

Tag:	9A
Description:	This field contains the local date used to generate the cryptogram.
Source:	POS Terminal
Usage:	Mandatory for EMV contact and EMV contactless transactions.
Format:	n 6 (YYMMDD)
Binary Length:	3
ASCII Hex Length:	6
Example Value:	121231 (numeric)
Example TLV:	9A03121231 (hex)

E.42 Transaction Sequence Counter

Table E-44 Transaction Sequence Counter

Tag:	9F41
Description:	This field uniquely identifies each transaction on a POS terminal. The Transaction Sequence Counter value subfield is right-justified with leading zeros.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	n 4 to 8
Binary Length:	2 to 4
ASCII Hex Length:	4 to 8
Example Value:	435 (numeric)
Example TLV:	9F410400000435 (hex)

E.43 Transaction Status Information

Table E-45 Transaction Status Information

Tag:	9B
Description:	This field contains the functions performed in the transaction.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	2
ASCII Hex Length:	4
Example Value:	0100 1000 0000 0000 (binary)
Example TLV:	9B024800 (hex)

E.44 Transaction Time

Table E-46 Transaction Time

Tag:	9F21
Description:	This subfield contains the local time that the transaction was authorized.
Source:	POS Terminal
Usage:	Conditional: Mandatory for EMV contact and EMV contactless transactions.
Format:	n 6 (HHMMSS)
Binary Length:	3
ASCII Hex Length:	6
Example Value:	123456 (numeric)
Example TLV:	9F2103123456 (hex)

E.45 Transaction Type

Table E-47 Transaction Type

Tag:	9C
Description:	This field indicates the type of financial transaction as represented by the first two digits of the ISO 8583:1987 Processing Code.
Source:	POS Terminal
Usage:	Mandatory for EMV contact and EMV contactless transactions.
Format:	n 2
Binary Length:	1
ASCII Hex Length:	2
Example Value:	00 (numeric)
Example TLV:	9C0100 (hex)

E.46 Unpredictable Number

Table E-48 Unpredictable Number

Tag:	9F37
Description:	This field is randomly generated by the POS Terminal and is used to provide variability and uniqueness to the cryptogram.
Source:	POS Terminal
Usage:	Mandatory for EMV contact and EMV contactless transactions.
Format:	b
Binary Length:	4
ASCII Hex Length:	8
Example Value:	0001 0010 0011 0100 0101 0110 0111 1000 (binary)
Example TLV:	9F370412345678 (hex)

Appendix F: EMV PDL Data Examples

The following example does not include any host specific “wrapper”, but rather only depicts the exchange of the actual EMV PDL data between the POS and the host.

Note: This is example data only that should not be used for certification or in production.

Table F-1 EMV PDL Data Examples

POS		↔	Host	
Table 10 Request (Versions and Flags)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	10			
EMV PDL CARD TYPE	<2 spaces>			
EMV PDL PARAMETER VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	00			
		⇐	Table 10 Response (Versions and Flags)	
			Field	Value
			EMV PDL PARAMETER VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	00
			EMV PDL TABLE ID	10
			EMV PDL CARD TYPE	<2 spaces>
			EMV PDL END-OF-TABLE FLAG	Y
			EMV PDL ENABLED	Y
			EMV PDL TABLE ID 30 VERSION	001
			EMV PDL TABLE ID 30 FLAG	Y
EMV PDL NUMBER OF CARD TYPES	04			

Table F-1 EMV PDL Data Examples (Continued)

POS	↔ Host
	VISA
	EMV PDL CARD TYPE 01
	EMV PDL TABLE ID 40 VERSION 001
	EMV PDL TABLE ID 40 FLAG Y
	EMV PDL TABLE ID 50 VERSION 001
	EMV PDL TABLE ID 50 FLAG Y
	EMV PDL TABLE ID 60 VERSION 001
	EMV PDL TABLE ID 60 FLAG Y
	MasterCard
	EMV PDL CARD TYPE 02
	EMV PDL TABLE ID 40 VERSION 001
	EMV PDL TABLE ID 40 FLAG Y
	EMV PDL TABLE ID 50 VERSION 001
	EMV PDL TABLE ID 50 FLAG Y
	EMV PDL TABLE ID 60 VERSION 001
	EMV PDL TABLE ID 60 FLAG Y
	American Express
	EMV PDL CARD TYPE 03
	EMV PDL TABLE ID 40 VERSION 001
	EMV PDL TABLE ID 40 FLAG Y
	EMV PDL TABLE ID 50 VERSION 001
	EMV PDL TABLE ID 50 FLAG Y
	EMV PDL TABLE ID 60 VERSION 001
	EMV PDL TABLE ID 60 FLAG Y
	Discover
	EMV PDL CARD TYPE 04
	EMV PDL TABLE ID 40 VERSION 001
	EMV PDL TABLE ID 40 FLAG Y
	EMV PDL TABLE ID 50 VERSION 001
	EMV PDL TABLE ID 50 FLAG Y
	EMV PDL TABLE ID 60 VERSION 001
	EMV PDL TABLE ID 60 FLAG Y

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
Table 10 Confirmation Request (Versions and Flags)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	07			
EMV PDL TABLE ID	10			
EMV PDL CARD TYPE	<2 spaces>			
EMV PDL PARAMETER VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	00			
		⇐	Table 10 Confirmation Response (Versions and Flags)	
Field	Value			
EMV PDL PARAMETER VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	00			
EMV PDL TABLE ID	10			
EMV PDL CARD TYPE	<2 spaces>			
EMV PDL CONFIRMATION FLAG	Y			
Table 30 Request (Terminal Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	30			
EMV PDL CARD TYPE	<2 spaces>			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	01			

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host		
	↩	Table 30 Response (Terminal Data)		
		Field	Value	
	EMV PDL TABLE VERSION	001		
	EMV PDL BLOCK SEQUENCE NUMBER	01		
	EMV PDL TABLE ID	30		
	EMV PDL CARD TYPE	<2 spaces>		
	EMV PDL END-OF-TABLE FLAG	Y		
	EMV PDL TABLE DATA BLOCK LENGTH	023		
	EMV PDL TERMINAL TYPE	22		
	EMV PDL ADDITIONAL TERMINAL CAPABILITIES	F000F0A001		
	EMV PDL TERMINAL COUNTRY CODE	840		
	EMV PDL TRANSACTION CURRENCY CODE	840		
	EMV PDL TRANSACTION CURRENCY EXPONENT	2		
	EMV PDL TRANSACTION REFERENCE CURRENCY CODE	840		
EMV PDL TRANSACTION REFERENCE CURRENCY EXPONENT	2			
Table 30 Confirmation Request (Terminal Data)	⇒			
	Field	Value		
EMV PDL PARAMETER TYPE	07			
EMV PDL TABLE ID	30			
EMV PDL CARD TYPE	<2 spaces>			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	00			

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
	↔	Table 30 Confirmation Response (Terminal Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	00
		EMV PDL TABLE ID	30
		EMV PDL CARD TYPE	<2 spaces>
		EMV PDL CONFIRMATION FLAG	Y
Table 40 Request (VISA Contact Card Data)	⇒		
Field		Value	
EMV PDL PARAMETER TYPE		06	
EMV PDL TABLE ID		40	
EMV PDL CARD TYPE		01	
EMV PDL TABLE VERSION		001	
EMV PDL BLOCK SEQUENCE NUMBER	01		
	↔	Table 40 Response (VISA Contact Card Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	01
		EMV PDL TABLE ID	40
		EMV PDL CARD TYPE	01
		EMV PDL END-OF-TABLE FLAG	Y
		EMV PDL TABLE DATA BLOCK LENGTH	374
		EMV PDL AID COUNT	02
		VISA Credit/Debit	
		EMV PDL APPLICATION IDENTIFIER (AID)	A0000000031010 + <18 spaces>
		EMV PDL APPLICATION SELECTION INDICATOR	1
		EMV PDL APPLICATION VERSION NUMBER	0096

Table F-1 EMV PDL Data Examples (Continued)

POS	↔ Host
	EMV PDL APPLICATION COUNTRY CODE <3 spaces>
	EMV PDL TRANSACTION TYPES 8000
	EMV PDL TERMINAL CAPABILIITES E0B8C8
	EMV PDL TERMINAL FLOOR LIMIT 000000000000
	EMV PDL THRESHOLD VALUE FOR BIASED RANDOM SELECTION 000000000000
	EMV PDL TARGET PERCENTAGE TO BE USED FOR RANDOM SELECTION 00
	EMV PDL MAXIMUM TARGET PERCENTAGE TO BE USED FOR BIASED RANDOM SELECTION 00
	EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL 0010000000
	EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE DC4004F800
	EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT DC4000A800
	EMV PDL TERMINAL RISK MANAGEMENT DATA <16 spaces>
	EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL) <32 spaces>
	EMV PDL DEFAULT DYNAMIC DATA AUTHENTICATION DATA OBJECT LIST (DDOL) 9F3704 + <26 spaces>
	VISA Electron
	EMV PDL APPLICATION IDENTIFIER (AID) A0000000032010 + <18 spaces>
	EMV PDL APPLICATION SELECTION INDICATOR 1
	EMV PDL APPLICATION VERSION NUMBER 0096
	EMV PDL APPLICATION COUNTRY CODE <3 spaces>
	EMV PDL TRANSACTION TYPES 8000
	EMV PDL TERMINAL CAPABILIITES E0B8C8
	EMV PDL TERMINAL FLOOR LIMIT 000000000000
	EMV PDL THRESHOLD VALUE FOR BIASED RANDOM SELECTION 000000000000

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
			EMV PDL TARGET PERCENTAGE TO BE USED FOR RANDOM SELECTION	00
			EMV PDL MAXIMUM TARGET PERCENTAGE TO BE USED FOR BIASED RANDOM SELECTION	00
			EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0010000000
			EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	DC4004F800
			EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	DC4000A800
			EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>
			EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
			EMV PDL DEFAULT DYNAMIC DATA AUTHENTICATION DATA OBJECT LIST (DDOL)	9F3704 + <26 spaces>
Table 40 Confirmation Request (VISA Contact Card Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	07			
EMV PDL TABLE ID	40			
EMV PDL CARD TYPE	01			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	00			
		⇐	Table 40 Confirmation Response (VISA Contact Card Data)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	00
			EMV PDL TABLE ID	40
			EMV PDL CARD TYPE	01
			EMV PDL CONFIRMATION FLAG	Y

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
Table 40 Request (MasterCard Contact Card Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	40			
EMV PDL CARD TYPE	02			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	01			
		⇐	Table 40 Response (MasterCard Contact Card Data)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	01
			EMV PDL TABLE ID	40
			EMV PDL CARD TYPE	02
			EMV PDL END-OF-TABLE FLAG	Y
			EMV PDL TABLE DATA BLOCK LENGTH	188
			EMV PDL AID COUNT	01
			MasterCard Credit/Debit	
			EMV PDL APPLICATION IDENTIFIER (AID)	A0000000041010 + <18 spaces>
			EMV PDL APPLICATION SELECTION INDICATOR	1
			EMV PDL APPLICATION VERSION NUMBER	0002
			EMV PDL APPLICATION COUNTRY CODE	<3 spaces>
			EMV PDL TRANSACTION TYPES	8000
			EMV PDL TERMINAL CAPABILITIES	E0F8C8
			EMV PDL TERMINAL FLOOR LIMIT	000000020000
			EMV PDL THRESHOLD VALUE FOR BIASED RANDOM SELECTION	000000000000
			EMV PDL TARGET PERCENTAGE TO BE USED FOR RANDOM SELECTION	00

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL MAXIMUM TARGET PERCENTAGE TO BE USED FOR BIASED RANDOM SELECTION	00
		EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0000000000
		EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	FC50BCF800
		EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	FC50BCA000
		EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>
		EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
		EMV PDL DEFAULT DYNAMIC DATA AUTHENTICATION DATA OBJECT LIST (DDOL)	9F3704 + <26 spaces>
Table 40 Confirmation Request (MasterCard Contact Card Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	40		
EMV PDL CARD TYPE	02		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		
	↔	Table 40 Confirmation Response (MasterCard Contact Card Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	00
		EMV PDL TABLE ID	40
		EMV PDL CARD TYPE	02
		EMV PDL CONFIRMATION FLAG	Y

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
Table 40 Request (American Express Contact Card Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	40			
EMV PDL CARD TYPE	03			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	01			
		⇐	Table 40 Response (American Express Contact Card Data)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	01
			EMV PDL TABLE ID	40
			EMV PDL CARD TYPE	03
			EMV PDL END-OF-TABLE FLAG	Y
			EMV PDL TABLE DATA BLOCK LENGTH	188
			EMV PDL AID COUNT	01
			American Express Credit/Debit	
			EMV PDL APPLICATION IDENTIFIER (AID)	A00000002501 + <20 spaces>
			EMV PDL APPLICATION SELECTION INDICATOR	1
			EMV PDL APPLICATION VERSION NUMBER	0001
			EMV PDL APPLICATION COUNTRY CODE	<3 spaces>
			EMV PDL TRANSACTION TYPES	8000
			EMV PDL TERMINAL CAPABILITIES	E0B8C8
			EMV PDL TERMINAL FLOOR LIMIT	000000000000
			EMV PDL THRESHOLD VALUE FOR BIASED RANDOM SELECTION	000000000000
			EMV PDL TARGET PERCENTAGE TO BE USED FOR RANDOM SELECTION	00

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL MAXIMUM TARGET PERCENTAGE TO BE USED FOR BIASED RANDOM SELECTION	00
		EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0000000000
		EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	C800000000
		EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	C800000000
		EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>
		EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
		EMV PDL DEFAULT DYNAMIC DATA AUTHENTICATION DATA OBJECT LIST (DDOL)	9F3704 + <26 spaces>
Table 40 Confirmation Request (American Express Contact Card Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	40		
EMV PDL CARD TYPE	03		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		
Table 40 Confirmation Response (American Express Contact Card Data)		⇐	
Field	Value		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		
EMV PDL TABLE ID	40		
EMV PDL CARD TYPE	03		
EMV PDL CONFIRMATION FLAG	Y		

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
Table 40 Request (Discover Contact Card Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	40			
EMV PDL CARD TYPE	04			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	01			
		⇐	Table 40 Response (Discover Contact Card Data)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	01
			EMV PDL TABLE ID	40
			EMV PDL CARD TYPE	04
			EMV PDL END-OF-TABLE FLAG	Y
			EMV PDL TABLE DATA BLOCK LENGTH	188
			EMV PDL AID COUNT	01
			Discover Credit/Debit	
			EMV PDL APPLICATION IDENTIFIER (AID)	A0000001523010 + <18 spaces>
			EMV PDL APPLICATION SELECTION INDICATOR	1
			EMV PDL APPLICATION VERSION NUMBER	0001
			EMV PDL APPLICATION COUNTRY CODE	<3 spaces>
			EMV PDL TRANSACTION TYPES	8000
			EMV PDL TERMINAL CAPABILITIES	E0F8C8
			EMV PDL TERMINAL FLOOR LIMIT	000000030000
			EMV PDL THRESHOLD VALUE FOR BIASED RANDOM SELECTION	000000000000
			EMV PDL TARGET PERCENTAGE TO BE USED FOR RANDOM SELECTION	00

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL MAXIMUM TARGET PERCENTAGE TO BE USED FOR BIASED RANDOM SELECTION	00
		EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0010000000
		EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	FCE09CF800
		EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	DC00002000
		EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>
		EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
		EMV PDL DEFAULT DYNAMIC DATA AUTHENTICATION DATA OBJECT LIST (DDOL)	9F3704 + <26 spaces>
Table 40 Confirmation Request (Discover Contact Card Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	40		
EMV PDL CARD TYPE	04		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		
Table 40 Confirmation Response (Discover Contact Card Data)		⇐	
Field	Value		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		
EMV PDL TABLE ID	40		
EMV PDL CARD TYPE	04		
EMV PDL CONFIRMATION FLAG	Y		

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
Table 50 Request (VISA Contactless Card Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	50			
EMV PDL CARD TYPE	01			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	01			
		⇐	Table 50 Response (VISA Contactless Card Data)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	01
			EMV PDL TABLE ID	50
			EMV PDL CARD TYPE	01
			EMV PDL END-OF-TABLE FLAG	Y
			EMV PDL TABLE DATA BLOCK LENGTH	350
			EMV PDL AID COUNT	02
			VISA Credit/Debit	
			EMV PDL APPLICATION IDENTIFIER (AID)	A0000000031010 + <18 spaces>
			EMV PDL APPLICATION SELECTION INDICATOR	1
			EMV PDL APPLICATION VERSION NUMBER	0096
			EMV PDL CONTACTLESS MAGSTRIPE APPLICATION VERSION NUMBER	0001
			EMV PDL APPLICATION COUNTRY CODE	<3 spaces>
			EMV PDL TRANSACTION TYPES	8000
			EMV PDL TERMINAL CAPABILITES	E028C8
			EMV PDL TERMINAL CONTACTLESS FLOOR LIMIT	000000000000
			EMV PDL TERMINAL CVM REQUIRED LIMIT	000000005000

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL TERMINAL CONTACTLESS TRANSACTION LIMIT	999999999999
		EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0010000000
		EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	DC4004F800
		EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	DC4000A800
		EMV PDL TERMINAL TRANSACTION QUALIFIERS (TTQ)	B2004000
		EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>
		EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
		VISA Electron	
		EMV PDL APPLICATION IDENTIFIER (AID)	A0000000031010 + <18 spaces>
		EMV PDL APPLICATION SELECTION INDICATOR	1
		EMV PDL APPLICATION VERSION NUMBER	0096
		EMV PDL CONTACTLESS MAGSTRIPE APPLICATION VERSION NUMBER	0001
		EMV PDL APPLICATION COUNTRY CODE	<3 spaces>
		EMV PDL TRANSACTION TYPES	8000
		EMV PDL TERMINAL CAPABILITES	E028C8
		EMV PDL TERMINAL CONTACTLESS FLOOR LIMIT	000000000000
		EMV PDL TERMINAL CVM REQUIRED LIMIT	000000005000
		EMV PDL TERMINAL CONTACTLESS TRANSACTION LIMIT	999999999999
		EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0010000000
		EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	DC4004F800
		EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	DC4000A800

Table F-1 EMV PDL Data Examples (Continued)

POS		Host			
		EMV PDL TERMINAL TRANSACTION QUALIFIERS (TTQ)	B2004000		
		EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>		
		EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>		
Table 50 Confirmation Request (VISA Contactless Card Data)		⇒			
Field	Value				
EMV PDL PARAMETER TYPE	07				
EMV PDL TABLE ID	50				
EMV PDL CARD TYPE	01				
EMV PDL TABLE VERSION	001				
EMV PDL BLOCK SEQUENCE NUMBER	00				
		⇐	Table 50 Confirmation Response (VISA Contactless Card Data)		
				Field	Value
				EMV PDL TABLE VERSION	001
				EMV PDL BLOCK SEQUENCE NUMBER	00
				EMV PDL TABLE ID	50
				EMV PDL CARD TYPE	01
				EMV PDL CONFIRMATION FLAG	Y
Table 50 Request (MasterCard Contactless Card Data)		⇒			
Field	Value				
EMV PDL PARAMETER TYPE	06				
EMV PDL TABLE ID	50				
EMV PDL CARD TYPE	02				
EMV PDL TABLE VERSION	001				
EMV PDL BLOCK SEQUENCE NUMBER	01				

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
	↔	Table 50 Response (MasterCard Contactless Card Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	01
		EMV PDL TABLE ID	50
		EMV PDL CARD TYPE	02
		EMV PDL END-OF-TABLE FLAG	Y
		EMV PDL TABLE DATA BLOCK LENGTH	176
		EMV PDL AID COUNT	01
		MasterCard Credit/Debit	
		EMV PDL APPLICATION IDENTIFIER (AID)	A0000000041010 + <18 spaces>
		EMV PDL APPLICATION SELECTION INDICATOR	1
		EMV PDL APPLICATION VERSION NUMBER	0002
		EMV PDL CONTACTLESS MAGSTRIPE APPLICATION VERSION NUMBER	0001
		EMV PDL APPLICATION COUNTRY CODE	<3 spaces>
		EMV PDL TRANSACTION TYPES	8000
		EMV PDL TERMINAL CAPABILITIES	E068C8
		EMV PDL TERMINAL CONTACTLESS FLOOR LIMIT	000000020000
		EMV PDL TERMINAL CVM REQUIRED LIMIT	000000005000
		EMV PDL TERMINAL CONTACTLESS TRANSACTION LIMIT	999999999999
		EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0000000000
		EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	FC509C8800
		EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	FC509C8800
		EMV PDL TERMINAL TRANSACTION QUALIFIERS (TTQ)	B6000000

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
			EMV PDL TERMINAL RISK MANAGEMENT DATA	6CF8000000000000 0
			EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
Table 50 Confirmation Request (MasterCard Contactless Card Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	07			
EMV PDL TABLE ID	50			
EMV PDL CARD TYPE	02			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	00			
		↔	Table 50 Confirmation Response (MasterCard Contactless Card Data)	
			Field	Value
			EMV PDL PARAMETER VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	00
			EMV PDL TABLE ID	50
			EMV PDL CARD TYPE	02
			EMV PDL CONFIRMATION FLAG	Y
Table 50 Request (American Express Contactless Card Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	50			
EMV PDL CARD TYPE	03			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	01			

Table F-1 EMV PDL Data Examples (Continued)

POS	Host																																														
	<div style="text-align: center;">↔</div> <div style="text-align: center;">Table 50 Response (American Express Contactless Card Data)</div>																																														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Field</th> <th style="width: 30%;">Value</th> </tr> </thead> <tbody> <tr> <td>EMV PDL TABLE VERSION</td> <td>001</td> </tr> <tr> <td>EMV PDL BLOCK SEQUENCE NUMBER</td> <td>01</td> </tr> <tr> <td>EMV PDL TABLE ID</td> <td>50</td> </tr> <tr> <td>EMV PDL CARD TYPE</td> <td>03</td> </tr> <tr> <td>EMV PDL END-OF-TABLE FLAG</td> <td>Y</td> </tr> <tr> <td>EMV PDL TABLE DATA BLOCK LENGTH</td> <td>176</td> </tr> <tr> <td>EMV PDL AID COUNT</td> <td>01</td> </tr> <tr> <td colspan="2" style="text-align: center;">American Express Credit/Debit</td> </tr> <tr> <td>EMV PDL APPLICATION IDENTIFIER (AID)</td> <td>A00000002501 + <20 spaces></td> </tr> <tr> <td>EMV PDL APPLICATION SELECTION INDICATOR</td> <td>1</td> </tr> <tr> <td>EMV PDL APPLICATION VERSION NUMBER</td> <td>0001</td> </tr> <tr> <td>EMV PDL CONTACTLESS MAGSTRIPE APPLICATION VERSION NUMBER</td> <td>0001</td> </tr> <tr> <td>EMV PDL APPLICATION COUNTRY CODE</td> <td><3 spaces></td> </tr> <tr> <td>EMV PDL TRANSACTION TYPES</td> <td>8000</td> </tr> <tr> <td>EMV PDL TERMINAL CAPABILITIES</td> <td>E0E8C8</td> </tr> <tr> <td>EMV PDL TERMINAL CONTACTLESS FLOOR LIMIT</td> <td>000000000000</td> </tr> <tr> <td>EMV PDL TERMINAL CVM REQUIRED LIMIT</td> <td>000000005000</td> </tr> <tr> <td>EMV PDL TERMINAL CONTACTLESS TRANSACTION LIMIT</td> <td>999999999999</td> </tr> <tr> <td>EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL</td> <td>0000000000</td> </tr> <tr> <td>EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE</td> <td>C400000000</td> </tr> <tr> <td>EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT</td> <td>DC50840000</td> </tr> <tr> <td>EMV PDL TERMINAL TRANSACTION CAPABILITIES</td> <td>D8F00000</td> </tr> </tbody> </table>	Field	Value	EMV PDL TABLE VERSION	001	EMV PDL BLOCK SEQUENCE NUMBER	01	EMV PDL TABLE ID	50	EMV PDL CARD TYPE	03	EMV PDL END-OF-TABLE FLAG	Y	EMV PDL TABLE DATA BLOCK LENGTH	176	EMV PDL AID COUNT	01	American Express Credit/Debit		EMV PDL APPLICATION IDENTIFIER (AID)	A00000002501 + <20 spaces>	EMV PDL APPLICATION SELECTION INDICATOR	1	EMV PDL APPLICATION VERSION NUMBER	0001	EMV PDL CONTACTLESS MAGSTRIPE APPLICATION VERSION NUMBER	0001	EMV PDL APPLICATION COUNTRY CODE	<3 spaces>	EMV PDL TRANSACTION TYPES	8000	EMV PDL TERMINAL CAPABILITIES	E0E8C8	EMV PDL TERMINAL CONTACTLESS FLOOR LIMIT	000000000000	EMV PDL TERMINAL CVM REQUIRED LIMIT	000000005000	EMV PDL TERMINAL CONTACTLESS TRANSACTION LIMIT	999999999999	EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0000000000	EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	C400000000	EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	DC50840000	EMV PDL TERMINAL TRANSACTION CAPABILITIES	D8F00000
	Field	Value																																													
	EMV PDL TABLE VERSION	001																																													
	EMV PDL BLOCK SEQUENCE NUMBER	01																																													
	EMV PDL TABLE ID	50																																													
	EMV PDL CARD TYPE	03																																													
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	EMV PDL TABLE DATA BLOCK LENGTH	176																																													
	EMV PDL AID COUNT	01																																													
	American Express Credit/Debit																																														
	EMV PDL APPLICATION IDENTIFIER (AID)	A00000002501 + <20 spaces>																																													
	EMV PDL APPLICATION SELECTION INDICATOR	1																																													
	EMV PDL APPLICATION VERSION NUMBER	0001																																													
	EMV PDL CONTACTLESS MAGSTRIPE APPLICATION VERSION NUMBER	0001																																													
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	EMV PDL TERMINAL CVM REQUIRED LIMIT	000000005000																																													
	EMV PDL TERMINAL CONTACTLESS TRANSACTION LIMIT	999999999999																																													
	EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0000000000																																													
	EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	C400000000																																													
	EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	DC50840000																																													
EMV PDL TERMINAL TRANSACTION CAPABILITIES	D8F00000																																														

Table F-1 EMV PDL Data Examples (Continued)

POS		↔ Host	
		EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>
		EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
Table 50 Confirmation Request (American Express Contactless Card Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	50		
EMV PDL CARD TYPE	03		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		
		↔	
		Table 50 Confirmation Response (American Express Contactless Card Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	00
		EMV PDL TABLE ID	50
		EMV PDL CARD TYPE	03
		EMV PDL CONFIRMATION FLAG	Y
Table 50 Request (Discover Contactless Card Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	06		
EMV PDL TABLE ID	50		
EMV PDL CARD TYPE	04		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	01		

Table F-1 EMV PDL Data Examples (Continued)

POS	Host		
	<div style="text-align: center;"> ↔ ↩ Table 50 Response (Discover Contactless Card Data) </div>		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Field</th> <th style="width: 30%;">Value</th> </tr> </thead> </table>	Field	Value
	Field	Value	
	EMV PDL TABLE VERSION	001	
	EMV PDL BLOCK SEQUENCE NUMBER	01	
	EMV PDL TABLE ID	50	
	EMV PDL CARD TYPE	04	
	EMV PDL END-OF-TABLE FLAG	Y	
	EMV PDL TABLE DATA BLOCK LENGTH	176	
	EMV PDL AID COUNT	01	
	Discover Credit/Debit		
	EMV PDL APPLICATION IDENTIFIER (AID)	A0000003241010 + <18 spaces>	
	EMV PDL APPLICATION SELECTION INDICATOR	1	
	EMV PDL APPLICATION VERSION NUMBER	0001	
	EMV PDL CONTACTLESS MAGSTRIPE APPLICATION VERSION NUMBER	0001	
	EMV PDL APPLICATION COUNTRY CODE	<3 spaces>	
	EMV PDL TRANSACTION TYPES	8000	
	EMV PDL TERMINAL CAPABILITIES	E068C8	
	EMV PDL TERMINAL CONTACTLESS FLOOR LIMIT	000000000000	
	EMV PDL TERMINAL CVM REQUIRED LIMIT	000000005000	
	EMV PDL TERMINAL CONTACTLESS TRANSACTION LIMIT	999999999999	
	EMV PDL TERMINAL ACTION CODE (TAC) - DENIAL	0010000000	
	EMV PDL TERMINAL ACTION CODE (TAC) - ONLINE	FCE09CF800	
	EMV PDL TERMINAL ACTION CODE (TAC) - DEFAULT	DC00002000	
	EMV PDL TERMINAL TRANSACTION QUALIFIERS (TTQ)	96000000	

Table F-1 EMV PDL Data Examples (Continued)

POS		↔ Host	
		EMV PDL TERMINAL RISK MANAGEMENT DATA	<16 spaces>
		EMV PDL DEFAULT TRANSACTION CERTIFICATE DATA OBJECT LIST (TDOL)	<32 spaces>
Table 50 Confirmation Request (Discover Contactless Card Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	50		
EMV PDL CARD TYPE	04		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		
		↔	
		Table 50 Confirmation Response (Discover Contactless Card Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	00
		EMV PDL TABLE ID	50
		EMV PDL CARD TYPE	04
		EMV PDL CONFIRMATION FLAG	Y
Table 60 Request (VISA Public Key Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	06		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	01		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	01		

Table F-1 EMV PDL Data Examples (Continued)

POS	Host		
	<div style="text-align: center;">↔</div> <div style="text-align: center;">Table 60 Response (VISA Public Key Data)</div>		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Field</th> <th style="width: 30%;">Value</th> </tr> </thead> </table>	Field	Value
	Field	Value	
	EMV PDL TABLE VERSION	001	
	EMV PDL BLOCK SEQUENCE NUMBER	01	
	EMV PDL TABLE ID	60	
	EMV PDL CARD TYPE	01	
	EMV PDL END-OF-TABLE FLAG	N	
	EMV PDL TABLE DATA BLOCK LENGTH	875	
	EMV PDL KEY COUNT	04	
	VISA 1024-Bit Key (Expired)		
	EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000003	
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	01	
	EMV PDL KEY STATUS	E	
	VISA 1152-Bit Key (Active)		
	EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000003	
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	07	
EMV PDL KEY STATUS	A		
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0288		

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	A89F25A56FA6DA 258C8CA8B40427 D927B4A1EB4D7 EA326BBB12F97D ED70AE5E4480F C9C5E8A9721771 10A1CC318D06D2 F8F5C4844AC5FA 79A4DC470BB11E D635699C17081B 90F1B984F12E92 C1C529276D8AF8 EC7F28492097D8 CD5BECEA16FE4 088F6CFAB4A1B4 2328A1B996F927 8B0B7E3311CA5E F856C2F888474B 83612A82E4E00D 0CD4069A678314 0433D50725F
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	B4BC56CC4E883 24932CBC643D68 98F6FE593B172
VISA 1408-Bit Key (Active)			
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000003
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	08
		EMV PDL KEY STATUS	A
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0352

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	D9FD6ED75D51D 0E30664BD15702 3EAA1FFA871E4D A65672B863D255 E81E137A51DE4F 72BCC9E44ACE1 2127F87E263D3A F9DD9CF35CA4A 7B01E907000BA8 5D24954C2FCA30 74825DDD4C0C8 F186CB020F683E 02F2DEAD396913 3F06F7845166AC EB57CA0FC26034 45469811D293BF EFBAFAB57631B3 DD91E796BF850A 25012F1AE38F05 AA5C4D6D03B1D C2E56861278593 8BBC9B3CD3A91 0C1DA55A5A9218 ACE0F7A2128775 2682F15832A678 D6E1ED0B
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	20D213126955DE 205ADC2FD2822B D22DE21CF9A8
VISA 1984-Bit Key (Active)			
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000003
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	09
		EMV PDL KEY STATUS	A
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0496
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	9D912248DE0A4E 39C1A7DDE3F6D 2588992C1A4095 AFBD1824D1BA7 4847F2BC4926D2 EFD904B4B54954 CD1

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
Table 60 Request (VISA Public Key Data Continued)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	60			
EMV PDL CARD TYPE	01			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	02			
		⇐	Table 60 Response (VISA Public Key Data Continued)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	02
			EMV PDL TABLE ID	60
			EMV PDL CARD TYPE	01
			EMV PDL END-OF-TABLE FLAG	Y
			EMV PDL TABLE DATA BLOCK LENGTH	453

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	89A54C5D117965 4F8F9B0D2AB5F0 357EB642FEDA95 D3912C6576945F AB897E7062CAA4 4A4AA06B8FE6E3 DBA18AF6AE3738 E30429EE9BE034 27C9D64F695FA8 CAB4BFE376853E A34AD1D76BFCA D15908C077FFE6 DC5521ECE5D2 78A96E26F57359 FFAEDA19434B93 7F1AD999DC5C4 1EB11935B44C18 100E857F431A4A 5A6BB65114F174 C2D7B59FDF237 D6BB1DD0916E6 44D709DED56481 477C75D95CDD6 8254615F7740EC 07F330AC5D67BC D75BF23D28A140 826C026DBDE971 A37CD3EF9B8DF 644AC385010501 EFC6509D7A41
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	1FF80A40173F52 D7D27E0F26A146 A1C8CCB29046
Table 60 Confirmation Request (VISA Public Key Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	01		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
	↩	Table 60 Confirmation Response (VISA Public Key Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	00
		EMV PDL TABLE ID	60
		EMV PDL CARD TYPE	01
		EMV PDL CONFIRMATION FLAG	Y
Table 60 Request (MasterCard Public Key Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	06		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	02		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	01		
	↩	Table 60 Response (MasterCard Public Key Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	01
		EMV PDL TABLE ID	60
		EMV PDL CARD TYPE	02
		EMV PDL END-OF-TABLE FLAG	N
		EMV PDL TABLE DATA BLOCK LENGTH	875
EMV PDL KEY COUNT	03		

Table F-1 EMV PDL Data Examples (Continued)

POS	Host																
	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="781 331 1479 380">MasterCard 1152-Bit Key (Active)</th> </tr> </thead> <tbody> <tr> <td data-bbox="781 380 1248 453">EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)</td> <td data-bbox="1248 380 1479 453">A000000003</td> </tr> <tr> <td data-bbox="781 453 1248 527">EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX</td> <td data-bbox="1248 453 1479 527">04</td> </tr> <tr> <td data-bbox="781 527 1248 573">EMV PDL KEY STATUS</td> <td data-bbox="1248 527 1479 573">A</td> </tr> <tr> <td data-bbox="781 573 1248 646">EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH</td> <td data-bbox="1248 573 1479 646">0288</td> </tr> <tr> <td data-bbox="781 646 1248 1304">EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS</td> <td data-bbox="1248 646 1479 1304"> A6DA428387A502 D7DDFB7A74D3F 412BE762627197 B25435B7A81716 A700157DDD06F7 CC99D6CA28C24 70527E2C03616B 9C59217357C267 4F583B3BA5C7D CF2838692D023E 3562420B4615C4 39CA97C44DC9A 249CFCE7B3BFB 22F68228C3AF13 329AA4A613CF8D D853502373D62E 49AB256D2BC171 20E54AEDCED6D 96A4287ACC5C04 677D4A5A320DB8 BEE2F775E5FEC 5 </td> </tr> <tr> <td data-bbox="781 1304 1248 1377">EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT</td> <td data-bbox="1248 1304 1479 1377">03</td> </tr> <tr> <td data-bbox="781 1377 1248 1478">EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM</td> <td data-bbox="1248 1377 1479 1478"> 381A035DA58B48 2EE2AF75F4C3F2 CA469BA4AA6C </td> </tr> </tbody> </table>	MasterCard 1152-Bit Key (Active)		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000003	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	04	EMV PDL KEY STATUS	A	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0288	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	A6DA428387A502 D7DDFB7A74D3F 412BE762627197 B25435B7A81716 A700157DDD06F7 CC99D6CA28C24 70527E2C03616B 9C59217357C267 4F583B3BA5C7D CF2838692D023E 3562420B4615C4 39CA97C44DC9A 249CFCE7B3BFB 22F68228C3AF13 329AA4A613CF8D D853502373D62E 49AB256D2BC171 20E54AEDCED6D 96A4287ACC5C04 677D4A5A320DB8 BEE2F775E5FEC 5	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	381A035DA58B48 2EE2AF75F4C3F2 CA469BA4AA6C
MasterCard 1152-Bit Key (Active)																	
EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000003																
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	04																
EMV PDL KEY STATUS	A																
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0288																
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	A6DA428387A502 D7DDFB7A74D3F 412BE762627197 B25435B7A81716 A700157DDD06F7 CC99D6CA28C24 70527E2C03616B 9C59217357C267 4F583B3BA5C7D CF2838692D023E 3562420B4615C4 39CA97C44DC9A 249CFCE7B3BFB 22F68228C3AF13 329AA4A613CF8D D853502373D62E 49AB256D2BC171 20E54AEDCED6D 96A4287ACC5C04 677D4A5A320DB8 BEE2F775E5FEC 5																
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03																
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	381A035DA58B48 2EE2AF75F4C3F2 CA469BA4AA6C																

Table F-1 EMV PDL Data Examples (Continued)

POS	↔ Host
	MasterCard 1408-Bit Key (Active)
	EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID) A000000004
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX 05
	EMV PDL KEY STATUS A
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH 0352
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS B8048ABC30C90 D976336543E3FD 7091C8FE4800DF 820ED55E7E9481 3ED00555B573FE CA3D84AF6131A6 51D66CFF4284FB 13B635EDD0EE40 176D8BF04B7FD1 C7BACF9AC7327 DFAA8AA72D10D B3B8E70B2DDD8 11CB4196525EA3 86ACC33C0D9D4 575916469C4E4F 53E8E1C912CC61 8CB22DDE7C356 8E90022E6BBA77 0202E4522A2DD6 23D180E215BD1D 1507FE3DC90CA3 10D27B3EFCCD8 F83DE3052CAD1 E48938C68D095A AC91B5F37E28BB 49EC7ED597
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT 03
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM EBFA0D5D06D8C E702DA3EAE8907 01D45E274C845

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		MasterCard 1984-Bit Key (Active)	
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000004
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	06
		EMV PDL KEY STATUS	A
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0496
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	CB26FC830B4378 5B2BCE37C81ED 334622F9622F4C 89AAE641046B23 53433883F307FB7 C974162DA72F7A 4EC75D9D657336
Table 60 Request (MasterCard Public Key Data Continued)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	06		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	01		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	02		
	↔	Table 60 Response (MasterCard Public Key Data Continued)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	02
		EMV PDL TABLE ID	60
		EMV PDL CARD TYPE	01
		EMV PDL END-OF-TABLE FLAG	Y
EMV PDL TABLE DATA BLOCK LENGTH	440		

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	865B8D3023D3D6 45667625C9A07A 6B7A137CF0C641 98AE38FC238006 FB2603F41F4F3B B9DA1347270F2F 5D8C606E420958 C5F7D50A71DE30 142F70DE468889 B5E3A08695B938 A50FC980393A9C BCE44AD2D64F6 30BB33AD3F5F5F D495D31F37818C 1D94071342E07F 1BEC2194F6035B A5DED3936500EB 82DFDA6E8AFB6 55B1EF3D0D7EB F86B66DD9F29F6 B1D324FE8B26C E38AB2013DD13F 611E7A594D675C 4432350EA244CC 34F3873CBA0659 2987A1D7E852AD C22EF5A2EE2813 2031E48F74037E 3B34AB747F
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	F910A1504D5FFB 793D94F3B50076 5E1ABCAD72D9
Table 60 Confirmation Request (MasterCard Public Key Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	02		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
	↩	Table 60 Confirmation Response (MasterCard Public Key Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	00
		EMV PDL TABLE ID	60
		EMV PDL CARD TYPE	02
		EMV PDL CONFIRMATION FLAG	Y
Table 60 Request (American Express Public Key Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	06		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	03		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	01		
	↩	Table 60 Response (American Express Public Key Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	01
		EMV PDL TABLE ID	60
		EMV PDL CARD TYPE	03
		EMV PDL END-OF-TABLE FLAG	N
		EMV PDL TABLE DATA BLOCK LENGTH	875
		EMV PDL KEY COUNT	04
		American Express 1024-Bit Key (Expired)	
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000025
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	03
		EMV PDL KEY STATUS	E

Table F-1 EMV PDL Data Examples (Continued)

POS	Host	
	American Express 1152-Bit Key (Active)	
	EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000025
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	0E
	EMV PDL KEY STATUS	A
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0288
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	AA94A8C6DAD24 F9BA56A27C09B0 1020819568B81A0 26BE9FD0A3416C A9A71166ED5084 ED91CED47DD45 7DB7E6CBCD53E 560BC5DF48ABC 380993B6D549F5 196CFA77DFB20A 0296188E969A277 2E8C4141665F8B B2516BA2C7B5F C91F8DA04E8D51 2EB0F6411516FB 86FC021CE7E969 DA94D33937909A 53A57F907C40C2 2009DA7532CB3B E509AE173B39AD 6A01BA5BB85
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	A7266ABAE64B42 A3668851191D498 56E17F8FBCD
	American Express 1408-Bit Key (Active)	
	EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000025
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	0F
	EMV PDL KEY STATUS	A
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0352

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	C8D5AC27A5E1F B89978C7C6479A F993AB3800EB24 3996FBB2AE26B6 7B23AC482C4B74 6005A51AFA7D2D 83E894F591A235 7B30F85B85627F F15DA12290F70F 05766552BA11AD 34B7109FA49DE2 9DCB0109670875 A17EA95549E923 47B948AA1F0457 56DE56B707E386 3E59A6CBE99C12 72EF65FB66CBB4 CFF070F36029DD 76218B21242645B 51CA752AF37E70 BE1A84FF31079D C0048E928883EC 4FADD497A71938 5C2BBBEB5A66 AA5E5655D18034 EC5
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	A73472B3AB5574 93A9BC2179CC80 14053B12BAB4
American Express 1984-Bit Key (Active)			
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000025
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	10
		EMV PDL KEY STATUS	A
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0496
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	CF98DFEDB3D37 27965EE77977233 55E0751C81D2D3 DF4D18EBAB9FB 9D49F38C8C4A82 6B99DC9DEA3F0 104

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
Table 60 Request (American Express Public Key Data Continued)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	06			
EMV PDL TABLE ID	60			
EMV PDL CARD TYPE	03			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	02			
		⇐	Table 60 Response (American Express Public Key Data Continued)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	02
			EMV PDL TABLE ID	60
			EMV PDL CARD TYPE	03
			EMV PDL END-OF-TABLE FLAG	Y
			EMV PDL TABLE DATA BLOCK LENGTH	453

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	3D4BF22AC3550E 2962A59639B1332 156422F788B9C1 6D40135EFD1BA9 4147750575E636B 6EBC618734C91C 1D1BF3EDC2A46 A43901668E0FFC 136774080E88804 4F6A1E65DC9AA A8928DACBEB0D B55EA3514686C6 A732CEF55EE27 CF877F110652694 A0E3484C855D88 2AE191674E25C2 96205BBB599455 176FDD7BBC549 F27BA5FE35336F 7E29E68D783973 199436633C67EE 5A680F05160ED1 2D1665EC83D199 7F10FD05BBDBF 9433E8F797AEE3 E9F02A34228ACE 927ABE62B8B928 1AD08D3DF5C73 79685045D7BA5F CDE58637
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	C729CF2FD26239 4ABC4CC1735065 02446AA9B9FD
Table 60 Confirmation Request (American Express Public Key Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	07		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	03		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	00		

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
	↩	Table 60 Confirmation Response (American Express Public Key Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	00
		EMV PDL TABLE ID	60
		EMV PDL CARD TYPE	03
		EMV PDL CONFIRMATION FLAG	Y
Table 60 Request (Discover Public Key Data)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	06		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	04		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	01		
	↩	Table 60 Response (Discover Public Key Data)	
		Field	Value
		EMV PDL TABLE VERSION	001
		EMV PDL BLOCK SEQUENCE NUMBER	01
		EMV PDL TABLE ID	60
		EMV PDL CARD TYPE	04
		EMV PDL END-OF-TABLE FLAG	N
		EMV PDL TABLE DATA BLOCK LENGTH	875
EMV PDL KEY COUNT	04		

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
Discover 1024-Bit Key (Active)			
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000152
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	01
		EMV PDL KEY STATUS	A
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0256
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	8D1727AB9DC852 453193EA0810B1 10F2A3FD304BE2 58338AC2650FA2 A040FA10301EA5 3DF18FD9F40F55 C44FE0EE7C7223 BC649B8F932892 5707776CB86F3A C37D1B22300D00 83B49350E09ABB 4B62A96363B01E 4180E158EADDD 6878E85A6C9D56 509BF68F0400AF FBC441DDCCDAF 9163C4AACEB2C 3E1EC13699D23C DA9D3AD
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	E0C2C1EA411DB 24EC3E76A9403F 0B7B6F406F398
Discover 1152-Bit Key (Active)			
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000152
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	03
		EMV PDL KEY STATUS	A
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0288

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	BF321241BDBF35 85FFF2ACB89772 EBD18F2C872159 EAA4BC179FB03 A1B850A1A758FA 2C6849F48D4C4F F47E02A575FC13 E8EB77AC371350 30C5600369B556 7D3A7AAF020151 15E987E6BE566B 4B4CC03A4E2B16 CD9051667C2CD 0EEF4D76D27A6F 745E8BBEB45498 ED8C30E2616DB 4DBDA4BAF8D71 990CDC22A8A387 ACB21DD88E2CC 27962B31FBD786 BBB55F9E0B041
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	CA1E9099327F0B 786D8583EC2F27 E57189503A57

Table F-1 EMV PDL Data Examples (Continued)

POS	↔	Host	
		Discover 1408-Bit Key (Active)	
		EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000152
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	04
		EMV PDL KEY STATUS	A
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0352
		EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	8EEEC0D6D3857 FD558285E49B62 3B109E6774E06E 9476FE1B2FB273 685B5A235E9558 10ADDB5CDCC2 CB6E1A97A07089 D7FDE0A548BDC 622145CA2DE3C7 3D6B14F284B3DC 1FA056FC0FB281 8BCD7C852F0C9 7963169F01483C E1A63F0BF899D4 12A
Table 60 Request (Discover Public Key Data Continued)		⇒	
Field	Value		
EMV PDL PARAMETER TYPE	06		
EMV PDL TABLE ID	60		
EMV PDL CARD TYPE	04		
EMV PDL TABLE VERSION	001		
EMV PDL BLOCK SEQUENCE NUMBER	02		

Table F-1 EMV PDL Data Examples (Continued)

POS	Host																				
	<div style="text-align: center;"> ↔ ↩ Table 60 Response (Discover Public Key Data Continued) </div>																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 70%;">Field</th> <th style="width: 30%;">Value</th> </tr> </thead> <tbody> <tr> <td>EMV PDL TABLE VERSION</td> <td>001</td> </tr> <tr> <td>EMV PDL BLOCK SEQUENCE NUMBER</td> <td>02</td> </tr> <tr> <td>EMV PDL TABLE ID</td> <td>60</td> </tr> <tr> <td>EMV PDL CARD TYPE</td> <td>04</td> </tr> <tr> <td>EMV PDL END-OF-TABLE FLAG</td> <td>Y</td> </tr> <tr> <td>EMV PDL TABLE DATA BLOCK LENGTH</td> <td>755</td> </tr> <tr> <td>EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS</td> <td>B67C5BBDC8B4F 6FB9ABB57E9512 5363DBD8F5EBA A9B74ADB932020 50341833DEE8E3 8D28BD175C83A6 EA720C262682BE ABEA8E955FE67 BD9C2EFF7CB9A 9F45DD5BDA4A1 EEFB148BC44FF F68D9329FD</td> </tr> <tr> <td>EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT</td> <td>03</td> </tr> <tr> <td>EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM</td> <td>17F971CAF6B708 E5B9165331FBA9 1593D0C0BF66</td> </tr> </tbody> </table>	Field	Value	EMV PDL TABLE VERSION	001	EMV PDL BLOCK SEQUENCE NUMBER	02	EMV PDL TABLE ID	60	EMV PDL CARD TYPE	04	EMV PDL END-OF-TABLE FLAG	Y	EMV PDL TABLE DATA BLOCK LENGTH	755	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	B67C5BBDC8B4F 6FB9ABB57E9512 5363DBD8F5EBA A9B74ADB932020 50341833DEE8E3 8D28BD175C83A6 EA720C262682BE ABEA8E955FE67 BD9C2EFF7CB9A 9F45DD5BDA4A1 EEFB148BC44FF F68D9329FD	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	17F971CAF6B708 E5B9165331FBA9 1593D0C0BF66
	Field	Value																			
	EMV PDL TABLE VERSION	001																			
	EMV PDL BLOCK SEQUENCE NUMBER	02																			
	EMV PDL TABLE ID	60																			
	EMV PDL CARD TYPE	04																			
	EMV PDL END-OF-TABLE FLAG	Y																			
	EMV PDL TABLE DATA BLOCK LENGTH	755																			
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	B67C5BBDC8B4F 6FB9ABB57E9512 5363DBD8F5EBA A9B74ADB932020 50341833DEE8E3 8D28BD175C83A6 EA720C262682BE ABEA8E955FE67 BD9C2EFF7CB9A 9F45DD5BDA4A1 EEFB148BC44FF F68D9329FD																			
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03																				
EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	17F971CAF6B708 E5B9165331FBA9 1593D0C0BF66																				

Table F-1 EMV PDL Data Examples (Continued)

POS	Host	
	Discover 1984-Bit Key (Active)	
	EMV PDL REGISTERED APPLICATION PROVIDER IDENTIFIER (RID)	A000000152
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY INDEX	05
	EMV PDL KEY STATUS	A
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS LENGTH	0496
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY MODULUS	E1200E9F4428EB 71A526D6BB44C9 57F18F27B20BAC E978061CCEF235 32DBEBFAF654A1 49701C14E6A2A7 C2ECAC4C92135 BE3E9258331DDB 0967C3D1D375B9 96F25B77811CCC C06A153B4CE699 0A51A0258EA843 7EDBEB701CB1F 335993E3F48458 BC1194BAD29BF6 83D5F3ECB984E3 1B7B9D2F6D947B 39DEDE0279EE45 B47F2F3D4EEEF9 3F9261F8F5A571 AFBFB569C15037 0A78F6683D687C B677777B2E7ABE FCFC8F5F935017 36997E8310EE0F D87AFAC5DA772 BA277F88B44459 FCA563555017CD 0D66771437F8B6 608AA1A665F88D 846403E4C41AFE EDB9729C2B2511 CFE228B50C1B15 2B2A60BBF61D89 13E086210023A3 AA499E423
	EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY EXPONENT	03

Table F-1 EMV PDL Data Examples (Continued)

POS		↔	Host	
			EMV PDL CERTIFICATION AUTHORITY PUBLIC KEY CHECKSUM	12BCD407B6E627 A750FDF629EE8C 2C9CC7BA636A
Table 60 Confirmation Request (Discover Public Key Data)		⇒		
Field	Value			
EMV PDL PARAMETER TYPE	07			
EMV PDL TABLE ID	60			
EMV PDL CARD TYPE	04			
EMV PDL TABLE VERSION	001			
EMV PDL BLOCK SEQUENCE NUMBER	00			
		⇐	Table 60 Confirmation Response (Discover Public Key Data)	
			Field	Value
			EMV PDL TABLE VERSION	001
			EMV PDL BLOCK SEQUENCE NUMBER	00
			EMV PDL TABLE ID	60
			EMV PDL CARD TYPE	04
			EMV PDL CONFIRMATION FLAG	Y

Appendix G: Glossary

Note: Shaded glossary terms are EMV related.

Table G-1 Glossary

Term	Definition
AVS	See Address Verification System.
3-D Secure™	Three-Domain Secure™ (merchant, acquirer, issuer). A VISA-approved Authentication Method that is the global authentication standard for Electronic Commerce Transactions.
AAC (Application Authentication Cryptogram)	A type of cryptogram generated by the Chip Card when a transaction is declined (at the end of offline or online declined transaction) to indicate the card declined the transaction. Other types of cryptograms are ARQC, TC, ARPC, AAR.
ABA Transit Number	The ABA Transit Number, known as the routing transit number (RTN), is a nine-digit bank code, used in the United States. It appears on the bottom of negotiable instruments, such as checks, identifying the financial institution on which it was drawn.
AC (Application Cryptogram)	This is a generic term to describe an application cryptogram. It is generated from data elements contained in either the online authorization request to the Issuer, or the final financial transaction required for clearing and settlement. There are four types of Application Cryptograms (ARQC, TC, AAC, ARPC).
ACH	See Automated Clearing House.
ACI	See Authorization Characteristics Indicator.
Acquirer	A company that enters into contractual relationships with merchants, therefore allowing the merchant to accept credit/debit cards. Heartland Payment Systems is an acquirer.
Acquiring Financial Institution	An acquiring financial institution (or "acquirer") contracts with the bank and the merchants to enable credit card transaction.
Acquiring Host	The processing system which communicates with the card acceptor or a communications network processor and is responsible for receiving the data relating to a transaction and obtaining an approval or denial for the transaction. The system maintains reconciliation totals for all financial transactions.
Action Codes	There are 2 sets of action codes: <ul style="list-style-type: none"> • TACs (Terminal Actions Codes held in the POS terminal) and • IACs (Issuer Action Codes read from the Chip Card). Each of these sets of action codes contain 3 codes which are compared to the TVR: <ul style="list-style-type: none"> • Denial action codes are used to determine if the transaction should be declined. • Online action codes are used to determine if the transaction required online authorization, and in the event that the terminal is unable to go online. • Default action codes are used to determine if the transaction should be declined.

Table G-1 Glossary

Term	Definition
Activation	Changing the state of a fixed denomination account from "inactive" to "active", enabling the prepaid card for use.
Activation and Initial Load	Changing the state of a stored value/prepaid account from "inactive" to "active", enabling the card for use, and requesting the loading of a variable amount to the account.
Address Verification System	A service supported by Visa, MasterCard, Discover and American Express that verifies the cardholder's billing address against the address on file with the issuer. AVS is designed to minimize fraud in non-face-to-face transactions (card not present, internet, mail/phone order).
Advice Message	A message that notifies a party of an action that has been taken and does not require further approval, but does require a response from the receiver.
AFD	See Automated Fuel Dispenser.
Age Verification	A security process used to verify a consumer's age. Age verification is typically used by liquor and tobacco outlets, bars and casinos.
Agents	Those who sell bankcard services to merchants on behalf of ISOs, acquirers and processors. Also known as merchant level salespeople (MLs) and independent sales agents (ISAs), most agents are independent contractors. Others are paid employees of ISOs, acquirers and processors.
AID (Application Identifier)	<p>Names of applications supported by the POS. The POS obtains the DF names from the Card by issuing SELECT and READ RECORD commands. The POS AIDs are compared with the Chip Card DF Names to find a mutually supported application. *POS and Chip Card can support multiple AIDs.</p> <p>The AID structure is an ISO entity defined in the ISO7816 standard and is made up of two elements:</p> <ul style="list-style-type: none"> • The RID (Registered Identification Provider Identifier) is five (5) bytes and identifies the scheme. (See RID for more detailed explanation). • The PIX (Proprietary Application Identification Extension) is a variable length field from 0 to 11 bytes long and is used to identify the different applications offered. Each brand under a specific scheme normally have a unique PIX. <p>Example of two AID's for VISA:</p> <ul style="list-style-type: none"> • RID: A000000003 PIX: 1010 AID: A0000000031010 PRODUCT: Visa Credit or Debit • RID: A000000003 PIX: 1020 AID: A0000000032010 PRODUCT: Visa Electron

Table G-1 Glossary

Term	Definition
AIP (Application Interchange Profile)	<p>List of security functions that <u>reside on the Chip Card</u>. The AIP indicates which functions are supported by the Card and which should be applied to the current transaction.</p> <p>Types of security functions residing on the card may include:</p> <ul style="list-style-type: none"> • SDA • DDA • CDA • Terminal Risk Management • Cardholder Verification • Issuer Authentication. <p>See SDA, DDA, CDA, and other functions for further details.</p>
American Banks Association Transit Number	See ABA Transit Number.
American National Standards Institute	Governing institute that establishes guidelines for business practices.
American Standard Code for Information Interchange	ASCII is a character-encoding scheme based on the ordering of the English alphabet. ASCII codes represent text for computers, communications equipment, and other devices that use text.
Annual Percentage Rate	The percentage rate charged for a credit card (or other loan) for a whole year. It is the finance charge, expressed as an annual rate.
ANSI	See American National Standards Institute.
Application Version Number (ICC)	This data element indicates the version of the application on the Chip Card. It is specified by the Payment System and used in Application Version Number checking by the POS.
Application Version Number (Terminal)	This data element indicates the version of the application on the POS device. It is specified by the Payment System and used in Application Version Number checking by the POS.
Approved Scanning Vendor (ASV)	<p>The PCI Security Standards Council maintains a structured process for security solution providers to become Approved Scanning Vendors (ASVs), as well as to be re-approved each year. The five founding members of the Council recognize the ASVs certified by the PCI Security Standards Council as being qualified to validate adherence to the PCI DSS by performing vulnerability scans of Internet facing environments of merchants and service providers. The major requirement of the process is a rigorous remote test conducted by each vendor on the PCI Security Standards Council's test infrastructure, which simulates the network of a typical security scan customer. The Council has set up the test infrastructure in such a way as to deliberately introduce vulnerabilities and misconfigurations for the vendor to identify and report as part of the compliance testing process.</p>
APR	See Annual Percentage Rate.

Table G-1 Glossary

Term	Definition
ARPC (Authorization Response Cryptogram)	Used in Online processing. A cryptogram generated by the Issuer in response to an ARQC. It is sent in the authorization response back to the acquirer Host to the POS. The POS sends this cryptogram back to the Chip Card with a response code accepting or declining the transaction. The Chip Card's receipt and validation of the ARPC confirms approval response from the Issuer and ensures that it is communicating with the valid Issuer. This cryptogram is also typically used to allow the Chip Card to reset counters.
ARQC (Authorization Request Cryptogram)	Used in Online processing. This is a cryptogram requested by the POS and generated by the Chip Card at the end of the first round of Card Action Analysis step for transactions requiring <u>online</u> authorization. It is included in the authorization request or full financial request (B2) sent to the Issuer and it allows the Issuer to verify the validity of the Chip Card and message. When validated by the Issuer, the ARQC confirms that the Chip Card has not been copied or changed.
ASCII	See American Standard Code for Information Interchange.
Attended POS	An attended POS device, meaning a person representing the merchant, accepts the payment. This can also be called a MAT, attended POS, and face-to-face transaction.
Auth Only	Authorization Only. Host Processing Mode whereby a POS utilizes the Heartland network to obtain online authorizations only. It then captures offline transactions such as sales captures, returns, and voids and settles with an acquirer other than Heartland.
Authorization	A process where a merchant issues a request to an authorization center to obtain an approval for a cardholder transaction for a specific amount. This process verifies that a credit or debit card has sufficient funds available to cover the amount of the transaction. This process also reserves the specified amount and ensures the card is authentic and not reported lost or stolen. This authorization request is usually submitted through a point-of-sale device. The merchant may also obtain authorizations by telephoning the authorization center.
Authorization Characteristics Indicator	A value determined by VISA based on the data included with the authorization request. It is returned with the electronic authorization response.
Authorization Code	A code that a credit card issuing bank returns to the POS indicating an approval of the request transaction.
Authorization Request	If the cardholder account has sufficient funds to cover the amount of the transaction.
Authorization Response	A response to an authorization request indicating a financial institution's approval or disapproval of a transaction.
Auto-Substantiation	This transaction is applied to either a Credit Authorization or Credit Sale Transaction. Amount types included in this transaction are healthcare, prescription, vision/optical, clinic or other qualified medical and dental amounts.
Automated Clearing House	An electronic payment network most commonly associated with payroll direct deposit and recurring payments. The ACH can be used also to clear electronic checks and other demand deposit account (DDA) transactions.

Table G-1 Glossary

Term	Definition
Automated Fuel Dispenser	A pump at a service station or truck stop that is operated by the cardholder to obtain credit for pumping fuel. The pump contains a card reader. Also called an ICR, CRIND, or CAT.
Balance Inquiry	Requesting the balance of an account to provide to the cardholder at the POS.
Bank Card	In general, a bank card refers to a plastic card issued by a bank and used to access funds from an account.
Bank Card Direct (BCD)	A service offered by Heartland Prepaid Services.
Bank Identification Number (BIN)	The primary account number found on credit cards and bank cards. It is a six-digit number, maintained by the American Bankers Association that identifies the bank and type of card. The first number identifies the card type (i.e., Amex = 3, VISA = 4, MasterCard = 5, Discover = 6). Also known as Issuer Identification Number (IIN).
Bank Routing Number	See Transit Routing Number.
Batch	Based on pre-determined criteria, the terminal will submit the batch transaction that has taken place since the last successful batch.
Batch Close	The process of sending batch information to the Host processor for clearing and settlement (the cardholders are charged and the merchant is paid).
BER-TLV Format	TLV is a data format that uses a label (tag) to uniquely identify the field. The tag is followed by the length, then the actual value of the field.
BIN	See Bank Identification Number.
CA (Certificate Authority)	Trusted third party that establishes a proof that links a public key (used by a merchant) and other relevant information to its owner. The CA issues, revokes and expires certificates. It is responsible for ensuring that the identity of the user requesting the certificate is legitimate.
Card Acceptance Processing Network (CAPN)	A set of requirements mandated by American Express to ensure processing of AMEX transactions according to their security standards. CAPN enhances POS security, supports expanded amounts, and adds a transaction life cycle identifier for all AMEX transactions.
Card Acceptor	The facility at which a purchase is made and a payment transaction is initiated. Also known as a merchant.
Card Acceptor Business (CAB) Program Code	Formerly MCC (Merchant Category Code) is a numerical representation of the type of business in which the card acceptor (merchant) engages. MasterCard assigns these codes.
Card Authentication	Chip Cards are authenticated during the payment transaction, protecting against counterfeit cards. Transactions require an authentic card validated either online by the Issuer using a dynamic cryptogram or offline with the Terminal using one of the following authentication methods: <ul style="list-style-type: none"> • SDA (Static Data Authentication) • DDA (Dynamic Data Authentication) • CDA (Combined DDA with application cryptogram generation)
Card Identifier (CID)	See Card Verification Number.

Table G-1 Glossary

Term	Definition
Card Issuing Bank	A financial institution that issues payment cards such as credit/debit cards.
Card Not Present	Card transactions (Internet or MOTO/eCommerce purchases, for example) for which the customer's card is not physically handled by the merchant. Interchange is set higher on these transactions because there is a higher risk of fraud.
Card Reader IN Dispenser (CRIND)	A term used primarily by Gilbarco referring to their brand of ICR.
Card Validation Code (CVC)	Three digit code value. See Card Verification Number.
Card Verification Number (CVN)	This is a three or four digit number that appears on either the front or back of a credit card. It is not included in the magnetic stripe data. It is provided as a fraud deterrent to ensure the card is physically present when a POS transaction is initiated. These codes are only required at authorization time. The following terms are used by various card issuers: CVV2 and CVC2 (three digits) used by VISA and MasterCard account numbers. CID (three digits) used by Discover account numbers. CID (four digits) used by American Express account numbers.
Card Verification Value (CVV)	An authentication procedure established by credit card companies to reduce fraud for internet transactions. It consists of requiring a card holder to enter the CVV number in at transaction time to verify that the card is on hand. The CVV code is a security feature for "card not present" transactions (e.g., Internet transactions), and now appears on most (but not all) major credit and debit cards. This new feature is a three- or four-digit code which provides a cryptographic check of the information embossed on the card. The CVV code is not part of the card number itself.
Cardholder	A customer doing business with a merchant using a payment card.
Cardholder Authentication Verification Value	A unique value transmitted by an issuer (or VISA on behalf of an issuer) in response to an authorization request message.
Cardholder Verification	<p>This verification validates that the person using the Chip Card is the true cardholder and the Card has not been lost or stolen.</p> <p>The Chip Card contains a list of cardholder verification methods (CVM) it supports, and the conditions under which they should be applied. The POS must navigate through this list and attempt the first method it finds for which the condition is met. If a method fails, the POS must check whether additional methods are allowed. For example, a list might contain the following:</p> <ul style="list-style-type: none"> • Signature • Online enciphered PIN • Offline enciphered PIN • Offline enciphered PIN and signature • Offline plaintext PIN • Offline plaintext PIN and signature • No CVM required
Cash Advance	A transaction that dispenses cash against a cardholder's account using rules specific to a client/merchant.
Cash Back	This is a service offered to retail customers whereby an amount is added to the total purchase price of a transaction the customer receives that amount in cash along with the purchase.

Table G-1 Glossary

Term	Definition
Cash Out	To remove the remaining cash funds available on the stored value card leaving the card with a balance of zero for the cash account.
CAT	See Customer Activated Terminal.
CAVV	See Cardholder Authentication Verification Value.
CDA (Combined DDA/Application Cryptogram Generation)	<p>Used in Offline processing. One of the three methods of Offline Data Authentication. This applies the same requirements of DDA with an additional step during Chip Card analysis so <u>it is the most secure option</u>. It offers protection against counterfeit and skimming and protects against man-in-the-middle attacks.</p> <p>The Chip Card generates a dynamic signature using card <u>private</u> key, in addition to the application cryptogram, to prove that the Chip Card authenticated during DDA was the same card that provided the application cryptogram.</p>
CDOL1 (Card Data Object List)	A list of data objects (tags and lengths) that are personalized on the Chip Card to make a decision on whether to approve or decline a transaction. They are read from the Card by the POS and used for the generation of the first cryptogram. The POS will send the values of these data objects together with the first Generate AC Command.
CDOL2 (Card Data Object List)	A list of data objects (tags and lengths) that are personalized on the Chip Card to make a decision on whether to approve or decline a transaction. They are read from the Card by the POS and used for the generation of the final cryptogram. The POS will send the values of these data objects together with the <u>second</u> Generate AC Command.
Certificate	The <u>public</u> key and identity of an entity together with some other information, rendered unforgeable by signing with the <u>private</u> key of the certification authority which issued that certificate.
Chargeback	A procedure where a cardholder or card issuer is disputing all or part of the amount of a credit or debit card transaction. A chargeback is therefore the act of taking back funds from a merchant for a disputed or improper transaction.
Check Reader	A device used to scan images of checks, according to legal specifications, for electronic clearing and settlement. Also known as check scanner.
Chip Card	<p>A Chip Card (also known as a Smart Card or ICC) is simply a plastic card containing an integrated circuit. It is used to perform EMV transactions on a POS and is instrumental in reducing fraud. It is usually powered by a reader and relies on a reader to function. Chip cards may be contact or contactless.</p> <p>A reader recognizes a Chip Card by the first digit of its Service Code, with one of the following values:</p> <ul style="list-style-type: none"> • “2” for international cards • “6” for domestic cards

Table G-1 Glossary

Term	Definition
CID (Cryptogram Information Data)	<p>A bit that is <u>set by the Chip Card</u> after Card Risk Management. It indicates the action to be performed by the POS.</p> <p>There are 3 types of actions indicated by the CID:</p> <ul style="list-style-type: none"> • AAC is generated whenever a card <u>declines</u> a transaction • ARQC is generated whenever a card requests <u>online authorization</u> • TC is generated whenever a card <u>approves</u> a transaction. <p>In addition, the card may also return a reason or advice code (e.g. service not allowed, or issuer authentication failed) to allow the terminal to perform any additional processing that may be required.</p>
Client	A company that has contracted to use the services provided by Heartland Payment Services.
Commercial Cards	Credit cards issued to businesses for travel, entertainment and other business expenses.
Consumer	See Cardholder.
Contact Chip Card	With a contact Chip Card, the embedded chip must come into physical contact with the chip reader for the payment transaction to occur. The Chip Card must remain in contact with the reader for the duration of the transaction. The terminal provides power to the chip to enable the chip to process.
Contactless Card	<p>These cards are also known as Proximity cards or NFC cards. These cards communicate with a reader through a RFID (radio frequency interface device) by waving or tapping the card on the designated area on the terminal. With a contactless Chip Card, the embedded chip must come within sufficient proximity of the reader (a maximum of 4cm) for information to flow between the chip and the acceptance terminal.</p> <p>The terminal provides power to the chip to enable the chip to process but the card does not have to remain in the device through the end of the transaction. This minimizes the amount of time the card must be held within proximity of a reader.</p> <p>Transmission of information is faster between the Card and the Terminal with contactless. And, additional steps may be performed after the card has left the proximity of the reader.</p> <p>The contactless card has an embedded RF antenna. It has longer life and higher reliability than a contact card.</p> <p>This contactless card method is the foundation for acceptance of mobile payments.</p>
Coordinated Universal Time	The time scale used as the basis of a coordinated dissemination of standard frequencies and time signals. UTC is formerly known as Greenwich Mean Time (GMT).
Corporate Cards	See Commercial Cards.
Counter-top POS	A category of POS devices that typically fits on a counter for use.
CPS	See Custom Payment Services.
CRIND	See Card Reader IN Dispenser.

Table G-1 Glossary

Term	Definition
Cryptogram	A numeric value that is the result of data elements entered into an algorithm. The result of this operation 'hides' the data and produces a 'digital signature' that can be used to verify the origin and integrity of the data by either a Chip Card or an Issuer. For EMV, a cryptogram is generated by the Chip Card in response to a Generate AC command and by the Issuer in the authorization response message.
Customer	See Cardholder.
Customer Activated Terminal	An unattended POS, which includes kiosks and fuel dispensers. Similar to AFD, ICR, & CRIND. Also known as Cardholder Activated Terminal.
Customer Payment Services	VISA's regulations for the information that must be submitted with each transaction. Transactions must meet CPS criteria in order to qualify for lowest transaction-processing fees available. This is similar to MasterCard's Merit system.
CVC2	See Card Validation Code or Card Verification Number.
CVN	See Card Verification Number.
CVV	See Card Verification Value.
CVV2	Three digit code used by Visa. See CVN.
Data Element	The identification of a data element based on the relative position of the data element within the message.
DDA (Dynamic Authentication Data)	An authentication technique used in offline chip transactions. This technique calculates a cryptogram for each transaction that is unique to the card and transaction. DDA protects against modification counterfeiting, cloning, and skimming.
DE	See Data Element.
Demand Deposit Account (DDA)	A merchant's checking account that is credited or debited with their deposits, fees and adjustments (also referred to as Direct Deposit Account).
Derived Unique Key Per Transaction	Reference standard X9.24, Retail Key Management for this definition. It is a key management technique in which for every transaction a unique key is used, which is derived from a fixed key. If a derived key is compromised, future and past transaction data are still protected since the next or prior keys cannot be easily determined.
Discover	Common name for DFS Services LLC.
Discretionary Data	An optional field where client data can be included within a transaction.
DSS	Data Security Standard. See PCI-DSS.
Dual Interface Card	A chip card that has contact and contactless interfaces. The card can be tapped or inserted into the POS device to initiate a transaction.
DUKPT	See Derived Unique Key Per Transaction.
E-PIN	Electronic PIN.

Table G-1 Glossary

Term	Definition
E3™	Heartland End-to-End Encryption. New technology offered by Heartland to allow encryption of card data from initial swipe or input at the POS through arrival at the Issuer. This system not only removes intrusion threats but it also greatly reduces the scope for PCI audits on the associated merchant POS software.
EBT	See Electronic Benefits Transfer.
EFT	Electronic Funds Transfer. A way of performing financial transactions electronically. The Pulse and Star networks are examples of EFT systems.
Electronic Benefits Transfer	EBT is an electronic system in the United States that allows state governments to provide financial and material benefits to authorized recipients via a plastic debit card. Common benefits provided via EBT are typically sorted into two general categories: Food Stamp and Cash Benefits.
Electronic PIN	E-PIN.
Electronic PIN Delivery	A service provided by Heartland Prepaid Services.
EMV Terminal or Reader	Also known as a Chip device. This is any point of sale device that is able to process chip transactions.
EMVCo	Europay International, MasterCard International and VISA International. EMVCo manages, maintains and enhances the EMV® Integrated Circuit Card Specifications for chip-based payment cards and acceptance devices, including POS terminals and ATMs. EMVCo establishes and administers testing and approval processes to evaluate compliance with the EMV Specifications. EMVCo is currently owned by American Express, JCB, MasterCard and VISA.
Encryption	A method of protecting data. Encryption transforms readable information using an algorithm (called a cipher) and makes it unintelligible to anyone except those who possess a key that converts the information back into readable form. See also end-to-end data encryption.
End-to-End Encryption	E3™. Refers to the Heartland Payment System process of converting card data to seemingly unreadable text from the moment it gets entered at the POS and through to the final authorization.
EPD	See Electronic PIN Delivery.
Face-to-Face Transactions	Transactions in which both the cardholder and the card are present at the point of sale.
Fallback	If a Chip-Card-capable POS is unable to read the data from the Chip Card, or if there are no mutually supported applications between the Card and the POS, the POS will 'fallback' to a magnetic stripe or manually keyed transaction. The resulting magnetic stripe or manually keyed transaction <u>must</u> be submitted to the Issuer for authorization <u>online</u> .
Financial Transaction	A message that either notifies the Host of the completion of a previously authorized payment transaction or that requests the approval and completion of the payment transaction by the Host causing the reconciliation totals to be increased.

Table G-1 Glossary

Term	Definition
Flexible Spending Accounts	A tax-advantaged financial account that can be set up through an employer in the United States. An FSA allows an employee to set aside a portion of his or her earnings to pay for qualified expenses as established in the cafeteria plan, most commonly for medical expenses or purchases.
Floor Limit	The payment amount above which credit and debit card transactions must be authorized. This amount is specified in each merchant's processing agreement.
FSA	See Flexible Spending Accounts.
General Services Administration	VISA Purchasing Card that is issued to federal government agencies by an Issuer contracted with the General Services Administration.
Global Trade Identification Number	The GTIN is an umbrella term used to describe the entire family of EAN/UCC data structures for trade item (products and services) identification. GTIN is a term only. It does not change existing standards. The UCC-12 code does not go away. The definition and information obtained from the Uniform Code Council, Inc. Refer to the organization's website at www.uc-council.org for more information.
Gratuity	This is an adjustment to a transaction for a tip.
GSA	See General Services Administration.
GTIN	See Global Trade Identification Number.
HDC	See Host Data Capture.
Health Reimbursement Arrangement	HRAs are Internal Revenue Service sanctioned programs that allow an employer to set aside funds to reimburse medical expenses paid by participating employees. Using an HRA yields tax advantages to offset health care costs for both employees as well as an employer.
Host Data Capture	Host Processing Mode whereby a POS utilizes the Heartland network to authorize, capture and adjust transactions. The POS maintains a batch which it reconciles with the Host. The Host will settle the batch on behalf of the POS.
HRA	See Health Reimbursement Arrangement.
IAC (Issuer Action Code)	Issuer-configured conditions or rules stored on the Chip Card. As a result of previous Chip & POS processing steps, the IACs are used by the POS, along with analysis of the TVR (Terminal Verification Results), to determine the action to be taken. Three types of codes are: <ul style="list-style-type: none"> • IAC Default: Specifies the Issuer's conditions (or rules) that cause a transaction to be rejected if it might have been approved online, but the terminal is unable to process the transaction online. • IAC DenialB Specifies the Issuer's conditions (or rules) that cause the denial of a transaction without attempt to go online. • IAC Online: Specifies the Issuer's conditions (or rules) that cause a transaction to be transmitted online.
ICC	Another name for a Chip Card or Chip application.
ICR	See Island Card Reader.
IEEE	See Institute of Electrical and Electronics Engineers.

Table G-1 Glossary

Term	Definition
IIAS	See Inventory Information Approval System.
IIN	See Bank Identification Number (BIN).
Incremental Authorization	Unique authorization for the Lodging Industry. Occurs when an authorization is adjusted above a threshold amount.
Information Security and Compliance (ISC)	ISC program used by Discover to implement and maintain efficient data security requirements and procedures. PCI is now used as a standard.
Inside POS	See Attended POS.
Institute of Electrical and Electronics Engineers	The IEEE is a non-profit professional association dedicated to advancing technological innovation related to electricity.
Integrated POS	A category of POS devices that typically combine several Point of Service locations in such industries as Retail, Parking, and Petroleum.
Integrated Services Digital Network	A set of standards for digital transmission over ordinary telephone copper wire as well as over other media. ISDN requires adapters at both ends of the transmission so an access provider also needs an ISDN adapter.
Interchange	The process by which all parties involved in a credit card transaction (processors, acquirers, and issuers) manages the processing, clearing and settlement of credit card transactions.
Interchange Fees	Fees paid by the acquirer (Heartland) to the card issuing bank to compensate for transaction-related costs.
International Organization for Standardization	See ISO.
International Telecommunication Union	An international organization within which governments and the private sector coordinate global telecom networks and services.
Inventory Information Approval System	This system identifies the qualified healthcare products being purchased by the cardholder at the point of sale. This system must be used for merchants utilizing auto-substantiation.
IP Address	Internet Protocol Address. A unique number assigned to any computer or printer that uses internet protocol.
ISA	Independent Sales Agent. See Agents.
ISC	See Information Security and Compliance.
ISDN	See Integrated Services Digital Network.
Island Card Reader	An ICR is an unattended device that accepts payment cards, typically used with fuel pumps at gasoline stations. Also known as AFD, CAT, CRINDS, DCR, and pay-at-the-pump.

Table G-1 Glossary

Term	Definition
ISO	International Organization for Standardization. Founded in 1946, ISO is an international organization composed of national standards bodies from over 75 countries. ANSI is a member of ISO. ISO has defined a number of important computer standards. Also an organization registered with VISA and sponsored by an acquiring bank to sell VISA card acceptance services. Can refer to an organization that works with and does business under the name of such a registered ISO. ISOs may also service merchant accounts once they are registered, dependent upon the contract with the acquirer. MasterCard uses the term "member service provider" to describe ISOs. However, it is common within the payments industry to use the term "ISO" when referring to independent sales organizations registered with either or both card brands.
Issuer	A company that enters into contractual relationships with consumers and/or businesses through the issuance of plastic credit/debit cards. An issuer is also known as a "card issuing center." Examples of issuers are Bank of America and Citi-Bank.
Issuer Authentication	<p>EMVCO: Validation of the issuer by the Chip Card to ensure the integrity of the authorization response.</p> <p>If the auth response contains an ARPC (Authorization Response Cryptogram), the Terminal sends the cryptogram to the Chip Card. The Card then performs Issuer Authentication by validating the response cryptogram to verify that the response came from the genuine Issuer.</p> <p>This process prevents criminals from circumventing the Chip Card's security features by simulating online processing and fraudulently approving a transaction to reset counters and indicators.</p> <p>If this step fails, subsequent transactions for the Chip Card will be sent online for authorization until Issuer Authentication is successful.</p>
Issuer Script	<p>This is a string of commands sent to the chip card from an issuer in a transaction response. The issuer can update securely the contents that are stored on chip cards without reissuing the cards, such as changing the cardholder's PIN, disabling the card, enabling a card, or changing authorization controls for the card.</p> <p>The terminal <u>must</u> send each of these commands unaltered to the Card.</p>
Issuing Bank	A federally insured financial institution that issues credit and debit cards. This is the cardholder's financial institution.
Issuing Host	The processing system that acts under the authority of the card issuer to receive a transaction and to approve funds to be given to the card acceptor or to guarantee checks.
ITU	See International Telecommunication Union.
JCB	Japan Credit Bureau. An independent card company originally established in Japan. JCB International Credit Card Company, Ltd. was established in Los Angeles in 1988 to issue credit cards as well.
Key Data	Data related to a security key. Reference standard X9.24, Retail Key Management.
Key Serial Number (KSN)	Used in PIN encryption/decryption.
Level of Issuance (LOI)	Series Number.

Table G-1 Glossary

Term	Definition
LLVAR	L is for length (LLL = 3 bytes). The field is parsed as three bytes of length and remaining of bytes as text content.
Load Amount	The amount of value that is added to the account. See Activation and Reload.
Load Value	To deposit funds into a cash account. See Activation and Replenish.
Local Pump Limit	This is the dollar amount that the POS has set for an ICR. The Pump will not exceed this amount regardless of the approved amount of the transaction. The customer can initiate another transaction if more fuel is desired.
Longitudinal Redundancy Character	The LRC is used as an error checking method by both Host and terminal to validate that the data was received without error.
LRC	See Longitudinal Redundancy Character.
LUHN Formula	The LUHN formula, also known as the MOD-10 Checksum, is used to generate and/or validate and verify the accuracy of account numbers.
Maestro	Maestro is a multi-national debit card service owned by MasterCard.
Magnetic Ink Character Recognition	Used on checks and includes the ABA number, account number, check sequence number, and special characters.
Magnetic Strip Reader	The device that a payment card is swiped through as the Track Data is read.
Magnetic Stripe	A strip of magnetic material on the back of credit cards which contains data identifying the cardholder, such as account number and cardholder name.
Manual Entry (Key Entered)	Card information is entered manually, or key-entered into a terminal, usually because the magnetic stripe could not be read or the card is not present at the time of sale (i.e., a mail/phone order merchant).
MAT	Manually Attended Terminal. See Inside POS.
MCC	See Merchant Category Code.
Member Service Provider	See ISO.
Merchant	Describes the business relationship where a cardholder interacts with the client.
Merchant Bank	A banking or financial institution that provides merchant services.
Merchant Category Code	Usually a four digit number that identifies the type of business in which a merchant is engaged by the type of goods or services it provides. VISA and MasterCard have specific numbers for each type of merchant business.
Merchant Discount Fee	A fee charged to a merchant for card processing services. This fee is usually represented in a percent format (example 2.25%). This merchant discount fee is used to determine part of a merchant's monthly processing charge.
Merchant Identification Number	A number assigned by an acquirer to identify each merchant for the purpose of reporting, processing and billing. All Heartland Payment Systems merchant numbers begin with a 65. All Heartland Payment Systems merchant numbers are 15 digits in length.
Merchant Service Fee	A fee assessed to a merchant for Heartland's value-add services such as the Merchant Center, 24/7 customer support and local servicing by Heartland Payment Systems Relationship Managers.
Merchant Services Provider	Handles the setup with the Front-End and Back-End Processors by Heartland.

Table G-1 Glossary

Term	Definition
Message	A set of data elements used to exchange information between a POS application and the Heartland system.
MICR	See Magnetic Ink Character Recognition.
MID	See Merchant Identification Number.
MIME	See Multipurpose Internet Mail Extensions.
MOD-10 Checksum	Modulus 10 Checksum. The "modulus 10" or mod 10" algorithm, also known as the Luhn formula, is a simple checksum formula used to validate a variety of identification numbers, such as credit card numbers.
MOTO/eCommerce	Mail Order/Telephone Order. A category of card-not-present transactions involving purchases made through mail order or telesales companies. In this type of transaction, the merchant typically has a card terminal and manually keys in required card information for transmission to the appropriate authorization network. Interchange rates for these transactions are among the highest.
MPLS	See Multi protocol Label Switching.
MSP	See Merchant Services Provider.
MSR	See Magnetic Strip Reader.
Multiprotocol Label Switching	A mechanism in high-performance telecommunications networks which directs and carries data from one network node to the next. It can encapsulate packets of various network protocols. MPLS is a highly scalable, protocol agnostic, data-carrying mechanism. Packet-forwarding decisions are made solely on the contents of the MPLS label, without the need to examine the packet itself. This allows creation of end-to-end circuits across any type of transport medium, using any protocol.
Multipurpose Internet Mail Extensions	An Internet standard that extends the format of email to support: Text in character sets other than ASCII Non-text attachments Message bodies with multiple parts Header information in non-ASCII character sets.
NACS	National Association of Convenience Stores. See PCATS.
NDA	Non-Disclosure Agreement. A confidentiality agreement signed by a customer and delivered to Heartland Payment Systems. Completion of NDA is required before receiving Heartland SDK, documentation and specifications.
NFC (Near Field Communication)	Wireless communication that allows data to be exchanged between devices (such as smart phones or mobile phones) that are centimeters apart. NFC-enabled mobile phones incorporate smart chips (called secure elements) that allow the phones to securely store payment and consumer account information.
NTS	Network Terminal Specification. Heartland proprietary transaction format (VAPS).
NWS	Heartland Host processing system supporting the Z01 and the POS 8583 specifications.
Offline Approval	A transaction that is approved at the point of transaction between the Chip Card and POS only, <u>without an authorization response from the Issuer.</u>

Table G-1 Glossary

Term	Definition
Offline Data Authentication	<p>This is a method the POS uses to authenticate a Chip Card using public-key cryptography. This authentication check protects against counterfeit and skimming.</p> <p>There are three methods of authentication that may be used:</p> <ul style="list-style-type: none"> • SDA • DDA • CDA <p>The method chosen is determined by the Issuer depending upon Chip Card capability. Only one method of offline data authentication is performed during a transaction.</p>
Offline Decline	<p>A transaction that is declined at the point of transaction between the Chip Card and POS only <u>without interaction with the Host and Issuer</u> (no authorization response from the Issuer).</p>
Offline Enciphered PIN	<p>A card verification method (CVM). In this method, the PIN is entered at the POS device. The POS encrypts the entered PIN before sending it to the Chip Card (using public key encryption). The Chip Card decrypts PIN and compares with the reference PIN in its memory.</p> <p>This method assists with prevention of counterfeit and skimming through the use of cryptography.</p> <p>Terminals that support Offline Enciphered PIN must also support the less secure Offline Plaintext PIN method.</p>
Offline PIN Verification	<p>The process whereby a cardholder-entered PIN is passed to the Chip Card for comparison to a PIN value stored secretly on the Card.</p> <p>This method assists with detection of a lost or stolen card.</p>
Offline Plaintext PIN	<p>A card verification method (CVM). The cardholder enters a PIN at the entry device. The entry device does not encrypt the PIN before sending it to the Chip Card</p> <p>This is commonly used by cards that cannot support the more secure Offline Enciphered PIN method.</p> <p>Terminals that support Offline Plaintext PIN must also support Offline Enciphered PIN method.</p>
Online Card Authentication	<p>Used in Online processing. When Chip Card and Terminal agree to send a transaction online, the Chip Card generates a cryptogram, the ARQC (Authorization Request Cryptogram). The Issuer may respond with an ARPC (Authorization Response Cryptogram).</p>
Open-to-Buy (OTB)	<p>An inquiry transaction used to request the unused credit amount available for the account at the time of the transaction. The OTB is the amount of credit left on an account. For example, before a purchase, a customer has \$500.00 OTB. The customer purchases \$200.00 worth of products. After the sale, the OTB returned in the response will be \$300.00.</p>

Table G-1 Glossary

Term	Definition
Owning Host	Owning Host refers to one of several instances of the VAPS application suite that "owns" a particular terminal. These instances are geographically separated across the country. Any of these Hosts can initiate the authorization of a financial request (1200) with the issuer, but the Owning Host is the only Host that can process the capture or collect for that transaction.
PA-DSS	See Payment Application Data Security Standard.
PAN	See Primary Account Number.
PAPB	See Payment Application Best Practices.
Partial Authorization	A process to complete a transaction if the full amount requested is not approved but a partial portion of the requested amount is approved. A merchant must be set up for this capability. If a merchant is set up for this capability, the Issuer response will contain the full amount requested or a lesser or partial amount authorized.
Pay at the Pump (PATP)	The ability to use a payment card at a self-service island for the petroleum industry. See ICR, AFD, CAT, or CRIND.
Payment Application Best Practices	PCI SSC took over management of PABP and renamed to PA-DSS. See PA-DSS.
Payment Application Data Security Standard	Established to help software vendors and others develop secure payment applications that do not store prohibited data and to ensure their compliance with the PCI DSS. Payment applications that are sold, distributed or licensed to third parties are subject to PA DSS requirements.
Payment Card Industry (PCI)	The PCI denotes the debit, credit, prepaid, and POS cards and associated businesses. The term is sometimes more specifically used to refer to the Payment Card Industry Security Standards Council (PCI SSC) an independent council originally formed with the goal of managing the ongoing evolution of the Payment Card Industry Data Security Standards.
Payment Card Industry Compliance Acceleration Program	Under the CAP plan, acquirers are required to validate Level 1 and Level 2 merchant compliance with PIN security. This means that Level 1 and Level 2 merchants must not use payment devices such as PIN pads, and encourages the use of unique encryption keys for every device. For Level 3 and Level 4 merchants, acquirers must establish a thorough compliance program for those merchants. According to VISA, as of November 1, 2007, acquirers whose transactions qualify for lower interchange rates available in the VISA and Interlink tiers must ensure that the merchants generating the transactions are PCI compliant in order to receive this benefit.
Payment Card Industry Data Security Standard (PCI-DSS)	The Payment Card Industry Data Security Standard is a worldwide information security standards assembled by the Payment Card Industry Security Standards Council (PCI SSC). The standard was created to help organizations that process card payments prevent credit card fraud through increased controls around data and its exposure to compromise. The standard applies to all organizations which hold, process, or pass cardholder information from any card branded with the logo of one of the card brands.
PCATS	See Petroleum Convenience Alliance for Technology Standards.
PCI	See Payment Card Industry.
PCI CAP	See Payment Card Industry Compliance Acceleration Program.

Table G-1 Glossary

Term	Definition
PCI-DSS	See Payment Card Industry Data Security Standard.
PED	See PIN Entry Device.
Peripheral	Any device that attaches to a computer and is controlled by its processor.
Personal Identification Number (PIN)	A PIN is used to help ensure that the cardholder is really the cardholder. It is typically a four digit number that is not found anywhere on the card or in track data.
Petroleum Convenience Alliance for Technology Standards	PCATS is an organization devoted to the development, maintenance, and implementation of standards for the convenience store and petroleum industries.
Piggyback Transaction	A Piggyback transaction allows the Capture from a previous Pre-authorization to be sent when the next transaction is sent to the Host. This helps to reduce the number of transactions sent reducing the cost to the merchant. Some transactions cannot be piggybacked. Fleet cards are not supported as part of a Piggyback transaction.
PIN	See Personal Identification Number.
PIN (Personal Identification Number)	For EMV, a secret number between 4 and 12 digits, known only by the Cardholder. It may be used during Cardholder Verification to confirm that the user of the card is the cardholder. The methods of PIN verification supported by EMV are: <ul style="list-style-type: none"> • Offline Plaintext PIN • Offline Enciphered PIN • Online Enciphered PIN For EMV processing, when either online or offline PIN is changed, they must be synchronized.
PIN Debit	A debit card transaction authorized by the cardholder using a PIN.
PIN Entry Device	PCI PED requirements were established to protect against fraud by ensuring the security of devices that process financial data. Approval is granted for devices that have been evaluated by an approved laboratory and determined to be compliant with PCI Security Requirements.
PIN Pad	Numeric key pad a consumer uses to enter a PIN when paying with a debit card.
PL	See Private Label.
PLR	See Private Label Retail.
Point of Purchase (POP)	See POS.
POS	Point of Sale or Point of Service. The hardware and software used to collect and transmit non-cash payments for goods and/or services. The device where retail sales occur and payment transactions are initiated.
POS 8583	A Heartland transaction format based on ISO 8583.
POS System	Point of Sale System or Point of Service System. The system that processes the transaction messages at a point of service. The system may handle other non-transaction functions also.

Table G-1 Glossary

Term	Definition
PPSE (Proximity Payment System Environment)	This contains a directory of all the contactless payment applications that exist on the ICC. PPSE is mandatory in all contactless implementations.
Pre-Authorization	A pre-authorization is a request for approval of an estimated purchase amount before the exact amount is known.
Prepaid Card	A card representing a proxy for a stored value/prepaid account where value resides that the consumer can use for the purchase of specific goods or services provided by a prepaid product's service provider.
Primary Account Number	The account number that appears on the face of payment cards.
Private Key	That key of an entity's asymmetric key pair that should only be used by that entity. In the case of a digital signature scheme, the private key defines the signature function.
Private Label Cards	Private Label products or services are typically those manufactured or provided by one company for offer under another company's brand. Private Label Payment Cards tend to be exclusive to one merchant or company and can include special features, such as a loyalty program.
Private Label Retail	Acronym for Heartland Retail's Private Label system.
Processor	An acquirer (such as Heartland Payment Systems) or an acquirer's agent that provides authorization, clearing or settlement services for merchants.
PROM	Programmable Read-Only Memory. A form of digital memory where the setting of each bit is locked. Such PROMs are used to store programs permanently. The key difference from a strict ROM is that the programming is applied after the device is constructed.
Proprietary Cards	See Private Label Cards.
Proximity Entry	This transaction occurs when a card is read by a proximity reader to capture the card information stored on the magnetic strip or chip.
PSE (Payment System Environment)	This is a method that could be used by the Terminal for application selection. PSE is optional but highly recommended to enhance the performance of the transaction. HPS recommends this method if it is supported by the Chip Card.
Public Key	This is the public component of an asymmetric key pair. The public key is usually publicly exposed and available to users (not secret). A certificate to prove its origin often accompanies it. All card brands utilize public keys and it is used for contact and contactless. It is used to counter act any cryptographic operation that is done by the Private Key. The Public Key has a mathematical link to the Private Key which makes them a key pair.
Purchase	This term represents both a sale transaction and an Authorization/Force Draft Capture transaction pair.
QRG	Quick-Reference Guide. A document or chart, used as a guide, to give a merchant quick reference to terminal operation procedures, such as batch settlement, offline/force entries, returns, etc.

Table G-1 Glossary

Term	Definition
QSR	Quick Service Restaurant. A specific type of restaurant characterized by fast-food cuisine and by mini-meal table service.
Random Selection	An EMV online-capable POS function that allows for the selection of transactions for online processing. Part of the Terminal Risk Management function.
RDC	See Remote Deposit Capture.
Real Time Clearing	RTC is used only with VISA transactions, and is an online transaction based clearing system for Petroleum Merchant Codes 5541 and 5542 only.
Recharge	See Replenish.
Reconciliation	The process of confirming the accuracy of partial or final totals by comparing totals from different systems.
Reference Account	The account is part of an application transaction as one criterion for assessing the suitability for granting the application for a new account.
Referral Messages	A "call" or "call center" response for an authorization. See also Voice Authorization Center.
Reload	To load an amount of funds into a stored value/prepaid account.
Remote Deposit Capture	A check deposit process whereby paper checks are converted into digital images for electronic clearing and settlement, through either electronic check or ACH systems.
Replenish	To deposit funds into either the cash or credit account.
Request	A message directing or instructing the receiver to perform a specified action and respond with the results of the action.
Response	A message that provides the results of an action requested by the sender.
Response Codes	Codes returned from the Issuer down to the POS. Codes verify that a particular transaction was accepted or reflect why it was declined.
Retransmits Message	A message that retransmits the same information as a prior message.
Retrieval	A request for a legible copy of a sales slip and/or other documentation relating to a credit or debit card transaction. This is the process or stage before a disputed transaction becomes a chargeback.
Reversal	A system initiated transaction request to cancel or reverse a recently completed transaction.
Reversal Transaction	A message that cancels the specified financial transaction that was previously reported as complete, causing the reconciliation totals to be decreased.
RFID	Radio Frequency Identification or Radio Frequency Input Device. Radio-frequency identification (RFID) is the use of an RFID tag applied to or incorporated into a product for the purpose of identification using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader.

Table G-1 Glossary

Term	Definition
RID (Registered Application Provider Identifier)	<p>This is part of the AID, 5 bytes in length, used to identify the scheme (e.g. Visa, MasterCard, etc). Functions of this field:</p> <ul style="list-style-type: none"> • Identifies the payment brand/application • Certification Authority Public Key Index (1 byte) – unique per RID • It is received from the Chip Card and is a pointer to the offline Public keys required for the transaction.
Routing Transit Number	<p>A routing transit number is a nine-digit bank code, used in the United States, which appears on the bottom of negotiable instruments such as checks identifying the financial institution on which is was drawn.</p>
RTC	<p>See Real Time Clearing.</p>
RTN	<p>See Routing Transit Number.</p>
Script Commands (Issuer Scripts)	<p>Issuers can return script commands to Chip Cards in online responses.</p> <p>Scripts can block chips, and change Chip Card offline limits. Scripts may not be relevant to the current transaction but are important for the continued functioning of the ICC.</p> <p>A script may contain commands not known to the terminal, but the terminal must deliver each command to the ICC individually.</p>
SDA (Static Data Authentication)	<p>One of the three methods of Offline Data Authentication. SDA authenticates SAD (static data) put on the card by the Issuer has not changed since the original personalization of the card. This is a Terminal function.</p> <p>Each Chip Card is personalized with an Issuer public key certificate and static signed application data composed of data elements personalized onto the card and signed with Issuer private key. The POS validates this cryptographic signature/value.</p> <p>During SDA processing, the Chip Card is passive and the Terminal is active. The Chip Card provides the data to be validated but the POS carries out all the computation.</p> <p>This protects against some types of counterfeit fraud, ensuring that the data has not been fraudulently altered since original chip card personalization. This does not protect against skimming.</p> <p>Each terminal should be able to store 6 certification authority public keys per Registered Application Provider Identifier (RID).</p>
Service Code	<p>The 3-digit code that follows the expiration date on the card's Track 2 magnetic stripe. In EMV it is used to identify the technology supported of the payment card being swiped. Values supported by HPS are as follows for the first digit:</p> <ul style="list-style-type: none"> • 2 = International (EMV Chip, debit or credit) • 6 = National use only (EMV Chip, debit or credit)
Service Fee	<p>See Merchant Service Fee.</p>
Session	<p>A series of messages exchanged between the POS application and the Heartland system during a single communication connection.</p>
Settlement	<p>The process of transferring funds for sales and credits between acquirers and issuers, including the final debiting of a cardholder's account and the crediting of a merchant's account.</p>

Table G-1 Glossary

Term	Definition
SIC	See Merchant Category Code.
Signature Debit	A VISA Debit or Debit MasterCard transaction authorized by a cardholder's signature.
Spectrum	A Heartland proprietary POS Transaction Format.
Split Tender	Split tender processing allows the total amount of a particular transaction to be split over two different methods of payment (electronic or non-electronic).
SSL	Secure Sockets Layer. A protocol for transmitting data over the internet. SSL uses a cryptographic system to provide safety and privacy of data.
STAN	System Trace Audit Number. Also known as the transaction sequence number.
Stand-In	The process of providing authorization services on behalf of an Issuer. If allowed, a processing network or POS may act as a stand-in for the authorizer to approve transactions.
State Withholding Tax Rate (SWT Rate)	The state withholding tax rate that is imposed for this transaction. The rates can vary by state.
SVS	Stored Value Solutions.
Swiped Entry	A transaction where a card is swiped (or passed) through a magnetic card reader or chip reader to capture card information stored on the magnetic strip or chip.
System/Device	A single hardware unit (device) or a group of units (system) that present messages to a Host processing system.
TAC (Terminal Action Codes)	<p>A set of action codes stored on the POS terminal for AIDs it supports. As a result of previous Chip & POS processing steps, these are used by the POS, along with analysis of the TVR, to determine the action to be taken.</p> <p>Three types of codes are:</p> <ul style="list-style-type: none"> • TAC Default: Specifies the acquirer's conditions that cause a transaction to be rejected if it might have been approved online, but the terminal is unable to process the transaction online. • TAC Denial: Specifies the acquirer's conditions that cause the denial of a transaction without an attempt to go online. • TAC Online: Specifies the acquirer's conditions that cause a transaction to be transmitted online.
TAG Format	This is the format method used to exchange information with the EMV Chip and the POS Terminal. Each Tag is assigned a Tag Number denoting the type of information it contains.
Tamper Resistant Security Module	Key encryption.
Taxpayer Identification Number	An identification number assigned to taxpayers by the IRS. The TIN for individuals is their social security number. The TIN for businesses is the employer identification number.

Table G-1 Glossary

Term	Definition
TC (Transaction Certificate)	Indicates the data input and output capabilities of the POS, such as: <ul style="list-style-type: none"> • methods supported for entering information from the card into the POS • methods (CVM) for verifying the identity of the cardholder • methods for authenticating the card and whether or not the POS has the ability to capture a card
TDC	See Terminal Data Capture.
TDES	See Triple Data Encryption System.
Terminal	See POS system.
Terminal Based Terminal	A system where the merchant's transactions are stored within the terminals memory. The terminal stores the transactions until the merchant closes the batch.
Terminal Data Capture	The terminal captures all transactions and forwards transaction detail to the Heartland Host via a batch upload transaction. The terminal captures all other credit card transactions offline without contacting the Host.
Terminal Identification Number	A number assigned to the physical terminal device to identify its attributes to the processor. Each terminal within a merchant location has a separate TID.
Terminal Risk Management	This step performs various checks to protect the Issuer, acquirer, and system from fraud. Checks include the following: <ul style="list-style-type: none"> • Floor Limit • Random Selection • Velocity Checking The results of these checks are stored by the Terminal in the TVR for later use. Note: The terminal may randomly select some transactions for online processing.
Third Party Processors	An independent processor that is contracted with by a Bank or Processor to conduct a part of transaction processing.
TID	See Terminal Identification Number.
TIN	See Taxpayer Identification Number.
TPP	See Third-Party Processors.
Track Data	Track Data is the information encoded within the magnetic strip on the back of a credit card which is read by the electronic reader within the terminal or point-of-sale (POS) system.
Transaction	A set of messages to complete a processing action.
Transaction Fee	A fee charged to a merchant each time a transaction is processed, which dials into the authorization system, such as a sale or authorization only.
Triple Data Encryption System	In cryptography, Triple DES is the common name for the Triple Data Encryption Algorithm. It is so named because it applies the Data Encryption Standard (DES) cipher algorithm three times to each data block. Triple DES provides a relatively simple method of increasing the key size of DES to protect against brute force attacks, without requiring a completely new block cipher algorithm.
TRSM	See Tamper Resistant Security Module.
TSYS	Total System Services. Vital. Back-end processor.

Table G-1 Glossary

Term	Definition
TVR (Terminal Verification Result)	<p>The TVR is an EMV Tag containing the status of several different EMV checks and functions performed by the PINPad, Kernel, or the POS.</p> <p>It consists of a series of indicators used to record the results of offline processing between the Chip and the POS (e.g. card is expired, cardholder verification has failed, or online floor limits have been exceeded).</p> <p>The POS compares the TVR values with the IACs (on the Card) and TACs (on the POS) to determine if the transaction should be approved, declined, or sent online to the Issuer. Upon that determination the POS requests a cryptogram from the Chip Card (TC, ARQC or AAC).</p>
UAT	See User Acceptance Test.
Unload Value	See cash out.
User Acceptance Test (UAT)	Testing for business users to attempt to make a system fail, taking into account the type of organization it will functioning in. It is checking and verifying the system in the context of the business environment it will operate in.
UTC	See Coordinated Universal Time.
Value Added Reseller	A company that adds features or services to an existing product and resells it (usually to end-users) as an integrated product or complete turn-key solution.
ValueLink	ValueLink is a prepaid or stored value card and is a funds-valued card issued to a cardholder by a merchant.
VAPS	Value Added Payment System. Proprietary Heartland Host processing system supporting the NTS and the POS 8583 specifications.
VAR	See Value Added Reseller.
VDDF	Variable Discretionary Data Field. See Discretionary Data.
Version	May refer to a document version or software version. Each time a new document or software revision is released, a revision version number is incremented.
VIP	VISANet Integrated Payment System. VISA's main transaction processing system.
VNP	VISANet Processors. An entity that is directly connected to VISA through a VISANet Extended Access Server (VEAS).
Voice Authorization	An authorization center operated either by issuers or by processors on behalf of issuers. It is used to respond to requests for authorizations for purchases from merchants who do not have terminals, or whose terminals are not functioning properly, or for transactions for which special assistance is required.
Void	An attendant initiated transaction request to cancel a recently completed transaction.
VSAT	<p>Very Small Aperture Terminal.</p> <p>The hardware and software located at a merchant's location that allows POS communications via satellite.</p>
Z01	A Heartland Proprietary POS Transaction Format.
Zero Balance	See cash out.

Appendix H: Revision History

Revision History

Version	Release Date	Revisions
15.1	Mar-2015	New document.
15.1.1	May-2015	<p>General release clarification updates:</p> <ul style="list-style-type: none"> Identified corrections and clarification updates. Added new BIN ranges. Added missing requirement for PayPal card type.
15.2	Oct-2015	<p>General release clarification updates:</p> <ul style="list-style-type: none"> 1.4 Payment Application Data Security Standards (PA-DSS), pg. 20: Added requirement for strong cryptography. New section 2.1 Address Verification Service, pg. 21. New section 2.2 Chargeback Protected Limits, pg. 23: Moved from specifications. New section 2.3 No Signature Required, pg. 24: Moved from specifications. Separated the previous Chapter 5: EMV Processing Overview, pg. 91 into the following chapters and restructured and applied updates: <ul style="list-style-type: none"> Chapter 6: EMV Development Overview, pg. 101 Chapter 7: EMV Terminal Interface, pg. 109 Chapter 8: EMV Parameter Interface, pg. 153 A.2 MasterCard BIN Ranges, pg. 235: MasterCard mandate that new bin range 222100–272099 be supported. Table B-1 Connexus Product Codes, pg. 251: Added the following codes: <ul style="list-style-type: none"> Added off-road (non-taxable) gasoline (3 specific grades, 2 generic grades) codes 325–329) Added 90 Octane Recreational Fuel (330) Added Hydrogen H35 (331) and Hydrogen H70 (332) New section B.2 MasterCard Purchasing Product Codes, pg. 264. Table C-1 Additional Receipt Requirements by Card Types, pg. 290: Clarification for offline decline receipts. Deleted replicated information regarding Expiration Date. New Appendix E: EMV Field Definitions, pg. 295: Moved from specifications and modified format and content for clarification. New Appendix F: EMV PDL Data Examples, pg. 320. Table E-31 Issuer Script Results, pg. 310: Correction from alphanumeric to binary. <p>PIF 1124 – Drop Tank:</p> <ul style="list-style-type: none"> Table 3-1 Card Brand References to BIN Ranges and Track Data, pg. 27: Added card type for Drop Tank. New section 3.7 Drop Tank Card, pg. 43 with Track Format subsections. New section A.9 Drop Tank, pg. 247.

Revision History

Version	Release Date	Revisions
16.1	Mar-2015	<p>General release clarification updates:</p> <ul style="list-style-type: none"> • Global change: Removed GSB reference throughout. • Global change: Replaced () with Heartland Gift Card. • Table 5-11 Full vs. Partial Credit Transactions, pg. 98: Clarification from vendor inquiry. • Table 5-12 Full vs. Partial Debit Transactions, pg. 99: Clarification from vendor inquiry. • 6.1.2 Contactless Devices, pg. 101: MasterCard has replaced the reference to contactless from 'PayPass' to 'MasterCard Contactless'. Updated version numbers. • 6.3.1 Test Requirements, pg. 103: MasterCard has replaced the reference to contactless from 'PayPass' to 'MasterCard Contactless'. • Table 6-2 VSDC Testing, pg. 104: Updated version numbers. • Table 6-4 AEIPS Testing, pg. 105: Updated version numbers. • B.4 Heartland Product Codes for VISA Fleet Processing, pg. 270: Correction, Heartland product codes for VISA Fleet processing have been reinstated and new comment added. • Table E-22 Form Factor Indicator, pg. 306: Tag 9F6E. Deleted reference to MSD contactless. MasterCard contactless utilizes the reference to this 9F6E field as MasterCard Contactless in Table E-41 Third Party Data, pg. 315. • Correction of examples for FFC6, FFC7, and FFC8. Labeling these field identifiers as Heartland-defined. <ul style="list-style-type: none"> – Table E-34 Terminal Action Code – Default, pg. 312 – Table E-35 Terminal Action Code – Denial, pg. 312 – Table E-36 Terminal Action Code – Online, pg. 313 • Table E-41 Third Party Data, pg. 315: Tag 9F6E. MasterCard has changed the reference to contactless from 'PayPass' to 'MasterCard Contactless'.