Part IV

Cardholder, Attendant, and Acquirer Interface

11 Cardholder and Attendant Interface

11.1 Language Selection

The terminal shall support at least the local language which is the language of common usage in the terminal's locality or region. To display the standard messages defined in section 11.2, the terminal shall support the common character set as defined in Annex B, and should support the relevant character set defined in the corresponding part of ISO/IEC 8859 when necessary.

Depending on the local environment and business conditions, the terminal should support multiple languages for displaying the set of messages described in section 11.2 to the cardholder. A terminal supporting multiple languages may need additional parts of ISO/IEC 8859 to display characters relevant to these languages.

ISO/IEC 8859 consists of several parts, each part specifying a set of up to 191 characters coded by means of a single 8-bit byte. Each part is intended for use for a group of languages. All parts of ISO/IEC 8859 contain a common set of 95 characters, coded between '20' (hexadecimal) and '7E' (hexadecimal) as shown in Annex B. This common character set allows the terminal to display Application Label(s) and messages in multiple languages using Latin characters without using diacritic marks (see example in Annex B).

If the terminal supports multiple languages, selection of the language to be used for displaying cardholder messages is performed prior to the issuance of the GET PROCESSING OPTIONS command; otherwise the local language is used to display cardholder messages. Language selection may be performed either by using the EMV language selection process (based on language preference indicated by the card), or by using a proprietary process.

If the EMV language selection process is used, the following rules apply:

- If the card does provide a Language Preference data object, the terminal shall compare the card's language preferences with the languages it supports:
  - If a match is found, the language with the highest preference shall be used for the messages displayed to the cardholder. (The Language Preference data object is coded so that the language with the highest preference appears first and the lowest preference appears last.)
  - If no match is found, the terminal shall allow the cardholder to select their preferred language if it has a means for allowing such selection. Messages shall be displayed to the cardholder in the selected language or, if the terminal has no means of offering language selection to the cardholder, in the local language.

- If the card does not provide a Language Preference data object, the terminal shall allow the cardholder to select their preferred language if it has a means for allowing such selection. Messages shall be displayed to the cardholder in the selected language or, if the terminal has no means of offering language selection to the cardholder, in the local language.

Alternatively terminals may support a proprietary language selection process which is outside the scope of EMV. If such a proprietary language selection process is used, the EMV language selection process shall not be performed. The language selected using the proprietary process shall be used throughout the transaction.

Messages should be displayed to the attendant in the language of the attendant's choice or, if the terminal has no means of offering language selection to the attendant, in the local language. Messages displayed to the attendant and cardholder may be displayed in different languages if supported by the terminal.

11.2 Standard Messages[8]

To ensure consistency in the messages displayed by the terminal and the PIN pad, the following set of messages (or their equivalent meaning) shall be used in the languages of preference for the cardholder and attendant.

The messages shall be uniquely identified by a two-character message identifier as shown below. The message identifier is for identification purposes only and is not to be displayed to the cardholder or attendant.

- Values '01' – '13' (hexadecimal) are described in Table 8.
- Values '14' – '3F' (hexadecimal) are reserved for assignment according to this specification.
- Values '40' – '7F' (hexadecimal) are reserved for use by the individual payment systems.
- Values '80' – 'BF' (hexadecimal) are reserved for use by acquirers.
- Values 'C0' – 'FF' (hexadecimal) are reserved for use by issuers.

There may be additional messages displayed for the attendant or cardholder.

Note: Messages may be displayed simultaneously, such as 'Incorrect PIN' and 'Enter PIN'.

[8] This specification does not imply that the terminal shall support a set of standard messages in English.

Message Identifier	Message	Definition
'01'	(AMOUNT)	Indicates the transaction amount to both the cardholder and attendant.
'02'	(AMOUNT) OK?	Invites a response from the cardholder indicating agreement or disagreement with the displayed transaction amount. Agreement or disagreement should be denoted by pressing the 'Enter' or 'Cancel' keys, respectively.
'03'	APPROVED	Indicates to the cardholder and attendant that the transaction has been approved.
'04'	CALL YOUR BANK	Indicates to the cardholder or attendant to contact the issuer or acquirer, as appropriate, such as for voice referrals.
'05'	CANCEL OR ENTER	When used with the 'ENTER PIN' message, instructs the cardholder to validate PIN entry by pressing the 'Enter' key or to cancel PIN entry by pressing the 'Cancel' key.
'06'	CARD ERROR	Indicates to the cardholder or attendant a malfunction of the card or a non-conformance to answer-to-reset.
'07'	DECLINED	Indicates to the cardholder and attendant that the online or offline authorisation has not been approved.
'08'	ENTER AMOUNT	Instructs the cardholder at an unattended terminal or the attendant at an attended terminal to enter the amount of the transaction. Confirmation or cancellation of amount entry should be denoted by pressing the 'Enter' or 'Cancel' keys, respectively.
'09'	ENTER PIN	Invites the cardholder to enter the PIN for the first and subsequent PIN tries. An asterisk is displayed for each digit of the PIN entered.
'0A'	INCORRECT PIN	Indicates that the PIN entered by the cardholder does not match the reference PIN.

Table 8: Standard Messages

Message Identifier	Message	Definition
'0B'	INSERT CARD	Instructs to insert the ICC into the IFD. Correct insertion should be noted by displaying the message 'PLEASE WAIT' to reassure the cardholder or attendant that the transaction is being processed.
'0C'	NOT ACCEPTED	Indicates to the cardholder and attendant that the application is not supported or there is a restriction on the use of the application; for example, the card has expired.
'0D'	PIN OK	Indicates that offline PIN verification was successful.
'0E'	PLEASE WAIT	Indicates to the cardholder and attendant that the transaction is being processed.
'0F'	PROCESSING ERROR	Displayed to the cardholder or attendant when the card is removed before the processing of a transaction is complete, or when the transaction is aborted because of a power failure, or when the system or terminal has malfunctioned, such as communication errors or time-outs.
'10'	REMOVE CARD	Instructs to remove the ICC from the IFD.
'11'	USE CHIP READER	Instructs to insert ICC into the IC reader of the IFD, when the IC and magnetic stripe readers are not combined.
'12'	USE MAG STRIPE	Instructs to insert ICC into the magnetic stripe reader of the terminal after IC reading fails, when the IC and magnetic stripe readers are not combined.
'13'	TRY AGAIN	Invites the cardholder to re-execute the last action performed.

Table 8: Standard Messages, continued

11.3 Application Selection

A terminal shall support application selection using the 'List of AIDs' method as described in Book 1 section 12.3.3. A terminal may support application selection using the payment systems directory as described in Book 1.

A terminal supporting more than one application should offer the cardholder the ability to select an application and confirm the selection proposed by the terminal. Applications supported by both the ICC and the terminal shall be presented to the cardholder in priority sequence according to the card's Application Priority Indicator, if present, with the highest priority listed first.

A terminal allowing cardholder selection and confirmation shall create a list of ICC applications that are supported by the terminal as described in Book 1 and shall display:

- the Application Preferred Name(s), if present and if the Issuer Code Table Index indicating the part of ISO/IEC 8859 to use is present and supported by the terminal (as indicated in Additional Terminal Capabilities)
- otherwise, the Application Label(s), by using the common character set of ISO/IEC 8859 (see Annex B)

A terminal offering the cardholder neither the ability to select nor confirm a selection shall determine those applications supported by both the card and the terminal that may be selected without confirmation of the cardholder according to Application Priority Indicator, if present. The terminal shall select the application with the highest priority from those.

If the card returns SW1 SW2 other than '9000' in response to the SELECT command, indicating that the transaction cannot be performed with the selected application:

- A terminal allowing cardholder selection and confirmation should display the 'TRY AGAIN' message and shall present to the cardholder the list of applications supported by both the ICC and the terminal without this application.
- A terminal offering neither cardholder selection nor confirmation shall select the application with the next highest priority among those supported by both the ICC and the terminal that may be selected without cardholder confirmation.

If no application can be selected, the terminal should display the 'NOT ACCEPTED' message and shall terminate the transaction.

The application used for the transaction shall be identified on the transaction receipt by the partial Application PAN (or the full PAN, if allowed by payment system rules) and the AID.

11.4 Receipt

Whenever a receipt is provided, it shall contain the AID in addition to the data required by payment system rules. The AID shall be presented as hexadecimal characters.

12 Acquirer Interface

12.1 Message Content

Messages typically flow from the terminal to the acquirer and from the acquirer to the issuer. Message content may vary from one link to another, with data being added to enrich the message at the acquirer. To enrich the message, the acquirer stores static point of transaction data elements [9] based on the Merchant Identifier and/or the Terminal Identifier. These data elements are implicitly referred to by the Merchant/Terminal Identifier(s) and therefore may be absent in terminal to acquirer messages.[10] In the following sections, this implicit relationship is indicated by a specific condition: 'Present if the Merchant/Terminal Identifier(s) do not implicitly refer to the (data element)'.

Message content may also vary due to data requested by the acquirer but not the issuer, such as for transaction capture or audit. The ICC stored data elements are implicitly known by the issuer [11] based on the AID and/or PAN and therefore may be absent in acquirer to issuer messages. In the following sections, this implicit relationship is indicated by a specific condition: 'Present if requested by the acquirer'.

Data requirements may differ depending on terminal operational control, which is recognised through a specific condition: 'Present for Terminal Type = xx'. For example, Merchant Identifier is provided only for a merchant-controlled terminal (Terminal Type = '2x').

An authorisation message shall be used when transactions are batch data captured. A financial transaction message shall be used when online data capture is performed by the acquirer. An offline advice shall be conveyed within batch data capture when supported. An online advice or a reversal message shall be transmitted real-time, similarly to an authorisation or financial transaction message.

[9] These data elements indicate point of transaction acceptance characteristics that rarely change, such as Merchant Category Code, Acquirer Identifier, or Terminal Country Code.

[10] At a minimum, all data listed in the Card Risk Management Data Object Lists and the TDOL shall be available at the point of transaction.

[11] These data elements reflect card acceptance conditions and restrictions that rarely change, such as Application Interchange Profile, Application Usage Control, or Issuer Action Codes.

This section describes requirements associated with ICC transactions and distinguishes between existing data elements used for magnetic stripe transactions and those created specifically for ICC transactions. Data elements referred to as existing are those defined in ISO 8583:1987, though actual terminal message contents are usually specific to (each of) the acquiring system(s) to which the terminal is connected. For ICC transactions, the values of all card-originated data contained in acquirer interface messages shall be as read from the chip. It is not acceptable to populate the messages partially with data read from the chip and partially with data read from the magnetic stripe (if also read).

For informational purposes, Annex C describes an example of converting ICC-related and terminal-related data into message data elements.

12.1.1 Authorisation Request

An authorisation request should convey the data elements contained in Table 9 and Table 10 subject to the specified conditions.

Table 9 contains the data elements specifically created for an ICC transaction.

Data Element	Condition
Application Cryptogram * [12]	
Application Interchange Profile *	
Application Transaction Counter *	
CID	The CID does not need to be forwarded to the issuer; the presence of this data element is defined in the respective payment system network interface specifications.
CVM Results	
IFD Serial Number	Present if Terminal Identifier does not implicitly refer to IFD Serial Number
Issuer Application Data *	Present if provided by ICC in GENERATE AC command response
Payment Account Reference (PAR)	Present if provided by ICC, at the discretion of the acquirer, subject to payment system requirements.
Terminal Capabilities	
Terminal Type	
Token Requestor ID	If in ICC, the presence of this data element is at the discretion of the acquirer, subject to payment system requirements.
TVR *	
Unpredictable Number*	Present if input to application cryptogram calculation

Table 9: ICC-specific Authorisation Request Data Elements

[12] Data elements marked with an asterisk are the minimum set of data elements to be supported in authorisation request and response messages, as well as clearing messages, for ICC transactions.

Table 10 contains the data elements necessary for an ICC transaction.

Data Element	Condition
Acquirer Identifier	Present for Terminal Type = '1x' or '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single acquirer
Amount, Authorised * [13]	
Amount, Other *	Present if cashback used for current transaction
Application Effective Date	Present if in ICC
Application Expiration Date	Present if not in Track 2 Equivalent Data
Application PAN *	Present if not in Track 2 Equivalent Data
Application PAN Sequence Number *	Present if in ICC
Enciphered PIN Data	Present if CVM performed is 'enciphered PIN for online verification'
Merchant Category Code	Present for Terminal Type = '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single merchant category
Merchant Identifier	Present for Terminal Type = '2x' if Terminal Identifier does not implicitly refer to a single merchant
POS Entry Mode	
Terminal Country Code *	
Terminal Identifier	
Track 2 Equivalent Data	Present if in ICC
Transaction Currency Code *	
Transaction Date *	
Transaction Time	Present if Terminal Type = 'x2', 'x3', 'x5', or 'x6'
Transaction Type *	

Table 10: Existing Authorisation Request Data Elements

[13] Data elements marked with an asterisk are the minimum set of data elements to be supported in authorisation request and response messages, as well as clearing messages, for ICC transactions.

12.1.2 Financial Transaction Request

A financial transaction request should convey the data elements contained in Table 11 and Table 12 subject to the specified conditions.

Table 11 contains the data elements created specifically for an ICC transaction.

Data Element	Condition
Application Cryptogram * [14]	
Application Interchange Profile *	
Application Transaction Counter *	
Application Usage Control	Present if requested by acquirer
CID	The CID does not need to be forwarded to the issuer; the presence of this data element is defined in the respective payment system network interface specifications.
CVM List	Present if requested by acquirer
CVM Results	
IFD Serial Number	Present if Terminal Identifier does not implicitly refer to IFD Serial Number
Issuer Action Code - Default	Present if requested by acquirer
Issuer Action Code - Denial	Present if requested by acquirer
Issuer Action Code - Online	Present if requested by acquirer
Issuer Application Data *	Present if provided by ICC in GENERATE AC command response
Payment Account Reference (PAR)	Present if provided by ICC, at the discretion of the acquirer, subject to payment system requirements.
Terminal Capabilities	
Terminal Type	
Token Requestor ID	If in ICC, the presence of this data element is at the discretion of the acquirer, subject to payment system requirements.
TVR *	
Unpredictable Number *	Present if input to application cryptogram calculation

Table 11: ICC-specific Financial Transaction Request Data Elements

Table 12 contains the data elements necessary for an ICC transaction.

[14] Data elements marked with an asterisk are the minimum set of data elements to be supported in authorisation request and response messages, as well as clearing messages, for ICC transactions.

Data Element	Condition
Acquirer Identifier	Present for Terminal Type = '1x' or '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single acquirer
Amount, Authorised * [15]	Present if final transaction amount is different from authorised amount
Amount, Other *	Present if cashback used for current transaction
Application Effective Date	Present if in ICC
Application Expiration Date	Present if not in Track 2 Equivalent Data
Application PAN *	Present if not in Track 2 Equivalent Data
Application PAN Sequence Number *	Present if in ICC
Enciphered PIN Data	Present if CVM performed is 'Enciphered PIN for online verification'.
Issuer Country Code	Present if requested by acquirer
Merchant Category Code	Present for Terminal Type = '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single merchant category
Merchant Identifier	Present for Terminal Type = '2x' if Terminal Identifier does not implicitly refer to a single merchant
POS Entry Mode	
Terminal Country Code *	
Terminal Identifier	
Track 2 Equivalent Data	Present if in ICC
Transaction Amount *	
Transaction Currency Code *	
Transaction Date *	
Transaction Time	Present if Terminal Type = 'x2', 'x3', 'x5', or 'x6'
Transaction Type *	

Table 12: Existing Financial Transaction Request Data Elements

[15] Data elements marked with an asterisk are the minimum set of data elements to be supported in authorisation request and response messages, as well as clearing messages, for ICC transactions.

12.1.3 Authorisation or Financial Transaction Response

Authorisation and financial transaction responses should convey the data elements contained in Table 13 and Table 14 subject to the specified conditions.

Table 13 contains the data elements specifically created for an ICC transaction.

Data Element	Condition
Issuer Authentication Data * [16]	Present if online issuer authentication performed
Issuer Script * • Issuer Script Template 1 • Issuer Script Template 2	Present if commands to ICC are sent by issuer
Last 4 Digits of PAN	If the ICC has an affiliated payment token, the presence of this data element is dependent on payment system requirements.
Payment Account Reference (PAR)	Present if ICC has PAR assigned, subject to payment system requirements.

Table 13: ICC-specific Authorisation or Financial Transaction Response Data Elements

Table 14 contains the data elements necessary for an ICC transaction.

Data Element	Condition
Acquirer Identifier	Present for Terminal Type = '1x' or '2x' if in request message
Amount, Authorised	
Authorisation Code	Present if transaction is approved
Authorisation Response Code	
Terminal Identifier	
Transaction Date	
Transaction Time	

Table 14: Existing Authorisation or Financial Transaction Response Data Elements

[16] Data elements marked with an asterisk are the minimum set of data elements to be supported in authorisation request and response messages, as well as clearing messages, for ICC transactions.

12.1.4 Financial Transaction Confirmation

A financial transaction confirmation should convey the data elements contained in Table 15 and Table 16 subject to the specified conditions.

Table 15 contains the data elements specifically created for an ICC transaction.

Data Element	Condition
Issuer Script Results	Present if script commands to ICC are delivered by terminal
TC or AAC	

Table 15: ICC-specific Financial Transaction Confirmation Data Elements

Table 16 contains the data elements necessary for an ICC transaction.

Data Element	Condition
Terminal Identifier	

Table 16: Existing Financial Transaction Confirmation Data Elements

12.1.5 Batch Data Capture

Batch data capture should convey the data elements contained in Table 17 and Table 18 subject to the specified conditions. Message Type is used to distinguish between an offline advice and a financial record.

Table 17 contains the data elements specifically created for an ICC transaction.

Data Element	Condition
Application Cryptogram * [17] (i.e., TC, ARQC, or AAC)	ARQC may be used as TC substitute
Application Interchange Profile *	
Application Transaction Counter *	
Application Usage Control	Present if requested by acquirer
CID	The CID does not need to be forwarded to the issuer; the presence of this data element is defined in the respective payment system network interface specifications.
CVM List	Present if requested by acquirer
CVM Results	
IFD Serial Number	Present if Terminal Identifier does not implicitly refer to IFD Serial Number
Issuer Action Code - Default	Present if requested by acquirer
Issuer Action Code - Denial	Present if requested by acquirer
Issuer Action Code - Online	Present if requested by acquirer
Issuer Application Data *	Present if provided by ICC in GENERATE AC command response
Issuer Script Results	Present if script commands to ICC are delivered by terminal
Payment Account Reference (PAR)	Present if provided by ICC, at the discretion of the acquirer, subject to payment system requirements.
Terminal Capabilities	
Terminal Type	
Token Requestor ID	If in ICC, the presence of this data element is at the discretion of the acquirer, subject to payment system requirements.
TVR *	
Unpredictable Number *	Present if input to application cryptogram calculation

Table 17: ICC-specific Batch Data Capture Data Elements

[17] Data elements marked with an asterisk are the minimum set of data elements to be supported in authorisation request and response messages, as well as clearing messages, for ICC transactions.

Table 18 contains the data elements necessary for an ICC transaction.

Data Element	Condition
Acquirer Identifier	Present if for Terminal Type = '1x' or '2x' Merchant Identifier or Terminal Identifier does not implicitly refer to a single acquirer
Amount, Authorised * [18]	Present if final transaction amount is different from authorised amount
Amount, Other *	Present if cashback used for current transaction
Application Effective Date	Present if in ICC
Application Expiration Date	
Application PAN *	
Application PAN Sequence Number *	Present if in ICC
Authorisation Code	Present if transaction is approved
Authorisation Response Code	
Issuer Country Code	Present if requested by acquirer
Merchant Category Code	Present for Terminal Type = '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single merchant category
Merchant Identifier	Present for Terminal Type = '2x' if Terminal Identifier does not implicitly refer to a single merchant
Message Type	
POS Entry Mode	
Terminal Country Code *	
Terminal Identifier	
Transaction Amount *	
Transaction Currency Code *	Present if Merchant Identifier or Terminal Identifier does not implicitly refer to a single transaction currency accepted at point of transaction

Table 18: Existing Batch Data Capture Data Elements

[18] Data elements marked with an asterisk are the minimum set of data elements to be supported in authorisation request and response messages, as well as clearing messages, for ICC transactions.

Data Element	Condition
Transaction Date *	
Transaction Time	
Transaction Type *	

Table 18: Existing Batch Data Capture Data Elements, continued

12.1.6 Reconciliation

A reconciliation should convey the existing data elements necessary for ICC transactions and subject to the specified conditions.

Data Element	Condition
Acquirer Identifier	Present for Terminal Type = '1x' or '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single acquirer
Amount, Net Reconciliation	
Merchant Identifier	Present for Terminal Type = '2x' if Terminal Identifier implicitly does not refer to a single merchant
Reconciliation Currency Code	Present if Merchant Identifier or Terminal Identifier does not implicitly refer to a single transaction currency accepted at point of transaction
Terminal Identifier	
Transactions Number (per transaction type)	
Transactions Amount (per transaction type)	

Table 19: Existing Reconciliation Data Elements

12.1.7 Online Advice

An online advice should convey the data elements contained in Table 20 and Table 21 subject to the specified conditions.

Table 20 contains the data elements specifically created for an ICC transaction.

Data Element	Condition
Application Cryptogram (TC or AAC)	
Application Interchange Profile	
Application Transaction Counter	
CID	
CVM Results	
IFD Serial Number	Present if Terminal Identifier does not implicitly refer to IFD Serial Number
Issuer Application Data	Present if provided by ICC in GENERATE AC command response
Issuer Script Results	Present if script commands to ICC are delivered by terminal
Payment Account Reference (PAR)	Present if provided by ICC, at the discretion of the acquirer, subject to payment system requirements.
Terminal Capabilities	
Terminal Type	
Token Requestor ID	If in ICC, the presence of this data element is at the discretion of the acquirer, subject to payment system requirements.
TVR	
Unpredictable Number	Present if input to application cryptogram calculation

Table 20: ICC-specific Online Advice Data Elements

Table 21 contains the data elements necessary for an ICC transaction.

Data Element	Condition
Acquirer Identifier	Present for Terminal Type = '1x' or '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single acquirer
Amount, Authorised	Present if final transaction amount is different from authorised amount
Application Effective Date	Present if in ICC
Application Expiration Date	Present if not in Track 2 Equivalent Data
Application PAN	Present if not in Track 2 Equivalent Data
Application PAN Sequence Number	Present if in ICC
Authorisation Response Code	
Merchant Category Code	Present for Terminal Type = '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single merchant category
Merchant Identifier	Present for Terminal Type = '2x' if Terminal Identifier does not implicitly refer to a single merchant
POS Entry Mode	
Terminal Country Code	Present if Terminal Identifier or IFD Serial Number does not implicitly refer to a single terminal country
Terminal Identifier	
Track 2 Equivalent Data	Present if in ICC
Transaction Amount	
Transaction Currency Code	Present if Merchant Identifier or Terminal Identifier does not implicitly refer to a single transaction currency accepted at point of transaction
Transaction Date	
Transaction Time	Present if Terminal Type = 'x2', 'x3', 'x5', or 'x6'
Transaction Type	

Table 21: Existing Online Advice Data Elements

12.1.8 Reversal

A reversal should convey the data elements contained in Table 22 and Table 23 subject to the specified conditions.

Table 22 contains the data elements specifically created for an ICC transaction.

Data Element	Condition
Application Interchange Profile	
Application Transaction Counter	
IFD Serial Number	Present if Terminal Identifier does not implicitly refer to IFD Serial Number
Issuer Application Data	Present if provided by ICC in GENERATE AC command response
Issuer Script Results	Present if script commands to ICC are delivered by terminal
Payment Account Reference (PAR)	Present if provided by ICC, at the discretion of the acquirer, subject to payment system requirements.
Terminal Capabilities	
Terminal Type	
Token Requestor ID	If in ICC, the presence of this data element is at the discretion of the acquirer, subject to payment system requirements.
TVR	

Table 22: ICC-specific Reversal Data Elements

Table 23 contains the data elements necessary for an ICC transaction.

Data Element	Condition
Acquirer Identifier	Present for Terminal Type = '1x' or '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single acquirer
Application Expiration Date	Present if not in Track 2 Equivalent Data
Application PAN	Present if not in Track 2 Equivalent Data
Application PAN Sequence Number	Present if in ICC
Authorisation Response Code	
Merchant Category Code	Present for Terminal Type = '2x' if Merchant Identifier or Terminal Identifier does not implicitly refer to a single merchant category
Merchant Identifier	Present for Terminal Type = '2x' if Terminal Identifier does not implicitly refer to a single merchant
Original Data Elements	Present if available at terminal
POS Entry Mode	
Terminal Country Code	Present if Terminal Identifier or IFD Serial Number does not implicitly refer to a single terminal country
Terminal Identifier	
Track 2 Equivalent Data	Present if in ICC
Transaction Amount	
Transaction Currency Code	Present if Merchant Identifier or Terminal Identifier does not implicitly refer to a single transaction currency accepted at point of transaction
Transaction Date	
Transaction Time	Present if Terminal Type = 'x2', 'x3', 'x5', or 'x6'
Transaction Type	

Table 23: Existing Reversal Data Elements

12.2 Exception Handling

This section describes exception conditions that may occur during real-time authorisation, financial transaction, or online advice and the associated actions the terminal shall perform.

In this section, the term 'authorisation' applies to authorisation messages as well as financial transaction messages.

12.2.1 Unable to Go Online

During transaction processing, the terminal may send an authorisation request to the acquirer due to at least one of the following conditions:

- Online-only terminal type
- Attendant action (for example, merchant suspicious of cardholder)
- Terminal risk management parameters set by the acquirer
- Terminal action analysis in comparing TVR with Issuer Action Code - Online and Terminal Action Code - Online (see Book 3 section 10.7)
- Card action analysis via its response to the first GENERATE AC command: CID indicates ARQC returned (see Book 3)
- Terminal action analysis after first GENERATE AC with an XDA failure (see section 6.3.2.2.4)

If the terminal is unable to process the transaction online, as described in Book 3, the terminal shall compare the TVR with both Terminal Action Code - Default and Issuer Action Code - Default to determine whether to accept or decline the transaction offline and, if the card returned an ARQC in the first GENERATE AC response, the terminal shall issue the second GENERATE AC command to the ICC indicating its decision:

- If the terminal accepts the transaction, it shall set the Authorisation Response Code to 'Unable to go online, offline accepted'.
- If the terminal declines the transaction, it shall set the Authorisation Response Code to 'Unable to go online, offline declined'.

The result of card risk management performed by the ICC is made known to the terminal through the return of the CID indicating either a TC for an approval or an AAC for a decline.

12.2.2 Downgraded Authorisation

When the authorisation response received by the terminal does not contain the Issuer Authentication Data, the terminal shall not execute the EXTERNAL AUTHENTICATE command and shall set the 'Issuer authentication was performed' bit in the Transaction Status Information (TSI) to 0, as described in Book 3. The terminal shall continue processing based on the Authorisation Response Code returned in the response message as described in section 6.3.6.

Note: If the acquirer or the intermediate network is unable to support ICC messages, the terminal should send messages compliant with current payment system specifications. Payment systems will determine compliance requirements for message content.

12.2.3 Authorisation Response Incidents

The authorisation response may not be correctly received by the terminal. The following incidents may occur:

- Response not received or received too late (for example, network failure, time-out)
- Response with invalid format or syntax
- Request not received by the authorisation host (for example, network failure)

After repeat(s)[19], if any, of the authorisation request, the terminal shall process the transaction as being unable to go online. As described in Book 3, the terminal shall compare the TVR with both Terminal Action Code - Default and Issuer Action Code - Default to determine whether to accept or decline the transaction offline and, if the card returned an ARQC in the first GENERATE AC response, the terminal shall issue the second GENERATE AC command to the ICC indicating its decision:

- If the terminal accepts the transaction, it shall set the Authorisation Response Code to 'Unable to go online, offline accepted'.
- If the terminal declines the transaction, it shall set the Authorisation Response Code to 'Unable to go online, offline declined'.

The result of card risk management performed by the ICC is made known to the terminal through the return of the CID indicating either a TC for an approval or an AAC for a decline.

When online data capture is performed by the acquirer, the terminal shall send a reversal message regardless of the final decision on the transaction (to ensure that if the authorisation host received a request and sent a response, the transaction is cancelled). If the transaction is finally approved offline (TC returned by the ICC), the terminal shall create a financial record to be forwarded to the acquirer.

[19] Acquirers or networks may require that an authorisation request be repeated in the event that a valid response is not obtained. Requirements for such repeat(s) are outside the scope of EMV.

12.2.4 Script Incidents

The Issuer Script may not be correctly processed. The following incidents may occur:

- Script length error: The response message contains one (or more) Issuer Script(s) whose cumulative total length is larger than the script length supported by the network or terminal.
- Script with incorrect format or syntax: The terminal is unable to correctly parse the Issuer Script(s) into single Script Commands, as specified in Book 3.

If either of these incidents occurs, the terminal shall terminate the processing of the Issuer Script in which the incident occurred, shall read if possible the Script Identifier (when present) and shall report it as not performed in the Issuer Script Results of the financial transaction confirmation or batch data capture message. The terminal shall continue processing any subsequent Issuer Script.

Book 3 Annex E gives some examples of TVR and TSI bit setting following script processing.

12.2.5 Advice Incidents

If the terminal supports advices but is unable to create an advice when requested by the card in the CID returned in the response to the GENERATE AC command as described in section 6.3.7, the terminal shall terminate the transaction.

Part V

Annexes

Annex A Coding of Terminal Data Elements

This annex provides the coding for the Terminal Type, Terminal Capabilities, Additional Terminal Capabilities, CVM Results, Issuer Script Results, and Authorisation Response Code.

Coding of data (bytes or bits) indicated as RFU shall be '0'.

Neither the terminal nor the card shall check the data indicated as RFU.

A1 Terminal Type

Environment	Operational Control Provided By:		
	Financial Institution	Merchant	Cardholder [20]
Attended			
Online only	11	21	—
Offline with online capability	12	22	—
Offline only	13	23	—
Unattended			
Online only	14	24	34
Offline with online capability	15	25	35
Offline only	16	26	36

Table 24: Terminal Type

Terminal Types '14', '15', and '16' with cash disbursement capability (Additional Terminal Capabilities, byte 1, 'cash' bit = 1) are considered to be ATMs. All other Terminal Types are not considered to be ATMs.

[20] For the purpose of this specification, an attended cardholder-controlled terminal is considered to be a non-existent category.

Examples of terminal types are:

- Attended and controlled by financial institution: Branch terminal
- Attended and controlled by merchant: Electronic cash register, portable POS terminal, stand-alone POS terminal, host concentrating POS terminal
- Unattended and controlled by financial institution: ATM, banking automat
- Unattended and controlled by merchant: Automated fuel dispenser, pay telephone, ticket dispenser, vending machine
- Unattended and controlled by cardholder: Home terminal, personal computer, screen telephone, Payphones, Digital interactive Television / Set Top Boxes.

See Annex E for more detailed examples.

A2 Terminal Capabilities

This section provides the coding for Terminal Capabilities:

- Byte 1: Card Data Input Capability
- Byte 2: CVM Capability
- Byte 3: Security Capability

In the tables:

- A '1' means that if that bit has the value 1, the corresponding 'Meaning' applies.
- An 'x' means that the bit does not apply.

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

Table 25: Terminal Capabilities Byte 1 – Card Data Input Capability

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
x	x	x	1	x	x	x	x	Enciphered PIN for offline verification (RSA ODE)
x	x	x	x	1	x	x	x	No CVM Required
x	x	x	x	x	1	x	x	Online Biometric
x	x	x	x	x	x	1	x	Offline Biometric
x	x	x	x	x	x	x	1	Enciphered PIN for offline verification (ECC ODE)

Table 26: Terminal Capabilities Byte 2 – CVM Capability

If the terminal supports a CVM of signature, the terminal shall be an attended terminal (Terminal Type = 'x1', 'x2', or 'x3') and shall support signature capture by paper or electronic means (Additional Terminal Capabilities, byte 4, 'Print or electronic, attendant' bit = 1).

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	1	x	x	XDA
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	x	0	RFU

Table 27: Terminal Capabilities Byte 3 – Security Capability

A3 Additional Terminal Capabilities

This section provides the coding for Additional Terminal Capabilities:

- Byte 1: Transaction Type Capability
- Byte 2: Transaction Type Capability
- Byte 3: Terminal Data Input Capability
- Byte 4: Terminal Data Output Capability
- Byte 5: Terminal Data Output Capability

In the tables:

- A '1' means that if that bit has the value 1, the corresponding 'meaning' applies.
- An 'x' means that the bit does not apply.

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 [21]
x	x	x	x	x	1	x	x	Transfer [22]
x	x	x	x	x	x	1	x	Payment [23]
x	x	x	x	x	x	x	1	Administrative

Table 28: Add'l Term. Capabilities Byte 1 – Transaction Type Capability

[21] For the purpose of this specification, an inquiry is a request for information about one of the cardholder's accounts.

[22] For the purpose of this specification, a transfer is a movement of funds by a cardholder from one of its accounts to another of the cardholder's accounts, both of which are held by the same financial institution.

[23] For the purpose of this specification, a payment is a movement of funds from a cardholder account to another party, for example, a utility bill payment.

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Cash Deposit [24]
x	0	x	x	x	x	x	x	RFU
x	x	0	x	x	x	x	x	RFU
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

Table 29: Add'l Term. Capabilities Byte 2 – Transaction Type 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 characters 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

Table 30: Add'l Term. Capabilities Byte 3 – Terminal Data Input Capability

[24] A cash deposit is considered to be a transaction at an attended or unattended terminal where a cardholder deposits cash into a bank account related to an application on the card used.

b8	b7	b6	b5	b4	b3	b2	b1	Meaning [25]
1	x	x	x	x	x	x	x	Print or electronic, attendant 1: Paper receipt, attendant, or Paper Signature, or Electronic Signature
x	1	x	x	x	x	x	x	Print or electronic, cardholder 1: Paper receipt, cardholder, or Electronic Receipt, 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

Table 31: Add'l Term. Capabilities Byte 4 – Term. Data Output Capability

The code table number refers to the corresponding part of ISO/IEC 8859.

[25] If the terminal is attended (Terminal Type = 'x1', 'x2', or 'x3') and there is only one printer and electronic receipts are not supported, the 'Print or electronic, attendant' bit shall be set to 1 and the 'Print or electronic, cardholder' bit shall be set to 0.

If the terminal is attended and there is only one display, the 'Display, attendant' bit shall be set to 1 and the 'Display, cardholder' bit shall be set to 0.

If the terminal is unattended (Terminal Type = 'x4', 'x5', or 'x6'), the 'Print or electronic, attendant' and 'Display, attendant' bits shall be set to 0.

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

Table 32: Add'l Term. Capabilities Byte 5 – Term. Data Output Capability

The code table number refers to the corresponding part of ISO/IEC 8859.

A4 CVM Results

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 recognised or not supported

Table 33: CVM Results

A5 Issuer Script Results

Byte 1	Script Result	Most significant nibble: Result of the Issuer Script processing performed by the terminal: '0' = Script not performed '1' = Script processing failed '2' = Script processing successful Least significant nibble: Sequence number of the Script Command '0' = Not specified '1' to 'E' = Sequence number from 1 to 14 'F' = Sequence number of 15 or above
Bytes 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.

Table 34: Issuer Script Results

Bytes 1–5 are repeated for each Issuer Script processed by the terminal.

A6 Authorisation Response Code

When transmitted to the card, the Authorisation Response Code obtained from the authorisation response message shall include at least the following:

- Online approved
- Online declined
- Referral (initiated by issuer)
- Capture card

In addition, the terminal shall be able to generate and transmit to the card the new response codes listed in Table 35 when transactions are not authorised online:

Authorisation Response Code	Value
Offline approved	Y1
Offline declined	Z1
Unable to go online, offline approved	Y3
Unable to go online, offline declined	Z3

Table 35: Authorisation Response Codes

The terminal shall never modify the Authorisation Response Code returned in the response message.[26]

A7 Biometric Terminal Capabilities

This section provides the coding for Biometric Terminal Capabilities:

- Byte 1: Offline Biometric Capabilities
- Byte 2: Online Biometric Capabilities
- Byte 3: RFU

If any of the Offline Biometric Capabilities is supported in Biometric Terminal Capabilities, then the 'Offline Biometric' bit of the Terminal Capabilities shall be set to 1. If any of the Online Biometric Capabilities is supported in Biometric Terminal Capabilities, then the 'Online Biometric' bit of the Terminal Capabilities shall be set to 1.

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Facial biometric for offline verification
x	1	x	x	x	x	x	x	Finger biometric for offline verification
x	x	1	x	x	x	x	x	Iris biometric for offline verification
x	x	x	1	x	x	x	x	Palm biometric for offline verification
x	x	x	x	1	x	x	x	Voice biometric for offline verification
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 36: Biometric Term. Cap. Byte 1 – Offline Biometric Capabilities

[26] The card's final decision is reflected in the Cryptogram Information Data and not in the Authorisation Response Code.

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Facial biometric for online verification
x	1	x	x	x	x	x	x	Finger biometric for online verification
x	x	1	x	x	x	x	x	Iris biometric for online verification
x	x	x	1	x	x	x	x	Palm biometric for online verification
x	x	x	x	1	x	x	x	Voice biometric for online verification
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 37: Biometric Term. Cap. Byte 2 – Online Biometric Capabilities

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	x	x	x	x	x	x	x	RFU
x	0	x	x	x	x	x	x	RFU
x	x	0	x	x	x	x	x	RFU
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

Table 38: Biometric Terminal Capabilities Byte 3 – RFU

Annex B Common Character Set

Table 39 shows the character set common to all parts of ISO/IEC 8859:

				b8	0	0	0	0	0	0	0	0
				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		00	01	02	03	04	05	06	07
0	0	0	0	00			SP	0	@	P	`	p
0	0	0	1	01			!	1	A	Q	a	q
0	0	1	0	02			“	2	B	R	b	r
0	0	1	1	03			#	3	C	S	c	s
0	1	0	0	04			$	4	D	T	d	t
0	1	0	1	05			%	5	E	U	e	u
0	1	1	0	06			&	6	F	V	f	v
0	1	1	1	07			‘	7	G	W	g	w
1	0	0	0	08			(	8	H	X	h	x
1	0	0	1	09			)	9	I	Y	i	y
1	0	1	0	10			*	:	J	Z	j	z
1	0	1	1	11			+	;	K	[	k	{
1	1	0	0	12			,	<	L	\	l	|
1	1	0	1	13			-	=	M	]	m	}
1	1	1	0	14			.	>	N	^	n	~
1	1	1	1	15			/	?	O	_	o	

Table 39: Common Character Set

The following is an example of the use of the common character set to display the 'APPROVED' message in French without supporting the part of ISO/IEC 8859 that allows the relevant diacritic marks to be displayed.

If the terminal supports Part 1 of ISO/IEC 8859 (the Latin 1 alphabet) and supports the display of the standard messages in French, when a card indicates in its Language Preference that French is the preferred language, the terminal can display the 'APPROVED' message as 'ACCEPTÉ', using the appropriate diacritic marks.

If the terminal does not support Part 1 of ISO/IEC 8859 (the Latin 1 alphabet) but supports Part 8 (the Hebrew alphabet), the terminal is still able to support the display of the standard messages in French by using the common character set. When a card indicates in its Language Preference that French is the preferred language, the terminal can display the 'APPROVED' message as 'ACCEPTE', without the use of diacritic marks. The cardholder should be able to comprehend the message.

Annex C Example Data Element Conversion

For the data elements listed in section 12.1, Table 40 illustrates an example of the relationship between:

- the ICC-related data described in Book 3 and the terminal-related data described in this specification
- the data transmitted in messages as defined in ISO 8583:1987 and bit 55 from ISO 8583:1993

This does not imply that ISO 8583 is required as the message standard.

Tag	ICC Data	Bit	Message Data Name
'9F01'	Acquirer Identifier	32	Acquiring Institution Identification Code
'9F02' or '81'	Amount, Authorised	4 30	Amount, Transaction (authorisation) Amount, Original Transaction (batch data capture, financial transaction)
'9F04' or '9F03'	Amount, Other	54	Additional Amounts
'9F26'	Application Cryptogram	55	ICC System-Related Data
'5F25'	Application Effective Date	see note	Date, Effective (YYMM only)
'5F24'	Application Expiration Date	14	Date, Expiration (YYMM only)
'82'	Application Interchange Profile	55	ICC System-Related Data
'5A'	Application PAN	2	PAN
'5F34'	Application PAN Sequence Number	23	Card Sequence Number
'9F36'	Application Transaction Counter	55	ICC System-Related Data
'9F07'	Application Usage Control	55	ICC System-Related Data

Table 40: Data Element Conversion

Note: Only defined in ISO 8583:1993.

Tag	ICC Data	Bit	Message Data Name
'89'	Authorisation Code	38	Authorisation Identification Response
'8A'	Authorisation Response Code	39	Response Code
'9F27'	Cryptogram Information Data	55	ICC System-Related Data
'8E'	CVM List	55	ICC System-Related Data
'9F34'	CVM Results	55	ICC System-Related Data
—	Enciphered PIN Data	52	PIN Data
'9F1E'	IFD Serial Number	see note	Card Accepting Device (CAD) Management
'9F0D'	Issuer Action Code - Default	55	ICC System-Related Data
'9F0E'	Issuer Action Code - Denial	55	ICC System-Related Data
'9F0F'	Issuer Action Code - Online	55	ICC System-Related Data
'9F10'	Issuer Application Data	55	ICC System-Related Data
'91'	Issuer Authentication Data	55	ICC System-Related Data
'5F28'	Issuer Country Code	20	Country Code, PAN Extended
'71' or '72'	Issuer Script Template 1 or 2	55	ICC System-Related Data
—	Issuer Script Results	55	ICC System-Related Data
'9F25'	Last 4 Digits of PAN		See EMV Tokenisation Framework
'9F15'	Merchant Category Code	18	Merchant Type
'9F16'	Merchant Identifier	42	Card Acceptor Identification
'9F24'	Payment Account Reference (PAR)		See EMV Tokenisation Framework
'9F39'	POS Entry Mode	22	POS Entry Mode (pos. 1–2)
'5F30'	Service Code	40	Service Code
'9F33'	Terminal Capabilities	see note	CAD Management

Table 40: Data Element Conversion, continued

Note: Only defined in additional/private data element of ISO 8583:1987 or ISO 8583:1993.

Tag	ICC Data	Bit	Message Data Name
'9F1A'	Terminal Country Code	19	Acquiring Institution Country Code
		43	Card Acceptor Name/Location (if terminal/acquirer countries are different)
'9F1C'	Terminal Identification	41	Card Acceptor Terminal Identification
'9F35'	Terminal Type	see note	CAD Management
'9F19'	Token Requestor ID		See EMV Tokenisation Framework
'95'	TVR	55	ICC System-Related Data
'57'	Track 2 Equivalent Data	35	Track 2 Data
—	Transaction Amount	4	Amount, Transaction
'5F2A'	Transaction Currency Code	49	Currency Code, Transaction
'9A'	Transaction Date	13	Date, Local Transaction (MMDD only)
'9F21'	Transaction Time	12	Time, Local Transaction
'9C'	Transaction Type	3	Processing Code (pos. 1–2)
'9F37'	Unpredictable Number	55	ICC System-Related Data

Table 40: Data Element Conversion, continued

Note: Only defined in additional/private data element of ISO 8583:1987 or ISO 8583:1993.

Annex D Informative Terminal Guidelines

D1 Terminal Usage

Because terminals are installed in a variety of environments and locations, it is recognised that throughout the world different attempts have been made to group relevant guidelines into different categories:

- Climatic conditions where the terminal is used (climate controlled, outdoor, indoor)
- Mechanical conditions (such as vibration, shocks, drop-tests)
- Electronic restrictions (such as isolation, security, penetration)

The guidelines have been documented in industry standards established in Europe and the United States (see section D5 for informative references).

D2 Power Supply

D2.1 External Power Supply

The power supply provides the required voltage and current to all components of the terminal. The power supply should comply with the relevant national safety regulations.

D2.2 Battery Requirements

An internal battery is used to prevent loss of sensitive data residing in the terminal in case of power supply breakdown.

For portable terminals, the battery supports necessary terminal functions (see EMV Contact Interface Specification for power/current requirements).

Power consumption can be reduced by energising the terminal automatically at card insertion.

D3 Keypad

To prevent characters printed on the keys of the keypad from becoming illegible after a while, precautions should be taken so that they:

- have wear-resistant lettering
- are able to function in normal operating environment including resistance to soft drink spills, alcohol, detergents, gasoline, etc.
- when operated as outdoor terminals, can resist the temperature ranges commonly encountered

D4 Display

To cater for visually disabled people, characters on the display are visible in all lighting conditions (bright overhead or dim diffuse light) and the size of the characters is large enough to be read from a distance of 1 meter.

D5 Informative References

IEC 950:1991	Safety of information technology equipment, including electrical business equipment, second edition. (Amendment 1-1992) (Amendment 2-1993)
IEC 801-2:1991	Electromagnetic compatibility for industrial-process measurement and control equipment – Part 2: Electrostatic discharge requirements, second edition
IEC 802-3:1984	Electromagnetic compatibility for industrial-process measurement and control equipment – Part 3: Radiated electromagnetic field requirements, first edition
IEC 801-4:1988	Electromagnetic compatibility for industrial-process measurement and control equipment – Part 4: Electrical fast transient/burst requirements, first edition
IEC 68-2-5:1975	Basic environmental testing procedures – Part 2: Tests – test Sa: Simulated solar radiation at ground level, first edition

IEC 68-2-6:1982	Basic environmental testing procedures – Part 2: Tests – test Fc and guidance: Vibration (sinusoidal), fifth edition. (Amendment 1: 1983) (Amendment 2: 1985)
IEC 68-2-11:1981	Basic environmental testing procedures – Part 2: Tests – test Ka: Salt mist, third edition
IEC 68-2-27:1987	Basic environmental testing procedures – Part 2: Tests – Guidance for damp heat tests, third edition
IEC 68-2-32:1975	Basic environmental testing procedures – Part 2: Tests – test Ed: Free fall, second edition. (Amendment 2-1990 incorporating Amendment 1)
EN 60-950:1988	Safety of information technology equipment including electrical business equipment
EN 41003:1993	Particular safety requirements for equipment to be connected to telecommunication networks
UL 1950:1993	Safety of information technology equipment including electrical business equipment
NF C 20-010:1992	Degrees of protection provided by enclosure (IP code)
NF C 98-310:1989	Financial transaction terminals [27]
NF C 98-020:1986	Telephone and telematic equipment. Electromagnetic compatibility

[27] This standard applies only to stand-alone terminals.

Annex E Examples of Terminals

For informational purposes only, this annex provides some examples of the physical and functional characteristics of terminals. Each example describes the setting of Terminal Type, Terminal Capabilities, and Additional Terminal Capabilities according to the specific terminal characteristics. This annex does not establish any requirements as such.

E1 Example 1 – POS Terminal or Electronic Cash Register

Characteristics	Example 1
Physical:	
Keypad	Attendant keypad (numeric and function keys) + PIN pad
Display	One for attendant One for cardholder
Printer	Yes for attendant
Magnetic stripe reader	Yes
IC reader	Yes
Functional:	
Language selection	Supports Part 1 of ISO/IEC 8859
Transaction type	Goods, cashback
SDA, DDA	Yes
Cardholder verification	Offline PIN, signature
Card capture	No
Online capable	Yes
Offline capable	Yes

Table 41: Example of POS Terminal or Electronic Cash Register

The coding of the terminal-related data for this example is the following:

- Terminal Type = '22'
- Terminal Capabilities, byte 1 = 'E0' (hexadecimal)
byte 2 = 'A0' (hexadecimal)
byte 3 = 'C0' (hexadecimal)
- Additional Terminal Capabilities, byte 1 = '50' (hexadecimal)
byte 2 = '00' (hexadecimal)
byte 3 = 'B0' (hexadecimal)
byte 4 = 'B0' (hexadecimal)
byte 5 = '01' (hexadecimal)

E2 Example 2 – ATM

Characteristics	Example 2
Physical:	
Keypad	PIN pad + function keys
Display	Yes for cardholder
Printer	Yes for cardholder
Magnetic stripe reader	Yes
IC reader	Yes
Functional:	
Language selection	Supports Part 5 of ISO/IEC 8859
Transaction type	Cash, inquiry, transfer, payment
SDA	No
Cardholder verification	Online PIN
Card capture	Yes
Online capable	Yes
Offline capable	No

Table 42: Example of ATM

The coding of the terminal-related data for this example is the following:

- Terminal Type = '14'
- Terminal Capabilities, byte 1 = '60' (hexadecimal)
  byte 2 = '40' (hexadecimal)
  byte 3 = '20' (hexadecimal)
- Additional Terminal Capabilities, byte 1 = '8E' (hexadecimal)
  byte 2 = '00' (hexadecimal)
  byte 3 = 'B0' (hexadecimal)
  byte 4 = '50' (hexadecimal)
  byte 5 = '05' (hexadecimal)

E3 Example 3 – Vending Machine

Characteristics	Example 3
Physical:	
Keypad	Function keys
Display	No
Printer	No
Magnetic stripe reader	Yes
IC reader	Yes
Functional:	
Language selection	No
Transaction type	Goods
SDA, DDA	Yes
Cardholder verification	No
Card capture	No
Online capable	No
Offline capable	Yes

Table 43: Example of Vending Machine

The coding of the terminal-related data for this example is the following:

- Terminal Type = '26'
- Terminal Capabilities, byte 1 = '60' (hexadecimal)
  byte 2 = '00' (hexadecimal)
  byte 3 = 'C0' (hexadecimal)
- Additional Terminal Capabilities, byte 1 = '40' (hexadecimal)
  byte 2 = '00' (hexadecimal)
  byte 3 = '10' (hexadecimal)
  byte 4 = '00' (hexadecimal)
  byte 5 = '00' (hexadecimal)

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