jPOS Common Message Format

jPOS.org

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Contents

Preface

Financial transaction networks have historically relied on ISO 8583 as the dominant message interchange standard. Over time, multiple revisions of the standard have emerged—notably the 1987, 1993, 2003, and 2023 editions—each reflecting evolving functional and operational requirements. In parallel, individual networks and schemes have introduced their own variants, extensions, and interpretations, frequently relying on private-use or national fields to accommodate functionality not formally defined in earlier versions of the standard.

ISO 8583:2003 represents a significant consolidation effort. It is largely a superset of earlier versions, formalizing many data elements and use cases that were previously implemented through private fields or network-specific conventions. It also formally defines composite data elements structured as typed datasets—each carrying a dataset identifier, a length prefix, and a payload encoded as either BER-TLV (identifiers `0x01`–`0x70`) or a Dataset Bitmap (DBM, identifiers `0x71`–`0xFE`). ISO 8583:2023 extends this foundation with new composite fields covering electronic commerce authentication, card acceptor data, verification data, and ICC-related data. Despite this progress, real-world deployments remain heterogeneous: legacy versions persist, private extensions are still widely used, and interoperability across networks continues to require non-trivial message transformation.

The jPOS Common Message Format (CMF) addresses this reality by introducing a normalized, internal message representation decoupled from any specific ISO 8583 version or network variant. CMF v3.0 provides a stable, deterministic format that captures the semantic intent of a transaction independently of how it is encoded or transported on the wire. This version aligns with ISO 8583:2023 and fully documents the composite dataset fields introduced in ISO 8583:2003, providing precise wire-level specifications suitable for any implementation—whether based on jPOS or otherwise.

Within jPOS-based systems—such as jCard and jPTS—CMF acts as a canonical interchange format. Network-specific details are handled at the system boundaries through dedicated converters:

Source Stations, which transform incoming network messages into CMF.

Destination Stations, which transform CMF into the format required by the target network.

This architectural separation allows core processing, routing, validation, and business logic to operate on a consistent message model, while isolating network idiosyncrasies to well-defined integration points. CMF v3.0 builds on this approach with explicit versioning, clearer encoding rules, and full coverage of ISO 8583:2023 composite fields, enabling long-term maintainability across diverse payment networks and protocols.

Nomenclature

bold Used sparingly to highlight critical terms, decisions, or emphasized warnings that require special attention.

italic Indicates emphasis, variable values, or to distinguish terms on first introduction. Used for stylistic clarity or soft emphasis.

`monospaced` Denotes literal code, configuration parameters, file paths, or command-line inputs. Used for technical precision.

Callout Box A highlighted block of text used to present additional context, warnings, tips, or notable recommendations relevant to compliance or implementation.

1. Message Representation and Encoding Conventions

1.1. Abbreviated Field Representation

The following abbreviations are used to describe field content, character set, and length. The notation is compatible with **ISO 7372**[1] and commonly used **ISO 8583**[2] field definitions.

Character and Content Types

Abbreviation	Meaning
`n`	Numeric digits (0–9).
`a`	Alphabetic characters (A–Z, case-insensitive unless stated otherwise).
`an`	Alphanumeric characters (A–Z, a–z, 0–9).
`ans`	Alphanumeric and special characters.
`b`	Binary data (encoding not otherwise specified).
`Nn`	Fixed-length numeric field encoded in BCD. If an odd number of digits is specified, the final nibble is padded with `F`.
`Bn`	Fixed-length binary field measured in **bytes**.
`bn`	Fixed-length binary field measured in **bits**.
`z`	Track data (as used for magnetic stripe Track 2 or Track 3), measured in nibbles.
`Z`	Track data (Track 2/3 character set), measured in bytes.
`c`	Credit indicator.
`d`	Debit indicator.
`YY`	Year (two digits).
`CCYY`	Century and year (four digits).
`MM`	Month (two digits).
`DD`	Day of month (two digits).
`hh`	Hour (two digits, 24-hour clock).
`mm`	Minute (two digits).
`ss`	Second (two digits).

For constructed data elements, subfield formats indicate the permitted character set, while the on-

the-wire encoding and byte count follow the parent data element format. For example, numeric sub-fields within an AN or B constructed element are encoded as ASCII digits (0-9) unless explicitly stated as BCD.

Length Qualifiers

The following length qualifiers describe how the length of variable-length fields is encoded. Unless otherwise stated, length indicators are expressed as **decimal digit counts**.

Qualifier	Meaning
Fixed length (e.g., n6)	Fixed-length field of exactly the specified size.
LVAR	Variable-length field with a 1-digit decimal length prefix.
LLVAR	Variable-length field with a 2-digit decimal length prefix (00–99), length encoded in BCD.
LLLVAR	Variable-length field with a 3-digit decimal length prefix (000–999), length encoded in BCD.
LLLLVAR	Variable-length field with a 4-digit decimal length prefix (0000–9999), length encoded in BCD.
LLLLLVAR	Variable-length field with a 5-digit decimal length prefix.
N..nn	Variable-length numeric field encoded in BCD, up to *nn* digits.
B..nn	Variable-length binary field, up to *nn* bytes.

Notes

- Length prefixes represent **digit or character counts**, not byte counts, unless explicitly stated otherwise.
- Fixed-length fields are encoded without a length prefix.
- Variable-length fields are **not padded**; the effective length is determined solely by the length prefix.
- LVAR and LLLLLVAR are commonly used in **private or network-specific fields** and are **not defined by the ISO 8583 standard**.
- Their inclusion does **not** imply ISO 8583 conformance; they are documented for interoperability with existing implementations.
- Composite fields MAY use these qualifiers for subfield length encoding.

Combined Length and Content Notation

Example	Interpretation
`n6`	Fixed-length numeric field of 6 digits.
`N12`	Fixed-length numeric field of 12 digits encoded in BCD.
`an20`	Fixed-length alphanumeric field of 20 characters.
`ansLLLVAR`	Variable-length alphanumeric-special field with a 3-digit length prefix.
`N..19`	Variable-length numeric field encoded in BCD, up to 19 digits.
`B8`	Fixed-length binary field of 8 bytes.
`B..48`	Variable-length binary field, up to 48 bytes.
`cn12`	Credit indicator followed by a 12-digit numeric amount.
`dn12`	Debit indicator followed by a 12-digit numeric amount.
`xn`	Signed numeric amount, where the **first character** indicates credit (`c`) or debit (`d`), followed by numeric digits.
`z..37`	Variable-length track data, up to 37 nibbles.
`Z..19`	Variable-length track data, up to 19 bytes.
`zLLVAR`	Variable-length track data with a 2-digit length prefix.
`CCYYMMDD`	Date expressed as century, year, month, and day.
`YYMMDD`	Date expressed as year, month, and day (two-digit year).

Notes

- In signed numeric fields (`xn`), the **credit/debit indicator precedes the numeric value**, in accordance with ISO 7372 and ISO 8583 conventions.
- Fixed-length numeric fields are **right-justified and zero-padded**, unless specified otherwise.
- Track data (`z`, `Z`) follows ISO 7813 encoding rules and may include separators such as `=` or `D`, depending on track type.

1.2. Encoding Conventions

In the early versions of ISO 8583—most notably the 1987 edition, introduced at a time when the first "smart" POS devices were rapidly replacing earlier CAT (Credit Authorization Terminal) equipment—the standard character encoding was either **ASCII** or **EBCDIC**, depending primarily on the host platform. Mainframe-based systems typically used EBCDIC, while minicomputer and microprocessor-based systems favored ASCII.

Some early terminal networks, including those using the **VISA-1** and **VISA-K** protocols, operated over **7-bit asynchronous communications** at 300 or 1200 baud using Bell 103 or CCITT V.21 modems. These deployments predated Unicode by more than a decade and further constrained character representation to very limited encoding sets.

A notable omission in many ISO 8583 specifications is the **explicit definition of character encoding**. Specifications frequently state, for example, that Data Element 43 is 40 alphanumeric characters—as defined in ISO 8583:1987 and commonly represented as `an40`—without clarifying how those characters are encoded on the wire. Due to historical practice, it is often implicitly assumed that 40 characters correspond to 40 bytes. While this assumption holds for ASCII and many single-byte encodings, it does **not** hold for multi-byte encodings such as UTF-8, which are increasingly common in payment gateways that originate messages from JSON- or XML-based APIs.

This ambiguity is usually manageable in English-only interchanges but becomes problematic in multilingual environments. As a result, many regional networks have converged—often informally—on specific **8-bit character encodings**, such as **ISO/IEC 8859-1 (Latin-1)**, even when these encodings are not explicitly documented in the interchange specification. ISO/IEC 8859-1 adequately supports Western European languages, including Spanish, but it is insufficient for languages that require larger character repertoires, where multi-byte encodings become unavoidable.

Mainframe-based environments introduce additional complexity. EBCDIC is not a single encoding but a family of **code pages**, and different markets have historically standardized on different variants. Common examples include:

- **EBCDIC CP037**, widely used in North America.
- **EBCDIC CP500**, commonly used in Western Europe.
- **EBCDIC CP273**, used in Germany.
- **EBCDIC CP284**, used in Spanish-speaking markets.
- **EBCDIC CP1047**, often used in UNIX-hosted mainframe environments.

Interoperability between systems using different EBCDIC code pages—or between EBCDIC and ASCII-based systems—requires explicit translation rules, which must be carefully documented to avoid data corruption.

jPOS itself is not exempt from these considerations. Traditional jPOS ISO field packagers assume that characters are represented using a **single-byte encoding** and standardize on **ISO/IEC 8859-1** unless

explicitly configured otherwise. However, when using CMF in conjunction with JSON- or XML-based packagers, jPOS can support **UTF-8**, provided that message length, field sizing, and conversion rules are clearly defined and consistently applied.

The key takeaway is that **character encoding is a fundamental aspect of any financial interchange** and must be explicitly specified. Encoding should be among the first technical topics agreed upon and documented by participating parties, as incorrect assumptions in this area can lead to subtle data loss, interoperability failures, and production defects that are difficult to diagnose.

Character Count vs. Byte Count

Unless explicitly stated otherwise, **field lengths expressed in CMF v2.0 are defined in terms of bytes on the wire**, not abstract character counts.

- For **single-byte encodings** (e.g., ASCII, ISO/IEC 8859-1, EBCDIC code pages), character count and byte count are equivalent.
- For **multi-byte encodings** (e.g., UTF-8), a character may occupy more than one byte, and length calculations MUST be performed on the encoded byte sequence.
- Length prefixes (`LVAR`, `LLVAR`, etc.) always represent the **number of bytes transmitted**, not the number of Unicode code points or glyphs.

When CMF fields are described using character-oriented notation (e.g., `an40`), the underlying encoding MUST be clearly specified to avoid ambiguity. Implementations MUST NOT assume that character count and byte count are interchangeable unless the encoding guarantees a fixed-width representation.

Canonical Encoding Recommendation

CMF v2.0 defines a **canonical internal encoding** to ensure deterministic behavior across systems and implementations.

- CMF v2.0 uses UTF-8 as the canonical encoding for internal message representation.
- UTF-8 provides:
  - Compatibility with ASCII for legacy content.
  - Support for multilingual character sets.
  - A well-defined, widely implemented standard.

When UTF-8 is used:

- All length calculations MUST be based on the UTF-8 encoded byte sequence.
- Implementations MUST reject or explicitly handle malformed UTF-8 input.

The use of UTF-8 internally does not mandate UTF-8 on the wire; it defines a stable normalization point within CMF-based systems.

Interchange-Specific Encoding Overrides

CMF explicitly allows **interchange-specific encoding overrides** at system boundaries.

- **Source Stations** are responsible for decoding inbound messages from the network-specific encoding (e.g., ASCII, EBCDIC CP500) into the CMF canonical representation.
- **Destination Stations** are responsible for encoding CMF messages into the target network's required encoding.
- Encoding overrides MUST be:

  - Explicitly configured.
  - Documented as part of the interchange specification.
  - Consistently applied to all affected fields.

Under no circumstances should encoding conversion rules be implicit or inferred. All participating systems MUST agree on:

- The character encoding used on the wire.
- Whether field lengths are interpreted as bytes or characters.
- Any required code-page mappings or translation tables.

Encoding Validity and Error Handling

The following rules define mandatory behavior for handling character encodings in CMF v2.0 implementations.

- Implementations **MUST explicitly define** the character encoding used for each interchange.
- Implementations **MUST NOT assume** a default encoding based on field type, field length, or historical practice.
- All length prefixes (`LVAR`, `LLVAR`, `LLLVAR`, `LLLLVAR`, `LLLLLVAR`) **MUST represent byte counts**, not character counts.

When CMF messages are processed internally using UTF-8:

- Implementations **MUST validate** that all character data is well-formed UTF-8.
- Implementations **MUST reject** messages containing malformed or overlong UTF-8 sequences.
- Implementations **MUST NOT** silently normalize, replace, or discard invalid byte sequences.

When processing inbound messages from an external interchange:

- Source Stations **MUST apply** the configured decoding rules before field length validation.
- Source Stations **MUST reject** messages whose decoded byte length does not match the declared field length.
- Source Stations **MUST NOT infer** encoding from content, heuristics, or runtime inspection.

When producing outbound messages:

- Destination Stations **MUST encode** character data using the encoding explicitly defined for the target interchange.
- Destination Stations **MUST ensure** that encoded field lengths match the declared length or length prefix.
- Destination Stations **MUST NOT emit** messages with ambiguous or inconsistent length and encoding semantics.

For EBCDIC-based interchanges:

- The specific EBCDIC code page **MUST be explicitly identified** (e.g., CP037, CP500).
- Implementations **MUST NOT assume** a default EBCDIC variant.

Failure to comply with these rules constitutes a **protocol violation** and may result in message rejection, data corruption, or interoperability failure.

2. Message Structure

2.1. Message Components

The ISO-8583 messages transmitted and received by jPOS Common Message Format use the following over-the-wire representation:

Component	Format	Mandatory	Description
Message Length	2 bytes (nbo)	Yes	Message length represented as two bytes in network byte order (big-endian), used to determine message boundaries in the TCP/IP stream.
MTI	N4 (BCD)	Yes	ISO 8583 Message Type Indicator. Four decimal digits encoded as BCD (2 bytes). In CMF v2.0, the first digit is always 2, identifying the ISO 8583:2003/2023 protocol family. See DE-000.
Primary Bitmap	B8	Yes	64 bits indicating which data elements (2–64) are present. Bit 1 set indicates a secondary bitmap follows.
Secondary Bitmap	B8	Conditional	64 bits indicating which data elements (65–128) are present. Present only when bit 1 of the primary bitmap is set.
Data Elements	byte stream	Yes	Variable-length binary encoding of the data elements indicated by the bitmap, in ascending field-number order.

2.2. Message Structure and Transport Considerations

A CMF 2.0.0 message follows the traditional ISO 8583 structural model, consisting of a **Message Type Indicator (MTI)**, followed by a **bitmap**, and then a sequence of **data elements**, each encoded according to its field definition and encoding rules.

Message Payload Structure

At the payload level, independent of transport framing, a CMF message is composed of the following components, in order:

1. **Message Type Indicator (MTI)** The MTI identifies the high-level function of the message (e.g., authorization request, financial response) and follows the conventions defined by ISO 8583.
2. **Bitmap** The bitmap indicates the presence or absence of data elements within the message.
   - A **primary bitmap** is always present and is encoded as **8 bytes (64 bits)**.
   - If the first bit of the primary bitmap is set, a **secondary bitmap** is present, extending the bitmap to **16 bytes (128 bits)**.

   The use of a secondary bitmap indicates that one or more data elements above field 64 are present. In practice, most CMF-based messages—particularly those used by jPOS systems—make extensive use of fields beyond 64 and therefore use the **extended (128-bit) bitmap**.
3. **Data Elements** Data elements appear sequentially in ascending field-number order. Each field is encoded according to:
   - Its declared content type (e.g., `n`, `an`, `ans`).
   - Its length definition (fixed or variable).
   - The applicable encoding and length rules defined elsewhere in this specification.

Fields not indicated by the bitmap MUST NOT appear in the message payload.

Bitmap Semantics

- Each bit in the bitmap corresponds directly to a data element number.
- **Bit numbering within each bitmap byte starts at the most significant bit (MSB)**.
- **Bit 1 is the MSB and has a hexadecimal value of `0x80`**.
- Bits are numbered left-to-right, from the MSB (`0x80`) to the least significant bit (`0x01`).

When the **first bit (bit 1, value `0x80`) of the primary bitmap is set**, a **secondary bitmap** is present immediately following the primary bitmap, extending the bitmap from 64 to 128 bits.

Rationale for MSB-First Bit Numbering

Although MSB-first numbering may appear counterintuitive to readers accustomed to least-significant-bit indexing, this convention originates from early **byte-oriented and bit-serial transmission systems** in which bits were processed and documented **left-to-right**, following their on-the-wire order.

This approach provides several practical advantages:

- The **visual representation of the bitmap matches its binary layout**, making it easier to inspect and reason about in hexadecimal or binary dumps.
- Each bitmap byte can be interpreted independently using fixed bit masks (`0x80`, `0x40`, `0x20`, …, `0x01`).
- The convention aligns with **ISO 8583**, **ISO 7372**, and long-standing industry practice, ensuring compatibility with existing systems and tooling.

CMF 2.0.0 inherits this numbering scheme without modification. Implementations MUST interpret bitmap bits using MSB-first numbering and MUST NOT remap or reinterpret bit positions based on alternative indexing conventions.

Transport Layer and Message Framing

While the message payload structure is independent of the transport mechanism, CMF 2.0.0 explicitly defines a **default transport framing** for interoperability within jPOS-based systems.

jPOS uses **channels** to encapsulate transport-layer concerns such as message framing, length encoding, and I/O handling. These concerns are deliberately separated from the message payload itself.

Default CMF Channel

CMF 2.0.0 defines a default transport profile, referred to as **CMFChannel**, with the following characteristics:

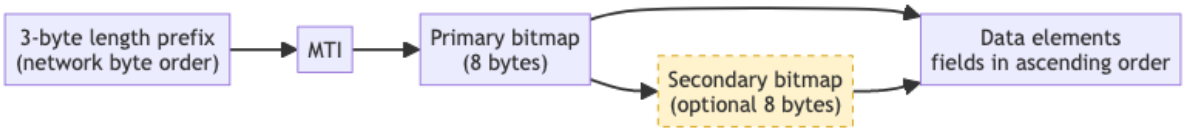
- No application-level header.
- A **three-byte message length prefix**.
- Length encoded in **network byte order** (big-endian).
- The length represents the number of bytes in the message payload (MTI + bitmap + data elements), excluding the length prefix itself.

This framing is compatible with common jPOS channel implementations and provides a simple, deterministic mechanism for message delimitation over stream-oriented transports.

Alternative channel configurations MAY be used by specific deployments but MUST be explicitly documented and agreed upon by all participating systems.

Wire-Level Layout Overview

The following diagram illustrates the relationship between the transport framing and the CMF message payload:



For messages that do not include fields above 64, the secondary bitmap is omitted, and the payload consists only of the MTI, primary bitmap, and data elements.

Separation of Concerns

CMF 2.0.0 intentionally separates:

- **Message structure** (MTI, bitmap, fields).
- **Encoding rules** (character sets, length semantics).
- **Transport framing** (length prefixes, channels).

This separation allows CMF messages to be transported over different media and protocols without altering their semantic structure, while still enabling a well-defined default configuration for jPOS-based systems.

Message Type Identifiers

jPOS Common Message Format implements the following message classes:

Table 5: Message Type Identifiers

Request	Response	Description
2100	**2110**	Authorization, Balance Inquiry, Mini statements
2200	**2210**	Financial presentment, Purchase, Void, Refund / Return, Refresh, Transfer
2220	**2230**	Financial presentment Advice
2240	**2250**	Financial presentment Notification
2300	**2310**	Card Activation/De-Activation
2304	**2314**	File Update
2420	**2430**	Reversals of Authorization and Financial messages
2600	**2610**	Administrative
2720	**2730**	Acquirer Fee Collection Advice
2722	**2732**	Issuer Fee Collection Advice
2740	**2750**	Acquirer Fee Collection Notification
2742	**2752**	Issuer Fee Collection Notification
2804	**2814**	Network Management

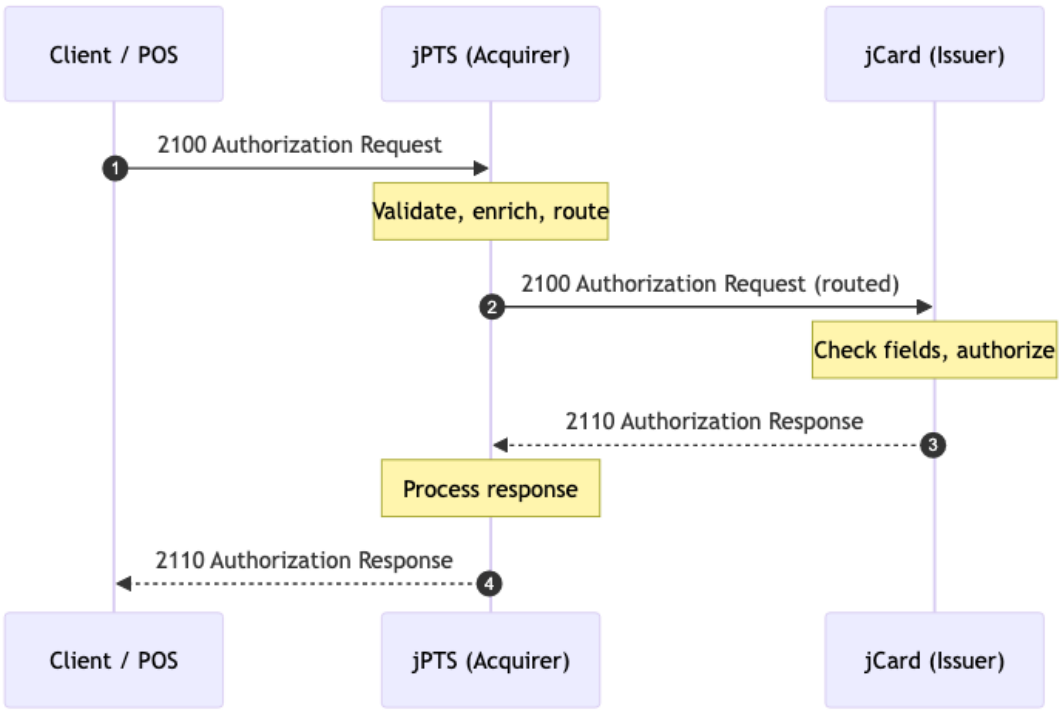
3. Transaction Definitions

3.1. Authorization

The authorization transaction requests approval from the issuer for a card-present or card-not-present transaction. Depending on the Function Code this class also covers balance inquiries and identity verifications.

Attribute	Value
Request MTI	`2100`
Response MTI	`2110`
Function codes	See Function Codes
Processing codes	`00xxxx` (purchase), `30xxxx` (balance inquiry), `31xxxx` (verification)

Message Flow



Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	2100	2110	2100	2110
2	Primary Account Number (PAN)	M	—	M	—
3	Processing Code	M	ME	M	ME
4	Amount, Transaction	M	ME	M	ME
6	Amount, Cardholder Billing	—	—	O	O
7	Transmission Date and Time	M	ME	M	ME
11	System Trace Audit Number	M	ME	M	ME
12	Time, Local Transaction	M	ME	M	ME
14	Date, Expiration	O	—	C-02	—
17	Date, Capture	O	—	O	—
22	Point-of-Service Data Code	M	—	O	—
23	Card Sequence Number	O	—	C-02	—
24	Function Code	M	ME	O	ME
25	Reason Code	O	—	O	—
26	Merchant Category Code	O	—	O	—
32	Acquiring Institution ID Code	O	—	O	—
33	Forwarding Institution ID Code	O	—	—	—
35	Track 2 Data	O	—	O	—
36	Track 3 Data	O	—	—	—
37	Retrieval Reference Number	O	ME	O	ME
38	Approval Code	—	M	—	—
39	Result Code	—	M	—	M
41	Card Acceptor Terminal ID	M	ME	M	ME
42	Card Acceptor ID Code	M	ME	M	ME
43	Card Acceptor Name/Location	O	—	O	—
45	Track 1 Data	O	—	—	—
46	Amounts, Fees	O	O	O	O
49	Verification Data	O	O	O	O
52	PIN Data	O	—	O	—
53	Security Related Control Info	O	—	O	—
54	Additional Amounts	O	O	—	—
55	ICC Related Data	O	O	O	O
59	Transport Data	O	O	—	—
60	Reserved, National Use	O	O	O	O
63	Display Message	O	O	O	O
111	Reserved, Private Use	O	O	O	O
112	Reserved, Private Use	O	O	—	—
113	jCard Data	O	O	O	O

Legend

Code	Meaning
M	Mandatory — field MUST be present

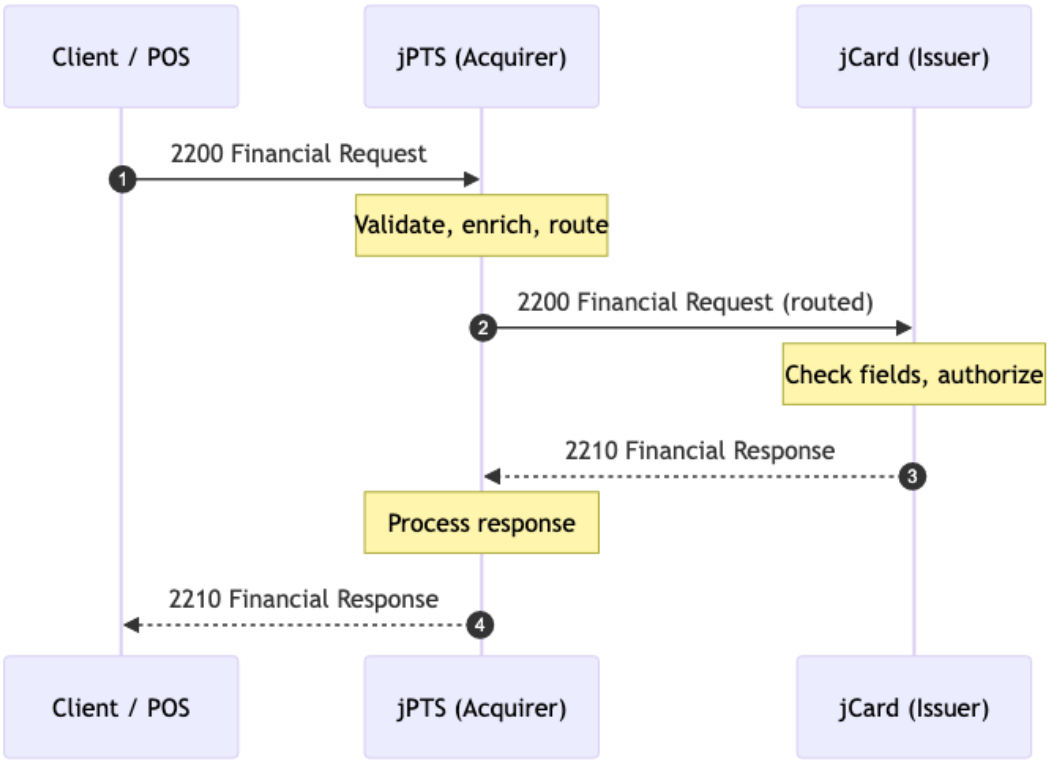
Code	Meaning
ME	Mandatory Echo — field MUST be present with same value as request
O	Optional — field MAY be present by bilateral agreement
C-xx	Conditional — present if condition xx applies
—	Not applicable for this role/direction

3.2. Financial Presentment

The financial presentment transaction is used for POS purchases, cash withdrawals, refunds/returns, and transfers. Unlike authorization, this message carries final obligation and is processed as a single-message transaction.

Attribute	Value
Request MTI	`2200`
Response MTI	`2210`
Function codes	See Function Codes
Processing codes	`00xxxx` (purchase), `01xxxx` (cash), `20xxxx` (refund/return), `40xxxx` (transfer)

Message Flow



Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	2200	2210	2200	2210
2	Primary Account Number (PAN)	M	—	M	—
3	Processing Code	M	ME	M	ME
4	Amount, Transaction	M	ME	M	ME
6	Amount, Cardholder Billing	—	—	O	O
7	Transmission Date and Time	M	ME	M	ME
11	System Trace Audit Number	M	ME	M	ME
12	Time, Local Transaction	M	ME	M	ME
15	Date, Settlement	O	—	O	—
17	Date, Capture	O	—	O	—
21	Transaction Life Cycle ID	—	—	O	—
22	Point-of-Service Data Code	M	—	O	—
23	Card Sequence Number	O	—	O	—
24	Function Code	O	ME	O	ME
26	Merchant Category Code	O	—	O	—
32	Acquiring Institution ID Code	O	—	O	—
37	Retrieval Reference Number	O	ME	O	ME
38	Approval Code	—	M	—	—
39	Result Code	—	M	—	M
41	Card Acceptor Terminal ID	M	ME	M	ME
42	Card Acceptor ID Code	M	ME	M	ME
43	Card Acceptor Name/Location	O	—	O	—
46	Amounts, Fees	O	O	O	O
49	Verification Data	O	O	O	O
52	PIN Data	O	—	O	—
55	ICC Related Data	O	O	O	O
60	Reserved, National Use	O	O	O	O
62	Reserved, Private Use	—	—	O	O
63	Display Message	O	O	O	O
111	Reserved, Private Use	O	O	O	O
113	jCard Data	O	O	O	O

Legend

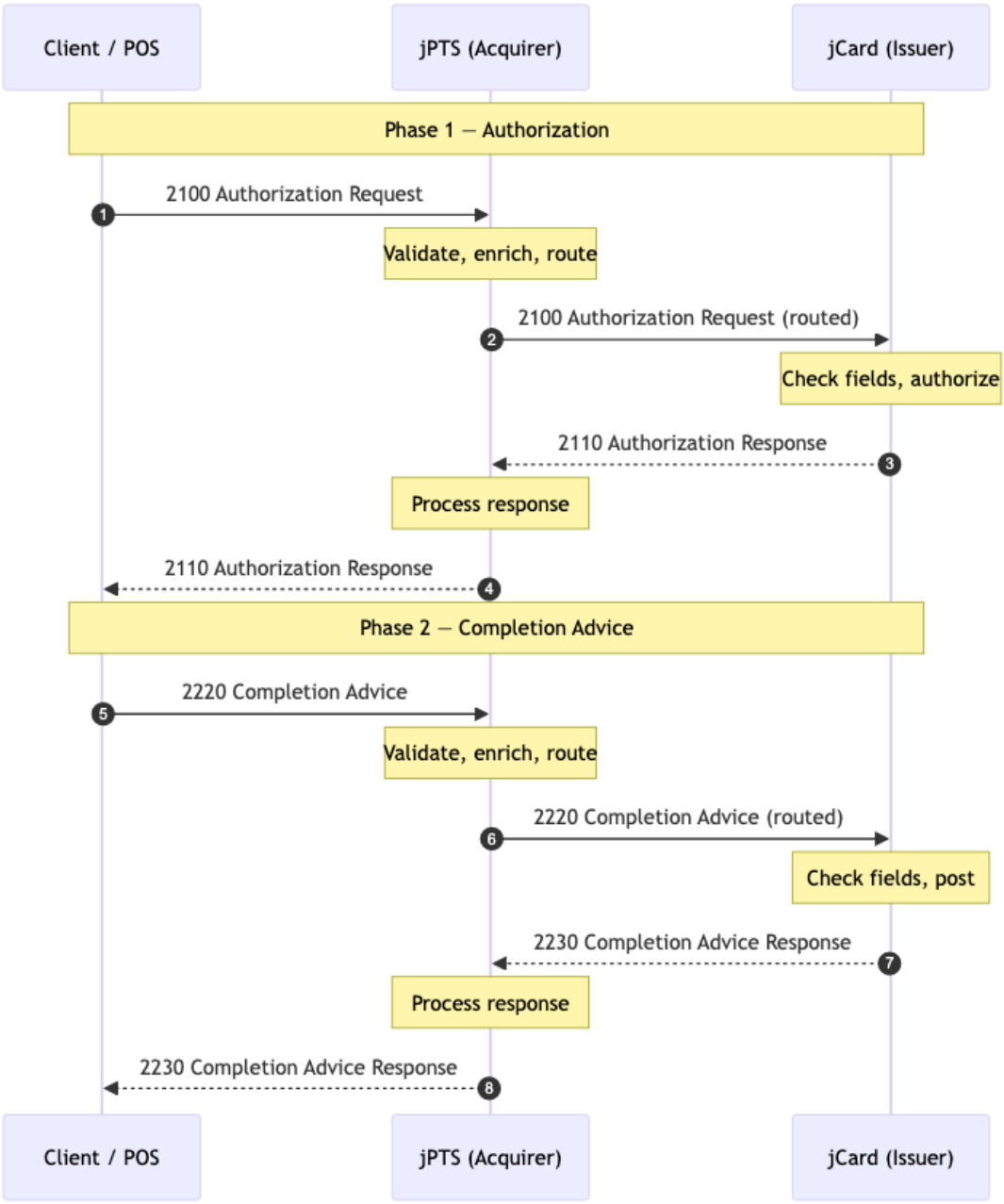
Code	Meaning
M	Mandatory — field MUST be present
ME	Mandatory Echo — field MUST be present with same value as request
O	Optional — field MAY be present by bilateral agreement
C-xx	Conditional — present if condition xx applies
—	Not applicable for this role/direction

3.3. Completion / Financial Advice

The completion (financial advice) transaction completes a two-message authorization flow. It is sent after a successful authorization (2100/2110) to advise the issuer that the transaction has been completed and carry the final transaction amount.

Attribute	Value
Request MTI	`2220`
Response MTI	`2230`
Function codes	See Function Codes
Processing codes	`00`xxxx (purchase), `01`xxxx (cash), `20`xxxx (refund/return)

Message Flow



Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	2220	2230	2220	2230
2	Primary Account Number (PAN)	M	—	M	—

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
3	Processing Code	M	ME	M	ME
4	Amount, Transaction	M	ME	M	ME
6	Amount, Cardholder Billing	—	—	O	O
7	Transmission Date and Time	M	ME	M	ME
11	System Trace Audit Number	M	ME	M	ME
12	Time, Local Transaction	M	ME	M	ME
15	Date, Settlement	O	—	O	—
17	Date, Capture	O	—	O	—
21	Transaction Life Cycle ID	—	—	O	—
22	Point-of-Service Data Code	M	—	O	—
24	Function Code	O	ME	O	ME
25	Reason Code	O	—	M	—
26	Merchant Category Code	O	—	O	—
32	Acquiring Institution ID Code	O	—	O	—
37	Retrieval Reference Number	O	ME	O	ME
38	Approval Code	M	ME	M	ME
39	Result Code	—	M	—	M
41	Card Acceptor Terminal ID	M	ME	M	ME
42	Card Acceptor ID Code	M	ME	M	ME
43	Card Acceptor Name/Location	O	—	O	—
46	Amounts, Fees	O	O	O	O
49	Verification Data	O	O	O	O
55	ICC Related Data	O	O	O	O
60	Reserved, National Use	O	O	O	O
62	Reserved, Private Use	—	—	O	O
63	Display Message	O	O	O	O
111	Reserved, Private Use	O	O	O	O
113	jCard Data	O	O	O	O

Legend

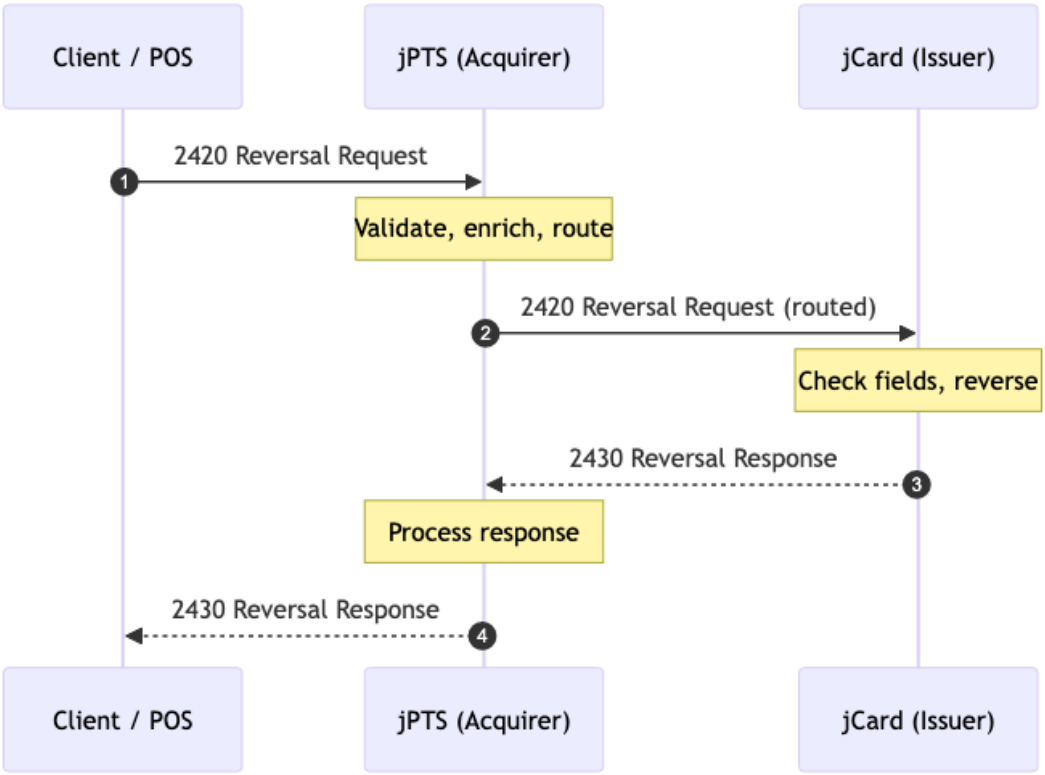
Code	Meaning
M	Mandatory — field MUST be present
ME	Mandatory Echo — field MUST be present with same value as request
O	Optional — field MAY be present by bilateral agreement
C-xx	Conditional — present if condition xx applies
—	Not applicable for this role/direction

3.4. Reversal

The reversal transaction is used to reverse a previously approved authorization or financial presentment. DE-56 Original Data Elements is mandatory and must reference the original transaction being reversed.

Attribute	Value
Request MTI	`2420`
Response MTI	`2430`
Function codes	See Function Codes
Processing codes	Matches original transaction processing code

Message Flow



Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	2420	2430	2420	2430
2	Primary Account Number (PAN)	M	—	M	—
3	Processing Code	M	ME	M	ME
4	Amount, Transaction	M	ME	M	ME
6	Amount, Cardholder Billing	—	—	O	O
7	Transmission Date and Time	M	ME	M	ME
11	System Trace Audit Number	M	ME	M	ME
12	Time, Local Transaction	M	ME	M	ME
13	Date, Effective	—	—	O	—
15	Date, Settlement	O	—	O	—
17	Date, Capture	O	—	O	—
21	Transaction Life Cycle ID	—	—	O	—
22	Point-of-Service Data Code	M	—	O	—
24	Function Code	O	ME	O	ME
25	Reason Code	O	—	M	—
26	Merchant Category Code	O	—	O	—
32	Acquiring Institution ID Code	O	—	O	—
37	Retrieval Reference Number	O	ME	O	ME
38	Approval Code	—	—	—	—
39	Result Code	—	M	—	M
41	Card Acceptor Terminal ID	M	ME	M	ME
42	Card Acceptor ID Code	M	ME	M	ME
43	Card Acceptor Name/Location	O	—	O	—
46	Amounts, Fees	O	O	O	O
56	Original Data Elements	M	ME	M	ME
60	Reserved, National Use	O	O	O	O
62	Reserved, Private Use	—	—	O	O
63	Display Message	O	O	O	O
111	Reserved, Private Use	O	O	O	O
113	jCard Data	O	O	O	O

Legend

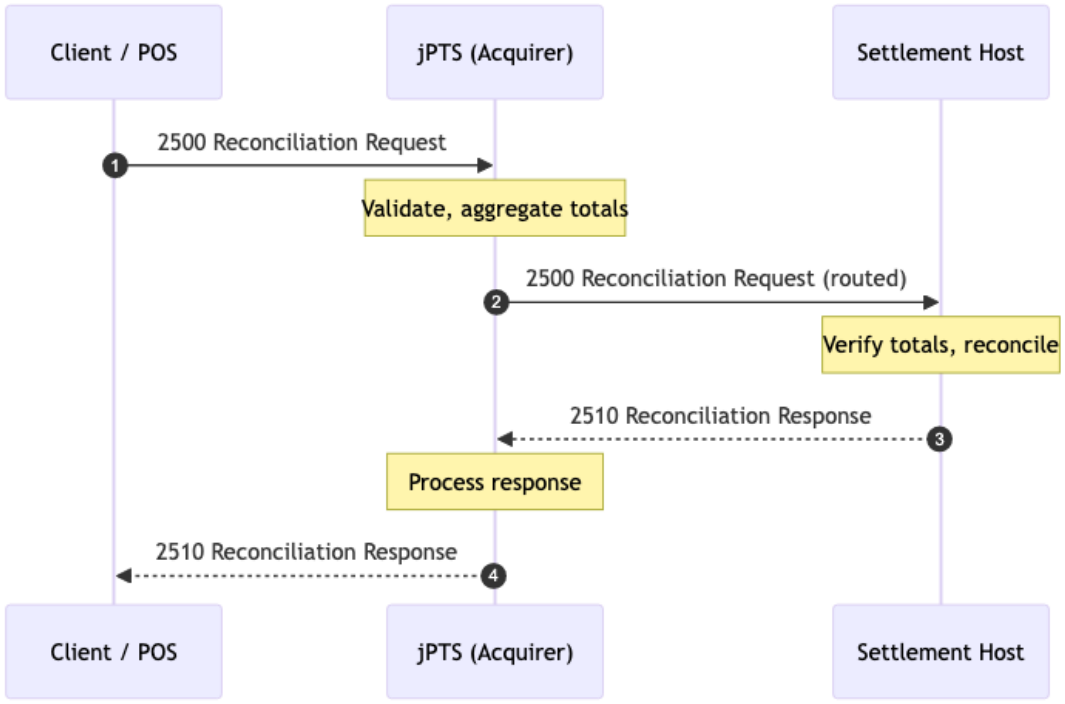
Code	Meaning
M	Mandatory — field MUST be present
ME	Mandatory Echo — field MUST be present with same value as request
O	Optional — field MAY be present by bilateral agreement
C-xx	Conditional — present if condition xx applies
—	Not applicable for this role/direction

3.5. Reconciliation / Settlement

The reconciliation / settlement transaction is used by acquirers (jPTS) to balance transaction totals with the issuer host at end of day or end of period. This message class is not applicable to issuers (jCard) in this flow.

Attribute	Value
Request MTI	`2500`
Response MTI	`2510`
Function codes	See Function Codes
Processing codes	`920000` (reconciliation)

Message Flow



Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	—	—	2500	2510
3	Processing Code	M	ME	—	—
7	Transmission Date and Time	M	ME	—	—

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
11	System Trace Audit Number	M	ME	—	—
12	Time, Local Transaction	M	ME	—	—
15	Date, Settlement	O	O	—	—
17	Date, Capture	O	O	—	—
24	Function Code	O	ME	—	—
25	Reason Code	O	—	—	—
26	Merchant Category Code	O	—	—	—
32	Acquiring Institution ID Code	O	—	—	—
33	Forwarding Institution ID Code	O	—	—	—
36	Track 3 Data	O	—	—	—
37	Retrieval Reference Number	O	ME	—	—
39	Result Code	—	M	—	—
41	Card Acceptor Terminal ID	M	ME	—	—
42	Card Acceptor ID Code	M	ME	—	—
43	Card Acceptor Name/Location	O	—	—	—
46	Amounts, Fees	O	O	—	—
56	Original Data Elements	O	—	—	—
59	Transport Data	O	O	—	—
60	Reserved, National Use	O	O	—	—
63	Display Message	O	O	—	—
74	Reconciliation Data, Primary	M	ME	—	—
111	Reserved, Private Use	O	O	—	—
112	Reserved, Private Use	O	O	—	—
113	jCard Data	O	O	—	—

Legend

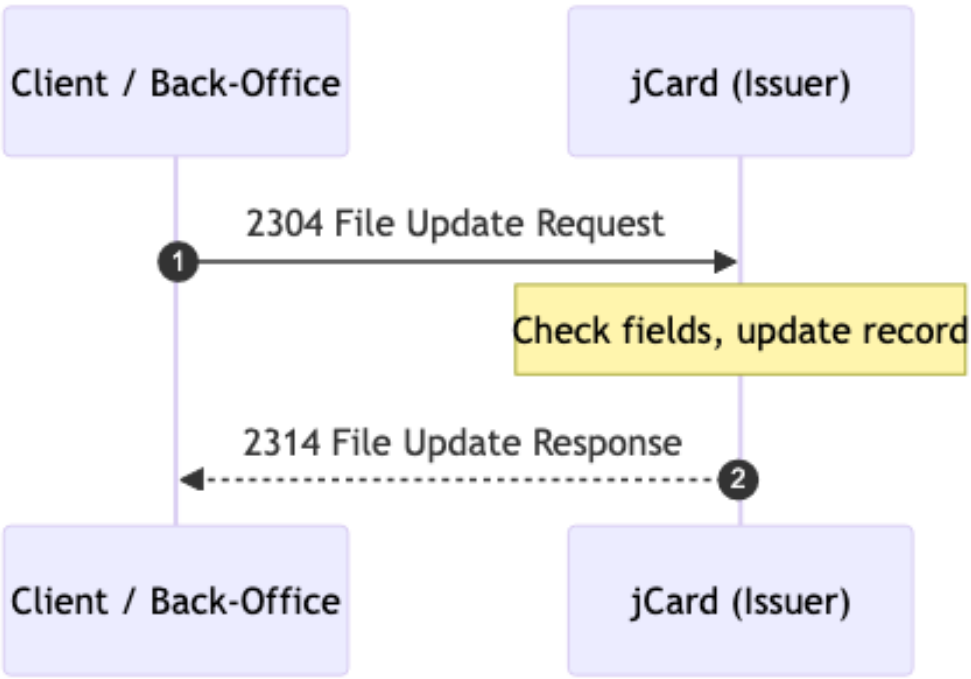
Code	Meaning
M	Mandatory — field MUST be present
ME	Mandatory Echo — field MUST be present with same value as request
O	Optional — field MAY be present by bilateral agreement
C-xx	Conditional — present if condition xx applies
—	Not applicable for this role/direction

3.6. Record Maintenance

The record maintenance transaction (File Update) is used by jCard to create or update customer, card, and merchant records. This message class is not applicable to acquirers (jPTS).

Attribute	Value
Request MTI	`2304`
Response MTI	`2314`
Function codes	See Function Codes

Message Flow



Add Customer Record

Creates or updates a cardholder customer record.

Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	—	—	2304	2314
2	Primary Account Number (PAN)	—	—	O	—
7	Transmission Date and Time	—	—	O	ME
11	System Trace Audit Number	—	—	M	ME
12	Time, Local Transaction	—	—	O	—
24	Function Code	—	—	M	ME
33	Forwarding Institution ID Code	—	—	O	—
39	Result Code	—	—	—	M
62	Reserved, Private Use	—	—	O	O
72	Data Record	—	—	O	O
101	File Name / Transaction Modifier	—	—	M	ME
111	Reserved, Private Use	—	—	O	O
113	jCard Data	—	—	O	O

Add Card Record

Creates or updates a card record associated with a customer.

Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	—	—	2304	2314
2	Primary Account Number (PAN)	—	—	M	ME
3	Processing Code	—	—	O	—
7	Transmission Date and Time	—	—	O	ME
11	System Trace Audit Number	—	—	M	ME
12	Time, Local Transaction	—	—	O	—
24	Function Code	—	—	M	ME
33	Forwarding Institution ID Code	—	—	O	—
35	Track 2 Data	—	—	O	—
39	Result Code	—	—	—	M
41	Card Acceptor Terminal ID	—	—	O	—
49	Verification Data	—	—	O	—
62	Reserved, Private Use	—	—	O	O
72	Data Record	—	—	O	O
101	File Name / Transaction Modifier	—	—	M	ME
111	Reserved, Private Use	—	—	O	O
113	jCard Data	—	—	O	O

Add Merchant Record

Creates or updates a merchant record.

Field Presence

DE	Name	jPTS Req	jPTS Resp	jCard Req	jCard Resp
MTI	Message Type Indicator	—	—	2304	2314
2	Primary Account Number (PAN)	—	—	O	—
7	Transmission Date and Time	—	—	M	ME
11	System Trace Audit Number	—	—	M	ME
12	Time, Local Transaction	—	—	M	ME
24	Function Code	—	—	M	ME
32	Acquiring Institution ID Code	—	—	O	—
39	Result Code	—	—	—	M
42	Card Acceptor ID Code	—	—	O	—
43	Card Acceptor Name/Location	—	—	O	—
62	Reserved, Private Use	—	—	O	O
72	Data Record	—	—	O	O
101	File Name / Transaction Modifier	—	—	M	ME
111	Reserved, Private Use	—	—	O	O
113	jCard Data	—	—	O	O

Legend

Code	Meaning
M	Mandatory — field MUST be present
ME	Mandatory Echo — field MUST be present with same value as request
O	Optional — field MAY be present by bilateral agreement
C-xx	Conditional — present if condition xx applies
—	Not applicable for this role/direction

A. Data Elements

DE-000: MTI — Message Type Indicator

The Message Type Indicator (MTI) is the first field in a CMF message payload. It identifies the overall purpose of the message and determines the high-level processing path, including request/response correlation and routing behavior.

Description

The MTI is a **four-digit numeric identifier** structured according to the ISO 8583 model. Each digit has a defined role:

1. **Version indicator**.
2. **Message class**.
3. **Message function**.
4. **Message origin**.

CMF v2.0 adopts the ISO 8583:2003 message family, including the updates introduced in the 2023 revision of the standard. Accordingly, all CMF MTIs begin with the digit **2**.

Over-the-Wire Format

In jPOS CMF, the MTI is encoded using **Binary Coded Decimal (BCD)**.

Attribute	Value
Notation	n4
Length	2 bytes
Encoding	BCD (4 nibbles, one digit per nibble)
Padding	Not applicable
Position	First field in the message payload, immediately preceding the bitmap

Each decimal digit of the MTI is encoded in a single 4-bit nibble. The four nibbles are packed into two bytes in network byte order.

Example encoding:

- MTI value: `2200`
- Logical digits: `2 2 0 0`
- Wire representation (hex): `22 00`

Implementations **MUST encode and decode the MTI as a fixed-length BCD field** and **MUST NOT** transmit it as ASCII characters.

Semantics

- The MTI determines the **message category and processing flow**.
- The **first digit is fixed to 2**, indicating the ISO 8583:2003 protocol family as adopted by CMF v2.0.
- The remaining three digits identify the message class, function, and origin, in accordance with ISO 8583 conventions and the applicable interchange profile.
- Requests and responses are related MTIs that differ primarily in the function digit.

CMF v2.0 systems **MUST reject** messages whose MTI is not recognized or not permitted by the configured interchange profile.

CMF transaction identifier convention

Within jPOS-based systems, transactions are commonly identified by the combination of the **last three digits of the MTI** (the class, function, and origin digits) together with the **first two digits of DE-003 (Processing Code)**. Because the first digit of the MTI is always 2, it carries no distinguishing information and is typically omitted in shorthand references. For example, the pair `(100, 00)` identifies a goods-and-services authorization request, and `(200, 00)` identifies a financial presentment for a purchase. This naming convention is used throughout this specification and in jPOS tooling.

Sample Dump

Illustrative payload prefix (hexadecimal):

```
22 00 <bitmap> <fields...>
```

Where:

- `22 00` represents the MTI `2200` encoded as BCD.
- `<bitmap>` begins immediately after the MTI.

Valid Values

Within the jPOS family of products, including **jCard** and **jPTS**, a defined subset of MTIs is supported.

All MTIs listed below assume a **leading version digit of 2**. For readability, the tables omit this digit. The full MTI is obtained by prefixing each listed value with 2.

Supported MTIs

Request	Response	Description
100	110	Authorization, balance inquiry, mini-statements.
200	210	Financial presentment: purchase, void, refund/return, refresh, transfer.

Request	Response	Description
220	230	Financial presentment advice.
240	250	Financial presentment notification.
300	310	Card activation and de-activation.
304	314	File update.
420	430	Reversal of authorization and financial messages.
600	610	Administrative messages.
720	730	Acquirer fee collection advice.
722	732	Issuer fee collection advice.
740	750	Acquirer fee collection notification.
742	752	Issuer fee collection notification.
804	814	Network management.

Notes

- Each request MTI has a corresponding response MTI.
- The listed MTIs constitute the **canonical set supported by jPOS-based systems**.
- Individual interchanges MAY further restrict the allowed MTIs.
- Use of MTIs outside this set is **out of scope** for jCard and jPTS unless explicitly documented.

DE-001: Bitmap — Field Presence Indicator

The bitmap immediately follows the MTI in a CMF message payload. It indicates which data elements are present in the message and defines the structure of the remaining payload.

Each bit in the bitmap corresponds to one data element by its field number. A bit value of `1` indicates that the corresponding data element is present; a value of `0` indicates absence. Bits are numbered from the most significant bit of the first byte, consistent with network byte order.

Over-the-Wire Format

Attribute	Value
Notation	`B8` (primary) / `B16` (primary + secondary)
Length	8 bytes (primary) or 16 bytes (with secondary)
Encoding	Binary
Padding	Not applicable

Semantics

- The **primary bitmap** (bits 1–64) is always present.
- **Bit 1** of the primary bitmap is the continuation indicator. If set to `1`, a **secondary bitmap** (bits 65–128) follows immediately after the primary bitmap.
- Implementations MUST parse the full 16-byte bitmap when bit 1 of the primary bitmap is set.
- Fields MUST appear in ascending field-number order after the bitmap.
- A field MUST NOT appear in the payload if its corresponding bitmap bit is not set.
- CMF messages regularly use fields above 64, so the secondary bitmap is present in most messages.

Bit numbering

Bit numbering uses MSB-first convention within each byte:

Bit	Byte	Mask	Field
1	1	`0x80`	1
2	1	`0x40`	2
8	1	`0x01`	8
9	2	`0x80`	9
64	8	`0x01`	64

Bit	Byte	Mask	Field
65	9	0x80	65
128	16	0x01	128

Sample Dump

A message with fields 2, 3, 4, 7, 11, 12, 37, 39, 41, 42, 49, and 113 present:

```
Primary bitmap   : F2 3C 01 00 80 00 80 00   (bits -164)
Secondary bitmap : 00 00 00 00 00 00 00 10   (bits -65128, bit 113 set)
```

Note that bit 1 of the primary bitmap is set (0x80), indicating the secondary bitmap is present.

ewpage

DE-002: Primary Account Number (PAN)

Data Element 2 identifies the **Primary Account Number (PAN)** associated with the transaction. It is one of the core identifiers in card-based financial messaging and is present in most authorization and financial presentment messages.

The Primary Account Number (PAN) contains the account number used to identify a customer account or relationship and **remains unchanged for the life of a transaction**.

The PAN uniquely identifies the cardholder account within the scope of the issuing scheme. Its structure and allocation are governed by ISO/IEC 7812 and typically consist of:

- A **Major Industry Identifier (MII)**.
- An **Issuer Identification Number (IIN)**.
- An **Individual Account Identifier**.
- A **check digit**, commonly calculated using the Luhn algorithm.

If Data Element 2 is not present and the message contains **Data Element 35 (Track 2 Data)**, the system MAY obtain the primary account number by parsing the track-two data contained in that field, subject to interchange rules.

Over-the-Wire Format

In CMF v2.0, Data Element 2 is encoded as a variable-length numeric field using BCD.

Attribute	Value
Notation	`N..19`
Length	Up to 19 digits
Length prefix	`LLVAR` (2-digit BCD length)
Encoding	BCD (one digit per nibble)
Padding	If the number of digits is odd, the final nibble is padded with `F`
Position	After the bitmap, according to field order

Semantics

- The PAN identifies the **cardholder account** for which the transaction is being performed.
- It MUST be interpreted as a numeric identifier; formatting characters such as spaces or separators MUST NOT be present.
- Leading zeros are significant and MUST be preserved.
- The presence of Data Element 2 is indicated solely by the corresponding bitmap bit.
- When derived from Track 2 data, the extracted PAN MUST be treated as if it had been explicitly present in Data Element 2.

Sample Dump

Illustrative example showing a PAN with 16 digits:

```
PAN (logical) : 5413330089012345
Length (LL)  : 16
Wire (hex)   : 16 54 13 33 00 89 01 23 45
```

Valid Values

- Minimum length: 2 digits.
- Maximum length: 19 digits.
- All digits MUST be in the range `0`–`9`.
- The final digit SHOULD conform to the Luhn check-digit algorithm, unless explicitly exempted by the interchange specification.

Notes

- PAN handling is subject to **PCI DSS** and other applicable security and privacy requirements.
- Implementations SHOULD minimize exposure of PAN data in logs, traces, and diagnostic outputs.
- CMF v2.0 does not redefine PAN semantics; it standardizes representation, encoding, and derivation behavior.

DE-003: Processing Code

Data Element 3, the **Processing Code**, identifies the specific type of transaction being performed and the accounts involved. It is a constructed field composed of three sub-fields and is interpreted in conjunction with the Message Type Indicator (MTI).

The Processing Code (referred to as `pcode` in this documentation) is a **six-character constructed data element** composed of three two-character sub-fields:

1. **Transaction Type Code (TTC)**.
2. **Account Type Code 1 (From Account)**.
3. **Account Type Code 2 (To Account)**.

The Transaction Type Code, when evaluated together with the MTI, uniquely identifies the functional intent of the message and drives the core transaction processing logic.

Over-the-Wire Format

Attribute	Value
Notation	AN6
Length	6 characters
Encoding	Single-byte character encoding
Padding	Not applicable

The Processing Code is transmitted as a fixed-length field and MUST be interpreted as three consecutive two-character sub-fields.

Semantics

- The Processing Code defines **what operation is being requested or advised**, and **which accounts are involved**.
- The field MUST be parsed strictly by position.
- Subfield semantics are invariant across messages but may be restricted by MTI.
- Invalid or unsupported Processing Codes MUST result in message rejection or appropriate error handling as defined by the interchange profile.

Positions 1–2 — Transaction Type Code (TTC)

The Transaction Type Code identifies the specific transaction function. Its interpretation is **contextual to the MTI**.

MTI	TTC	Description
100	00	Authorization (Goods and Services).
100	01	Authorization (Cash withdrawal).
100	02	Authorization void (Goods and Services).
100	09	Authorization (Purchase with cashback).
100	11	Authorization (Quasi-cash).
100	20	Refund / Return.
100	22	Refund / Return void.
100	30	Balance inquiry.
100	33	Verification inquiry.
200	00	POS purchase.
200	01	Cash withdrawal.
200	02	Void (Goods and Services).
200	09	Purchase with cashback.
200	20	Refund / Return.
200	22	Refund / Return void.
220	00	Advice (Goods and Services).
220	01	Advice (Cash withdrawal).
220	09	Advice (Purchase with cashback).
220	20	Advice (Refund / Return).
240	00	Notification (Goods and Services).
240	20	Notification (Refund / Return).
300	00	Card activation.
300	01	Card de-activation.
420	00	Reversal (Goods and Services).
420	01	Reversal (Cash withdrawal).
420	09	Reversal (Purchase with cashback).
420	20	Reversal (Refund / Return).
600	00	Administrative message.
720	00	Acquirer fee collection advice.
722	00	Issuer fee collection advice.
740	00	Acquirer fee collection notification.
742	00	Issuer fee collection notification.
804	30	Network management (Sign-on).
804	31	Network management (Sign-off).
804	32	Network management (Key exchange).
804	33	Network management (Echo test).

Positions 3–4 — Account Type Code 1 (From Account)

This subfield identifies the **source account** for the transaction.

Code	Description
00	Default / unspecified.
10	Savings account.
20	Checking account.
30	Credit account.
40	Universal account.
50	Investment account.
60	Mobile money account.

Positions 5–6 — Account Type Code 2 (To Account)

This subfield identifies the **destination account** for the transaction.

Code	Description
00	Default / unspecified.
10	Savings account.
20	Checking account.
30	Credit account.
40	Universal account.
50	Investment account.
60	Mobile money account.

Sample Dump

Example Processing Code for a POS purchase from a checking account:

```
Processing Code : 012000
TTC             : 01  (Cash Withdrawal)
From account    : 20  (Checking account)
To account      : 00  (Default)
```

Notes

- The Processing Code is a **composite field** and MUST be parsed by position.
- Not all combinations of TTC and account codes are valid; permitted combinations are defined by the MTI and interchange rules.
- CMF v2.0 standardizes the structure and interpretation of this field but does not mandate universal support for all listed codes.

DE-004: Amount, Transaction

Data Element 4 specifies the **transaction amount** associated with the message. It represents the principal monetary value of the transaction and is expressed without an explicit decimal separator.

In CMF v2.0, Data Element 4 follows the **ISO 8583:2003** definition and is a **constructed numeric field** composed of three subcomponents, for a total length of **16 numeric digits**:

1. **ISO 4217 Currency Code** (N3).
2. **Currency Minor Unit (Exponent)** (N1).
3. **Transaction Amount** (N12).

This structure allows the amount to be interpreted **independently of other data elements**, explicitly conveying both the currency and its decimal precision within the field itself.

Historical Note

In earlier versions of ISO 8583 (1987 and 1993), Data Element 4 consisted solely of a **12-digit numeric amount (N12)**. The number of implied decimal places was derived from the currency code conveyed separately in Data Element 49.

ISO 8583:2003 removed this implicit dependency by embedding both the **currency code** and **currency exponent** directly into Data Element 4.

Over-the-Wire Format

In CMF v2.0, Data Element 4 is encoded as a fixed-length numeric field using BCD.

Attribute	Value
Notation	N16
Length	8 bytes
Encoding	BCD (one digit per nibble)
Padding	Not applicable
Position	After the bitmap, according to field order

Subfield Layout

Positions	Subfield	Format	Description
1–3	Currency Code	N3	ISO 4217 numeric currency code.
4	Currency Minor Unit	N1	Number of decimal digits used by the currency.
5–16	Amount	N12	Transaction amount in minor units.

Semantics

- The **amount** represents the monetary value expressed in the smallest unit defined by the currency exponent.
- No decimal separator is transmitted.
- Leading zeros are significant and MUST be preserved.
- The currency code and minor unit MUST be consistent with ISO 4217 definitions.
- The field is **unsigned**; accounting direction (debit/credit) is determined by the MTI and Processing Code, not by DE-004 itself.

Sample Dump

Example: Transaction amount of **123.45 USD**.

- ISO 4217 numeric code (USD): `840`
- Currency minor unit: 2
- Amount: `000000012345`

```
Logical value : 8402000000012345
Wire (hex)    : 84 02 00 00 00 01 23 45
```

Where each nibble represents one decimal digit.

Valid Values

- Currency code: `000`–`999` (ISO 4217 numeric).
- Currency minor unit: `0`–`9`.
- Amount: `000000000000`–`999999999999`.
- All digits MUST be numeric (`0`–`9`).

Notes

- Data Element 4 is **mandatory** for authorization and financial presentment messages.
- CMF 2.0.0 explicitly follows the ISO 8583:2003 definition and **does not support** the implicit-decimal model used in ISO 8583:1987 and 1993.
- Implementations MUST NOT infer currency or decimal precision from other fields when DE-004 is present.

DE-005: Amount, Reconciliation

Data Element: 5

Format: N16

Data Element 5 specifies the **reconciliation amount** associated with the transaction. It represents the amount used for **interchange clearing and settlement** between participating institutions.

The Amount, Reconciliation is a **constructed numeric data element** composed of three subcomponents, totaling **16 numeric digits**, and follows the same structural definition as Data Element 4 (Amount, Transaction).

This field conveys the monetary amount as understood at the **interchange or settlement layer**, which may differ from both:

- The original **transaction amount** (DE-004).
- The **cardholder billing amount** (DE-006).

Relationship to Data Element 4

Data Element 5 has the same format and encoding as Data Element 4.

Both fields use the N16 constructed representation:

- Currency code (N3).
- Currency minor unit (N1).
- Amount (N12).

The difference between the two fields is **semantic**, not structural.

Over-the-Wire Format

Attribute	Value
Notation	N16
Length	8 bytes
Encoding	BCD (one digit per nibble)
Padding	Not applicable
Position	After the bitmap, according to field order

Subfield Layout

Positions	Subfield	Format	Description
1–3	Currency Code	N3	ISO 4217 numeric currency code used for reconciliation.

Positions	Subfield	Format	Description
4	Currency Minor Unit	N1	Number of decimal digits used by the reconciliation currency.
5–16	Amount	N12	Reconciliation amount in minor units.

Semantics

- Data Element 5 represents the amount used for **interbank reconciliation and settlement**.
- The currency code MAY differ from the currency used in:
  - Data Element 4 (Amount, Transaction).
  - Data Element 6 (Amount, Cardholder Billing).
- The reconciliation amount reflects:
  - Network-level currency conversions.
  - Scheme-defined settlement currencies.
  - Interchange agreements between acquirers and issuers.
- The field is **unsigned**.
- Leading zeros are significant and MUST be preserved. **International Transaction Context**

In international transactions, it is common for the following amounts to differ:

- **DE-004 (Amount, Transaction)** The amount as initiated at the point of interaction (e.g., merchant currency).
- **DE-005 (Amount, Reconciliation)** The amount used for clearing and settlement between network participants, often expressed in a **scheme-defined settlement currency**.
- **DE-006 (Amount, Cardholder Billing)** The amount billed to the cardholder, typically expressed in the cardholder's account currency.

Each of these amounts serves a distinct purpose and MUST be interpreted independently, even though they share the same structural format.

Sample Dump

Example: a transaction of **100.00 EUR** reconciled as **108.50 USD**.

- Reconciliation currency (USD): `840`
- Currency minor unit: 2
- Amount: `000000010850`

```
Logical value : 8402000000010850
Wire (hex)    : 84 02 00 00 00 10 85 00
```

Valid Values

- Currency code: `000`–`999` (ISO 4217 numeric).
- Currency minor unit: `0`–`9`.
- Amount: `000000000000`–`999999999999`.
- All digits MUST be numeric (`0`–`9`).

Notes

- Data Element 5 is typically present in **financial presentment**, **clearing**, and **settlement-related messages**.
- If present, its currency code and minor unit MUST be treated as authoritative for reconciliation purposes.
- CMF 2.0.0 standardizes representation and encoding but does not mandate when reconciliation amounts must be present; this is defined by the interchange profile.
- See **Data Element 4—Amount, Transaction** for the normative definition of the `N16` constructed amount format.

DE-006: Amount, Cardholder Billing

Data Element: 6

Format: N16

Data Element 6 specifies the **cardholder billing amount** associated with the transaction. It represents the amount that will ultimately be **posted to the cardholder's account**.

The Amount, Cardholder Billing is a **constructed numeric data element** composed of three subcomponents, totalling **16 numeric digits**, and follows the same structural definition as Data Element 4 (Amount, Transaction) and Data Element 5 (Amount, Reconciliation).

This field conveys the monetary amount as expressed in the **cardholder's billing currency**, which may differ from both:

- The **transaction currency** used at the point of interaction.
- The **reconciliation or settlement currency** used between network participants.

Relationship to Other Amount Fields

Data Element 6 has the same format and encoding as Data Elements 4 and 5.

All three fields use the N16 constructed representation:

- Currency code (N3).
- Currency minor unit (N1).
- Amount (N12).

The distinction between these fields is **purely semantic**.

Over-the-Wire Format

Attribute	Value
Notation	N16
Length	8 bytes
Encoding	BCD (one digit per nibble)
Padding	Not applicable
Position	After the bitmap, according to field order

Subfield Layout

Positions	Subfield	Format	Description
1–3	Currency Code	N3	ISO 4217 numeric currency code used for cardholder billing.

Positions	Subfield	Format	Description
4	Currency Minor Unit	N1	Number of decimal digits used by the billing currency.
5–16	Amount	N12	Billing amount in minor units.

Semantics

- Data Element 6 represents the amount that will be **debited or credited to the cardholder's account**.
- The billing currency MAY differ from:
  - The transaction currency (DE-004).
  - The reconciliation currency (DE-005).
- This amount typically reflects:
  - Currency conversion performed by the issuer.
  - Exchange rates applied at posting time.
  - Issuer-specific rounding rules.
- The field is **unsigned**.
- Leading zeros are significant and MUST be preserved.

International Transaction Context

In cross-border or multi-currency transactions, the following amounts commonly coexist:

- **DE-004 — Amount, Transaction** The amount as initiated at the merchant or terminal, expressed in the transaction currency.
- **DE-005 — Amount, Reconciliation** The amount used for interchange clearing and settlement, often expressed in a scheme-defined settlement currency.
- **DE-006 — Amount, Cardholder Billing** The amount ultimately posted to the cardholder's account, expressed in the cardholder's billing currency.

Each amount serves a distinct purpose and MUST be interpreted independently, even though all three share the same structural format.

Sample Dump

Example: A transaction of **100.00 EUR** billed to the cardholder as **109.10 USD**.

- Billing currency (USD): `840`
- Currency minor unit: `2`
- Amount: `000000010910`

```
Logical value : 8402000000010910
Wire (hex)    : 84 02 00 00 00 10 91 00
```

Valid Values

- Currency code: `000`–`999` (ISO 4217 numeric).
- Currency minor unit: `0`–`9`.
- Amount: `000000000000`–`999999999999`.
- All digits MUST be numeric (`0`–`9`).

Notes

- Data Element 6 is typically present in **financial presentment** and **billing-related messages**.
- If present, its currency code and minor unit MUST be treated as authoritative for billing purposes.
- CMF 2.0.0 standardizes representation and encoding but does not mandate when cardholder billing amounts must be present; this is defined by the interchange profile.
- See Data Element 4 — Amount, Transaction for the normative definition of the `N16` constructed amount format.

DE-007: Date and Time, Transmission

Data Element: 7

Data Element 7 records the date and time at which the message was transmitted from the originator. It is used for timing, audit, and duplicate detection purposes across the interchange.

Over-the-Wire Format

Attribute	Value
Notation	`N10`
Length	10 digits / 5 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	`MMDDhhmmss`
Padding	Not applicable

- `MM` — month (01–12)
- `DD` — day of month (01–31)
- `hh` — hour (00–23)
- `mm` — minute (00–59)
- `ss` — second (00–59)

Semantics

- The timestamp reflects the time at the **message originator**, not an intermediate node.
- Year is omitted; implementations SHOULD apply contextual year determination based on the processing date.
- This field MUST be set at message origination and MUST NOT be altered by intermediate nodes.
- Implementations use this field in conjunction with DE-011 (STAN) for duplicate detection.

Sample Dump

Transmission date/time March 15, 14:30:22:

```
Logical : 0315143022
Wire    : 03 15 14 30 22
```

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DE-008: Amount, Cardholder Billing Fee

Data Element: 8

Data Element 8 specifies the fee amount to be charged to the cardholder in the cardholder billing currency. It supplements the transaction amount when a surcharge, convenience fee, or interchange fee applies.

Over-the-Wire Format

Attribute	Value
Notation	`xN12`
Length	8 bytes total (1 sign byte + 7 BCD bytes covering 12 digits + currency)
Length prefix	None (fixed length)
Encoding	ISO 8583:2003 amount encoding (`IFB_AMOUNT2003`)
Padding	Not applicable

The amount is encoded using the ISO 8583:2003 format:

- **Byte 0 (sign)**: `0xC0` = credit, `0xD0` = debit
- **Bytes 1–7**: BCD-encoded amount digits (12 digits) followed by 3-digit currency code

Semantics

- This field MUST be present when a fee affecting the cardholder billing amount is included.
- The currency is implied by DE-006 (Cardholder Billing Currency) or carried within the field itself per the encoding conventions.
- A zero value indicates no fee.
- Condition code 01 applies: this field is mandatory if fees affect reconciliation.

ewpage

DE-009: Conversion Rate, Reconciliation

Data Element: 9

Data Element 9 specifies the exchange rate applied when converting the transaction amount to the reconciliation currency.

Over-the-Wire Format

Attribute	Value
Notation	N8
Length	8 digits / 4 bytes
Length prefix	None (fixed length)
Encoding	BCD
Padding	Not applicable

The rate is expressed as 8 BCD digits. The decimal position is determined by bilateral agreement.

Semantics

- Condition code 05: mandatory when reconciliation and transaction currencies differ and this field was not provided in the request or advice message.
- The actual rate interpretation (scale, precision) is determined by the interchange profile.

ewpage

DE-010: Conversion Rate, Cardholder Billing

Data Element: 10

Data Element 10 specifies the exchange rate applied when converting the transaction amount to the cardholder billing currency.

Over-the-Wire Format

Attribute	Value
Notation	N8
Length	8 digits / 4 bytes
Length prefix	None (fixed length)
Encoding	BCD
Padding	Not applicable

Semantics

- Condition code 04: mandatory if Amount, Cardholder Billing or Amount, Cardholder Billing Fee is present.
- The decimal position is determined by bilateral agreement.

ewpage

DE-011: Systems Trace Audit Number (STAN)

Data Element: 11

Data Element 11, commonly referred to as the **STAN**, is a sequential number assigned by the message originator to uniquely identify a transaction within a processing session. It is the primary field used for request/response correlation and duplicate detection.

Over-the-Wire Format

Attribute	Value
Notation	N6
Length	6 digits / 3 bytes
Length prefix	None (fixed length)
Encoding	BCD
Padding	Not applicable

Semantics

- The STAN MUST be unique within the scope of the originating institution for a given processing date.
- The STAN is **mandatory** in all request messages.
- Response messages MUST echo the STAN from the corresponding request (mandatory echo — condition code ME).
- Values are assigned sequentially and typically cycle from `000001` to `999999`.
- The STAN alone does not guarantee global uniqueness; it is always used in combination with DE-007 (Transmission Date and Time) and the originating institution identification.

Sample Dump

STAN value 42:

```
Logical : 000042
Wire    : 00 00 42
```

ewpage

DE-012: Date and Time, Local Transaction

Data Element: 12

Data Element 12 records the local date and time at the card acceptor location when the transaction was initiated.

Over-the-Wire Format

Attribute	Value
Notation	`N14`
Length	14 digits / 7 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	`CCYYMMDDhhmmss`
Padding	Not applicable

- `CC` — century (e.g., `20`)
- `YY` — year within century (e.g., `26`)
- `MM` — month (01–12)
- `DD` — day (01–31)
- `hh` — hour (00–23)
- `mm` — minute (00–59)
- `ss` — second (00–59)

Semantics

- This field reflects the **local time at the point of service**, which may differ from the transmission time in DE-007.
- It is mandatory in all request messages and MUST be echoed in responses.
- When used for authorization matching, implementations MUST treat this as the authoritative transaction timestamp at the card acceptor.

Sample Dump

Local transaction date/time 2026-03-15 14:30:22:

```
Logical : 20260315143022
Wire    : 20 26 03 15 14 30 22
```

ewpage

DE-013: Date, Effective

Data Element: 13

Data Element 13 specifies the date from which the card becomes effective (valid from date). It is used in card verification flows.

Over-the-Wire Format

Attribute	Value
Notation	N6
Length	6 digits / 3 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	CCYYMM
Padding	Not applicable

- CC — century
- YY — year
- MM — month (01–12)

Semantics

- Condition code 02: mandatory if information is available and not read electronically from the card.
- This field is optional and used primarily when the card includes a valid-from date embossed or encoded.

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DE-014: Date, Expiration

Data Element: 14

Data Element 14 specifies the date on which the card expires. It is used to validate that the card is still within its validity period at the time of the transaction.

Over-the-Wire Format

Attribute	Value
Notation	N4
Length	4 digits / 2 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	YYMM
Padding	Not applicable

- YY — year (two digits)
- MM — month (01–12)

A card is valid through the **last day of the specified month**.

Semantics

- Condition code 02: mandatory if not read electronically from the card and information is available.
- The issuer determines validity by comparing this value against the current date.
- Implementations MUST NOT accept transactions where the expiration date precedes the transaction date, unless explicit override logic applies.

Sample Dump

Expiration date December 2028:

```
Logical : 2812
Wire    : 28 12
```

ewpage

DE-015: Date, Settlement

Data Element: 15

Data Element 15 specifies the date on which the transaction is to be settled between the acquirer and the issuer.

Over-the-Wire Format

Attribute	Value
Notation	N8
Length	8 digits / 4 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	CCYYMMDD
Padding	Not applicable

Semantics

- Optional in requests; if present, it MUST be echoed in responses.
- Indicates the intended settlement date agreed between the interchange participants.
- When absent, the settlement date is determined by the receiving institution's default cut-off rules.

ewpage

DE-016: Date, Conversion

Data Element: 16

Data Element 16 specifies the date on which the currency conversion rate in DE-009 or DE-010 applies.

Over-the-Wire Format

Attribute	Value
Notation	N4
Length	4 digits / 2 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	MMDD
Padding	Not applicable

Semantics

- Used in conjunction with DE-009 and DE-010 to anchor the exchange rate to a specific calendar date.
- Year is omitted; it is inferred from the processing context.

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DE-017: Date, Capture

Data Element: 17

Data Element 17 specifies the date on which the transaction was captured at the point of service or by the acquirer.

Over-the-Wire Format

Attribute	Value
Notation	N4
Length	4 digits / 2 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	MMDD
Padding	Not applicable

Semantics

- Year is omitted; it is inferred from the processing context.
- Used in deferred and batch presentment flows where the capture date may differ from the transaction date.

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DE-018: Message Error Indicator

Data Element: 18

Data Element 18 allows a receiver to report one or more field-level errors detected while parsing or validating the incoming message. It is returned in a response or acknowledgement message to inform the originator of the precise location and nature of each error, without requiring a separate rejection mechanism.

The field may carry up to ten independent error sets, each describing one error condition.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..140`, `LLLVAR`
Length	Up to 140 characters/bytes, plus 3-byte BCD length prefix
Length prefix	`LLLVAR` (3-digit BCD)
Encoding	Mixed: numeric sub-fields encoded as ASCII digits; dataset identifier and dataset bit/tag sub-fields encoded as raw binary bytes

Each error set is exactly **14 positions** long and is concatenated directly with the preceding set, with no separator. Up to 10 sets may be present, for a maximum field length of 140 bytes.

Error Set Structure

Pos	Length	Notation	Subfield
1–2	2	`N2` (ASCII)	Error severity
3–6	4	`N4` (ASCII)	Message error code
7–9	3	`N3` (ASCII)	Data element in error
10–11	2	`N2` (ASCII)	Data sub-element in error
12	1	`B1` (binary)	Dataset identifier in error
13–14	2	`B2` (binary)	Dataset bit or tag in error

Error Severity (positions 1–2)

Value	Meaning
`00`	Message rejected — the error is critical and the message was not processed.
`01`	Message accepted with warning — the error affects a non-critical element and the message was processed. Other values may be defined by bilateral agreement.

Message Error Code (positions 3–6) A 4-digit code identifying the type of error. Valid values are defined in Appendix: Error Codes. Reserved ranges:

- `0014–3999` — reserved for ISO use
- `4000–5999` — reserved for national use
- `6000–9999` — reserved for private use

Data Element in Error (positions 7–9) The ISO 8583 data element number (001–128) that contains the erroneous data.

Data Sub-element in Error (positions 10–11) Used only for **constructed data elements** (those with a fixed set of positional sub-elements, such as DE-030 Amounts Original). Contains the sub-element part number. MUST be set to `00` if the data element in error is primitive or composite.

Dataset Identifier in Error (position 12) Used only for **composite data elements** (dataset-structured fields such as DE-034, DE-049, DE-055). Contains the dataset identifier byte in binary format. MUST be set to `0x00` if the data element in error is primitive or constructed.

Dataset Bit or Tag in Error (positions 13–14) Used only for **composite data elements**. Contains the DBM bit number or BER-TLV tag number of the erroneous sub-element, encoded as a 2-byte big-endian binary value. MUST be set to `0x0000` if the data element in error is primitive or constructed.

Semantics

- This field is **mandatory** when DE-039 contains result code `9100` (One or more data element errors).
- Each error set MUST identify the specific location of the error within the message.
- For **primitive DEs**, only the data element number is relevant; sub-element, dataset identifier, and dataset bit/tag MUST be zero.
- For **constructed DEs**, the sub-element field identifies which fixed part of the constructed element is in error; dataset fields MUST be zero.

- For **composite DEs** (dataset-structured), both the dataset identifier and the relevant bit number or TLV tag MUST be set.
- Error sets are listed in ascending data element number order, with multiple errors on the same DE appearing in ascending sub-element or tag order.

Error Types by DE Class

DE type	Element	Sub-element	Dataset ID	Bit/Tag
Primitive	set	`00`	`0x00`	`0x0000`
Constructed	set	part number	`0x00`	`0x0000`
Composite (DBM)	set	`00`	dataset id	DBM bit number
Composite (TLV)	set	`00`	dataset id	TLV tag

Sample Wire Encoding

Example 1: Missing required field DE-037 (Retrieval Reference Number)

```
Error severity       : 00  (message rejected)
Message error code   : 0001  (required element missing)
Data element         : 037
Sub-element          : 00
Dataset identifier   : 0x00
Dataset bit/tag      : 0x0000

Wire (14 bytes): 30 30 30 30 30 31 30 33 37 30 30 00 00 00
```

Example 2: Invalid value in ICC data (DE-055), TLV tag 0x9F26

```
Error severity       : 00  (message rejected)
Message error code   : 0003  (invalid value)
Data element         : 055
Sub-element          : 00
Dataset identifier   : 0x37  (the ICC dataset identifier)
Dataset bit/tag      : 0x9F26

Wire (14 bytes): 30 30 30 30 30 33 30 35 35 30 30 37 9F 26
```

Field encoding note: positions 1–11 are ASCII digit characters (`0x30` = character `'0'`); positions 12–14 are raw binary bytes.

jPOS Implementation Notes

In jPOS, DE-018 is represented as an `IFB_LLLCHAR` field in both `cmf.xml` and `cmfv3.xml`. To produce DE-018 programmatically:

- Use `CheckFields` or a similar validation participant to accumulate field-level errors during transaction processing.
- Store a list of `FieldError` instances in the transaction context, each capturing the DE number, error code, and location within the DE.
- A `CreateResponse` or equivalent participant reads that list and serializes it into the 14-byte-per-set wire format.

This participant-based approach keeps the low-level wire encoding logic separate from business validation logic.

DE-019: Country Code, Acquiring Institution

Data Element: 19

Data Element 19 contains the ISO 3166-1 numeric country code of the acquiring institution.

Over-the-Wire Format

Attribute	Value
Notation	N3
Length	3 digits / 2 bytes (zero-padded)
Length prefix	None (fixed length)
Encoding	BCD, left zero-padded to 4 digits in 2 bytes
Padding	Leading zero digit

Since 3 digits occupy 1.5 bytes, the value is encoded as 4 BCD digits in 2 bytes with a leading zero digit. The following examples illustrate the encoding across the full ISO 4217 range:

ISO 4217	Currency	Wire
`032`	Argentinian Peso (ARS)	`00 32`
`036`	Australian Dollar (AUD)	`00 36`
`076`	Brazilian Real (BRL)	`00 76`
`124`	Canadian Dollar (CAD)	`01 24`
`566`	Nigerian Naira (NGN)	`05 66`
`826`	UK Pound Sterling (GBP)	`08 26`
`840`	US Dollar (USD)	`08 40`
`858`	Uruguayan Peso (UYU)	`08 58`
`978`	Euro (EUR)	`09 78`
…	*(all ISO 4217 numeric codes apply)*	…

Semantics

- The country code MUST conform to ISO 3166-1 numeric encoding.
- Condition code 33: mandatory once assigned, in all subsequent messages in the transaction.

DE-020: Country Code, Primary Account Number

Data Element: 20

Data Element 20 contains the ISO 3166-1 numeric country code of the country associated with the Primary Account Number (PAN). It identifies the country where the card was issued.

Over-the-Wire Format

Attribute	Value
Notation	N3
Length	3 digits / 2 bytes (zero-padded)
Length prefix	None (fixed length)
Encoding	BCD, left zero-padded to 4 digits in 2 bytes
Padding	Leading zero digit

Semantics

- The country code MUST conform to ISO 3166-1 numeric encoding.
- Condition code 33: mandatory once assigned, in all subsequent messages in the transaction.

DE-021: Transaction Life Cycle Identification Data

Data Element: 21

Data Element 21 is a constructed field that provides a unique identifier used to correlate related messages across the full life cycle of a transaction—from authorization through financial presentment, reversal, and chargeback. Once assigned, it carries the same value through all subsequent messages in the transaction's life.

Over-the-Wire Format

Attribute	Value
Notation	`B19`
Length	19 bytes (fixed)
Length prefix	None
Encoding	Binary — see sub-field table below
Padding	Not applicable

Sub-field Structure

The field is a fixed-format constructed element. All four sub-fields MUST be present. The last two sub-fields MUST be set to all-zeroes when omitted by mutual agreement.

Sub-field	Bytes	Notation	Description
0	1	`AN1` (ASCII)	Life cycle support indicator
1	15	`AN15` (ASCII)	Life cycle trace identifier
2	2	`N2` (BCD)	Life cycle transaction sequence number
3	4	`N4` (BCD)	Life cycle authentication token

Sub-field 0 — Life Cycle Support Indicator A single ASCII character indicating the message class at which the life cycle identifier was first assigned. Common values:

Value	Meaning
1	First assigned during an authorization message (1xx).
2	First assigned during a financial presentment message (2xx).

Sub-field 1 — Life Cycle Trace Identifier A 15-character alphanumeric string. Its format and the institution responsible for assigning it are defined by bilateral agreement between the interchange parties.

Sub-field 2 — Life Cycle Transaction Sequence Number A 2-byte BCD value. When a single authorization covers multiple financial presentments (e.g. multiple tickets purchased in a single airline transaction), the acquirer increments this number to distinguish each presentment. When multiple authorizations cover a single financial presentment (e.g. hotel stay extension), all authorizations share the same sequence number.

When omitted by mutual agreement, this sub-field MUST be set to `0x0000`.

Sub-field 3 — Life Cycle Authentication Token A 4-byte BCD value assigned by the card issuer when the transaction is authorized. The acquirer echoes this value in the subsequent financial presentment to provide a quick check that critical data elements match the original authorization.

When omitted by mutual agreement, this sub-field MUST be set to `0x00000000`.

Semantics

- DE-021 MUST be assigned the first time the transaction crosses the acquirer–issuer boundary.
- Once assigned, the life cycle support indicator and life cycle trace identifier MUST remain unchanged in all subsequent messages: financial presentments, reversals, chargebacks, and retrievals.
- The transaction sequence number and authentication token MAY be omitted by mutual agreement, in which case they MUST be transmitted as all-zeroes.
- Condition code 33: mandatory once assigned.

Sample Dump

Life cycle support indicator `1`, trace `ABCDE1234567890`, sequence `0001`, token `0042`:

```
Sub-field 0 (indicator) : 31                          (ASCII '1')
Sub-field 1 (trace)     : 41 42 43 44 45 31 32 33
                          34 35 36 37 38 39 30        (ASCII '
                             ABCDE1234567890')
Sub-field 2 (sequence)  : 00 01                       (BCD 0001)
Sub-field 3 (token)     : 00 00 00 42                 (BCD 0042)
Full field (19 bytes)   : 31 41 42 43 44 45 31 32
                          33 34 35 36 37 38 39 30
                          00 01 00 00 00 42
```

DE-022: Point-of-Service Data Code

Data Element: 22

Format: B16

Description

Indicates the method used to capture the PAN and the terminal capabilities.

This is a constructed data element composed of four 32-bit elements (four bytes each) indicating:

- Card reading method used at POS.
- Cardholder verification method used at POS.
- POS environment.
- Security characteristics.

Over-the-Wire Format

Attribute	Value
Notation	B16
Length	16 bytes
Encoding	Binary
Padding	Not applicable
Position	After the bitmap, according to field order

Bit numbering convention

Following ISO 8583 convention, the bit columns in this table are numbered left to right, with **B1 representing the most significant bit** of each byte (hex value `0x80`). This convention originates from the early days of financial networks, where messages were transmitted serially over HDLC-framed links and bits were sent most-significant-first—the first bit to leave the wire was therefore bit 1. The convention was carried forward into ISO 8583 and applies consistently to all bitmap fields in the specification.

The jPOS `PosDataCode` class uses the opposite convention internally: flag values are plain Java `int` bitmasks where value 1 corresponds to the **least significant bit** of the 32-bit word. When the class serializes to the wire, it maps `int value 1` to bit B8 (`0x01`) of the first byte of each 4-byte sub-field. The two conventions are consistent on the wire—they differ only in how bits are named when reading from source code versus reading from the specification.

Implementations setting bits directly on a wire buffer MUST use ISO 8583 MSB-first numbering (B1 = `0x80`). Implementations using `PosDataCode` work in the jPOS internal convention and require no translation.

Card Reading Method Used at POS (Bits 1-16)

Reading Method	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Unknown	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Information not taken from card (e.g., RFID)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical (key entry or OCR reading of embossing or printed data either at time of transaction or after the event)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Bar code	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Magnetic stripe	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
ICC	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Account data on file	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-
ICC read attempted but failed	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Magnetic stripe read attempted but failed	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Fall back	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x

Semantics

- Bits 17-32 are reserved for ISO, national, and private use and are not used by jPOS Common Message Format.

Cardholder Verification Method Used at POS (Bits 1-16)

The following table lists the value attributed to each bit of the 32 bits (four bytes) indicating the cardholder verification method used by the POS.

Verification Method	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Unknown	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not verified	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manual signature verification	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Online PIN	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Offline PIN in clear	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Offline PIN encrypted	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Offline digital signature/certificate	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Offline biometric	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Offline biographic	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Credential on file (on-device CVM)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x

Semantics

- Bits 17-32 are reserved for ISO, national, and private use and are not used by jPOS Common Message Format.

POS Environment (Bits 1-16)

The following table lists the value attributed to each bit of the 32 bits (four bytes) indicating the POS environment.

Environment	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Unknown	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attended POS	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unattended, details unknown	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Mail order / telephone order	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Electronic commerce	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Mobile commerce	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Recurring transaction	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Stored details	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-
Cardholder Activated Terminal (CAT)	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-

Environment	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Reserved ISO	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-
Reserved national	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-
Reserved national	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-
Reserved private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
Reserved private	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x

Security Characteristics

The fourth 32-bit element contains security characteristics. The specification does not define these values; they are reserved for future use.

DE-023: Card Sequence Number

Data Element: 23

Data Element 23 identifies a specific card when multiple cards are associated with the same account. It is used to distinguish between primary and supplementary cards or to identify a reissued card.

Over-the-Wire Format

Attribute	Value
Notation	N3
Length	3 digits / 2 bytes (zero-padded)
Length prefix	None (fixed length)
Encoding	BCD, left zero-padded to 4 digits in 2 bytes
Padding	Leading zero digit

Semantics

- Condition code 02: mandatory if information is available and not read electronically from the card.
- A value of `001` typically identifies the primary cardholder's card.
- Implementations MUST treat this as a card-level identifier, not a cardholder-level identifier.

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DE-024: Function Code

Data Element: 24

Data Element 24 specifies the specific type of transaction or network management function being requested or reported. It refines the intent conveyed by the MTI and Processing Code.

Over-the-Wire Format

Attribute	Value
Notation	N3
Length	3 digits / 2 bytes (zero-padded)
Length prefix	None (fixed length)
Encoding	BCD, left zero-padded to 4 digits in 2 bytes
Padding	Leading zero digit

Semantics

- The Function Code is mandatory in all request messages.
- It must be interpreted in conjunction with the MTI.
- Valid values are defined in Appendix B: Function Codes.

Notes

- Within jPOS-based systems, the combination of the MTI (last 3 digits), the first 2 digits of DE-003 (Processing Code), and DE-024 (Function Code) together identify the precise transaction type being performed.

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DE-025: Message Reason Code

Data Element: 25

Data Element 25 provides additional context for the message, typically indicating the reason for a particular action such as a reversal, chargeback, or administrative transaction.

Over-the-Wire Format

Attribute	Value
Notation	N4
Length	4 digits / 2 bytes
Length prefix	None (fixed length)
Encoding	BCD
Padding	Not applicable

Semantics

- Valid values are defined in the Reason Codes appendix.
- In reversal messages, this field indicates the reason the original transaction is being reversed.
- In chargeback messages, this field indicates the reason for the chargeback.

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DE-026: Merchant Category Code (MCC)

Data Element: 26

Data Element 26 contains the Merchant Category Code (MCC) that classifies the type of business operated by the card acceptor. It is used for transaction routing, interchange fee determination, and spending controls.

Over-the-Wire Format

Attribute	Value
Notation	N4
Length	4 digits / 2 bytes
Length prefix	None (fixed length)
Encoding	BCD
Padding	Not applicable

Semantics

- MCC values are defined by ISO 18245 and maintained by the payment schemes.
- Condition code 36: mandatory in response messages for certain transaction types.
- The MCC is assigned to the card acceptor by the acquiring institution at the time of boarding.
- Implementations SHOULD validate that the MCC is consistent with the card acceptor identification code.

Valid Values

See Appendix: MCC Codes for the standard MCC table.

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DE-027: POS Capability

Data Element: 27

Describes the capabilities of the point-of-service terminal: card reading methods supported, cardholder verification methods supported, and capacity limits for approval codes, receipts, display data, ICC scripts, PIN input, track 3 rewrite, and card capture.

Relationship to DE-022
DE-022 (Point-of-Service Data Code) records what **actually happened** in a transaction. DE-027 (POS Capability) records what the terminal is **capable of**. Sub-fields 27-1 and 27-2 use the same bit tables as DE-022 sub-fields 1 and 2. The jPOS `PosDataCode` enums `ReadingMethod` and `VerificationMethod` apply to both fields.

Over-the-Wire Format

Attribute	Value
Notation	`ANB27`
Length	27 bytes (fixed)
Length prefix	None
Encoding	Mixed — binary for sub-fields 1, 2, 11; numeric ASCII for 3–8; ASCII for 9, 10
Padding	None

Sub-field Layout

Sub-field	Name	Format	Bytes
27-1	POS card reading capability	`B4`	1–4
27-2	POS cardholder verification capability	`B4`	5–8
27-3	Approval code length	`N1`	9
27-4	Cardholder receipt data length	`N3`	10–12
27-5	Card acceptor receipt data length	`N3`	13–15
27-6	Cardholder display data length	`N3`	16–18
27-7	Card acceptor display data length	`N3`	19–21
27-8	ICC scripts data length	`N3`	22–24
27-9	Magnetic stripe track 3 rewrite cap.	`A1`	25
27-10	Card capture capability	`A1`	26
27-11	PIN input length capability	`B1`	27

For sub-fields 27-4 through 27-8, `000` indicates no such capability. For sub-fields 27-9 and 27-10, `Y` = capable, `N` = not capable.

Sub-field 27-1: POS Card Reading Capability (Bits 1–16)

Indicates which card reading methods the terminal supports. Uses the same bit layout as DE-022 sub-field 1 (Card Reading Method). B1 = MSB = `0x80`.

Reading Capability	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Unknown	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Information not taken from card (e.g., RFID)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Physical (key entry or OCR reading of embossing or printed data either at time of transaction or after the event)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Bar code	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Magnetic stripe	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
ICC	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Account data on file	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-
ICC read attempted but failed	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Magnetic stripe read attempted but failed	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Fall back	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
Reserved ISO	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x

Bits 17–32 are reserved for ISO, national, and private use and are not used by jPOS Common Message Format.

Sub-field 27-2: POS Cardholder Verification Capability (Bits 1–16)

Indicates which cardholder verification methods the terminal supports. Uses the same bit layout as DE-022 sub-field 2 (Cardholder Verification Method). B1 = MSB = `0x80`.

Verification Capability	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Unknown	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
None	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manual signature verification	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Online PIN	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Offline PIN in clear	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Offline PIN encrypted	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Offline digitized signature analysis	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-

Verification Capability	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
Offline biometrics	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-
Offline manual verification (e.g., passport or driver's license)	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-
Offline biographics	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-
Account based digital signature	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-
Public key based digital signature	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Reserved	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-
Reserved	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-
Reserved	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-
Reserved	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x

Bits 17–32 are reserved for ISO, national, and private use and are not used by jPOS Common Message Format.

Sub-fields 27-3 through 27-11: Capacity and Feature Flags

Sub-field	Name	Format	Notes
27-3	Approval code length	N1	Maximum approval code length supported
27-4	Cardholder receipt data length	N3	Max receipt characters for cardholder; 000 = not capable
27-5	Card acceptor receipt data length	N3	Max receipt characters for merchant; 000 = not capable
27-6	Cardholder display data length	N3	Max display characters for cardholder; 000 = not capable
27-7	Card acceptor display data length	N3	Max display characters for merchant; 000 = not capable
27-8	ICC scripts data length	N3	Max ICC script bytes supported; 000 = not capable
27-9	Magnetic stripe track 3 rewrite capability	A1	Y = capable, N = not capable
27-10	Card capture capability	A1	Y = capable, N = not capable
27-11	PIN input length capability	B1	Maximum PIN length as a single byte binary value

Semantics

- Condition code 02: present when terminal capability data is available.
- The bit numbering convention is identical to DE-022: B1 = MSB = `0x80`. See the bit numbering note in DE-022 for the historical rationale.

DE-028: Date, Reconciliation

Data Element: 28

Data Element 28 specifies the date used for reconciliation purposes between interchange participants.

Over-the-Wire Format

Attribute	Value
Notation	N8
Length	8 digits / 4 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	CCYYMMDD
Padding	Not applicable

Semantics

- Condition code 23: mandatory if the transaction affects reconciliation and checkpoint reconciliation is used.
- Used to identify which reconciliation cycle the transaction belongs to.

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DE-029: Reconciliation Indicator

Data Element: 29

Data Element 29 contains a code that provides additional information about the reconciliation status or type.

Over-the-Wire Format

Attribute	Value
Notation	N3
Length	3 digits / 2 bytes (zero-padded)
Length prefix	None (fixed length)
Encoding	BCD, left zero-padded to 4 digits in 2 bytes
Padding	Leading zero digit

Semantics

- Condition code 24: mandatory if this message is used for cutover or checkpoint reconciliation.
- Values are defined by bilateral agreement between interchange participants.

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DE-030: Amounts, Original

Data Element: 30

Original transaction and reconciliation amounts from the originating message. Used in reversal and chargeback messages to carry the amounts from the original financial presentment.

Over-the-Wire Format

Attribute	Value
Notation	N32
Length	32 digits / 16 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

Sub-fields

The field is a fixed-length concatenation of two 16-digit amounts, each using the same XN16 structure as DE-004:

Sub-field	Name	Format	Digits
30-1	Original amount, transaction	XN16	1–16
30-2	Original amount, reconciliation	XN16	17–32

Each XN16 amount is a constructed value:

Part	Name	Format	Position within sub-field
30-x.1	Currency code	N3	1–3
30-x.2	Currency minor unit	N1	4
30-x.3	Amount value	N12	5–16

Semantics

- Sub-field values MUST use the same currency encoding as DE-004.
- If a sub-field is not applicable, it MUST be zero-filled.

- Condition code 12: mandatory if the transaction affects reconciliation and this data element was not provided in the request or advice message.

DE-031: Acquirer Reference Number

Data Element: 31

Data Element 31 is a unique reference number assigned by the acquirer to identify a specific transaction throughout its lifecycle, including chargebacks and retrievals.

Over-the-Wire Format

Attribute	Value
Notation	N23
Length	23 digits / 12 bytes
Length prefix	None (fixed length)
Encoding	BCD (23 digits, left zero-padded to 24 digits in 12 bytes)
Padding	Leading zero digit

Semantics

- Condition code 33: once assigned, MUST be present in all subsequent messages in the transaction lifecycle, including financial presentments, chargebacks, reversals, and retrievals.
- The reference number MUST contain the same value as originally assigned.

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DE-032: Acquiring Institution Identification Code

Data Element: 32

Data Element 32 identifies the acquiring institution that is routing or processing the transaction. It is used for routing decisions and audit purposes.

Over-the-Wire Format

Attribute	Value
Notation	`N..11`
Length	Up to 11 digits
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	BCD
Padding	If odd number of digits, final nibble padded with `F`

Semantics

- Condition code 33: mandatory once assigned.
- The code identifies the institution responsible for acquiring the transaction.
- In jPOS-based systems this is typically the BIN or IIN of the acquiring bank.

Sample Dump

Acquirer code `12345678901` (11 digits):

```
Length  : 11 → wire 0x11 (BCD)
Value   : 12 34 56 78 90 1F
Wire    : 11 12 34 56 78 90 1F
```

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DE-033: Forwarding Institution Identification Code

Data Element: 33

Data Element 33 identifies the institution that is forwarding the transaction message toward the issuer or authorization system. It may differ from the acquiring institution when intermediate routing nodes are present.

Over-the-Wire Format

Attribute	Value
Notation	`N..11`
Length	Up to 11 digits
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	BCD
Padding	If odd number of digits, final nibble padded with `F`

Semantics

- Condition code 10: mandatory when the forwarding institution is not the same as the institution originating the message.
- Condition code 33: mandatory once assigned in all subsequent messages.

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DE-034: Electronic Commerce Data

Data Element: 34

Format: `B..9999`, `LLLLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary – one or more dataset envelopes
Padding	None

The field is encoded as a sequence of **dataset envelopes**, each with the structure:

```
1 byte  -- Dataset identifier (0x01 for request; 0x73-0x77 for
   response datasets)
2 bytes -- Dataset content length (big-endian)
N bytes -- Dataset content (DBM bitmap + sub-field values, or BER-TLV)
```

Dataset `0x01` (request) encodes sub-fields as BER-TLV. Datasets `0x73`–`0x77` (response) encode sub-fields using a DBM bitmap: the first 2 bytes (16 bits) are always present; bit 1 of each byte group is a **continuation bit** – if set, the next byte extends the bitmap by 8 more bits. Each remaining bitmap bit, when set, indicates that the corresponding sub-field value follows in the payload.

The jPOS `DatasetPackager` implements this encoding; use `ISODatasetField` to construct and inspect datasets programmatically.

Description

Composite data element containing information related to 3-D Secure transactions and other e-commerce details.

Dataset 0x01 – Authentication Data (Request, TLV)

Sub-fields are encoded as BER-TLV elements within the dataset `0x01` envelope.

Dataset 0x73 – Authentication Data (Response)

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Account-based digital signature	LLVAR	B..90
3	Cardholder certificate serial number	LLVAR	B..16
4	Card acceptor certificate serial number	LLVAR	B..16
5	XID		B16
6	Authentication value		B20
7	Authentication code	LLVAR	ANSB..50
8	Authentication message version number	LLVAR	ANS..8
9	Authentication message category		AN2
10	Authentication merchant name	LLVAR	ANS..40
11	Authentication browser IP address	LLVAR	ANS..45
12	Authentication device information	LLLLVAR	ANS..9999
13	Authentication purchase amount	LLVAR	ANS..48
14	Authentication purchase currency		N3
15	Authentication purchase date and time		N14
16	Authentication address match indicator		A1
17	Continuation bit		
18	Authentication intermediary transaction identifier	LLVAR	ANS..36
19	Authentication server transaction identifier	LLVAR	ANS..36
20	Authentication status		A1
21	Application IP address	LLVAR	ANS..45
22	Shipping indicator		AN2

Dataset 0x74 – Additional Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Initiating party		AN1 (0 = customer, 1 = merchant)
3	Secure temporary storage, POS device capable		AN1 (1 = true)
4	Secure temporary storage, issuer capable		AN1 (1 = true)
5	Secure temporary storage, transaction utilized		AN1 (1 = true)
6	High risk transaction, acceptor		AN1 (1 = true)
7	Risk conditions, acceptor	LLVAR	AN2, iterative, up to 30
8	Deferred delivery		AN1 (1 = true)
9	Acceptance environment authentication outage indicator		AN1 (0 = no outage, 1 = outage)

Dataset 0x75 – Additional Service Request Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Card activation requested		AN1 (Y = yes, N = no)
3	Cash back requested		AN1 (Y = yes, N = no)
4	DCC requested		AN1 (Y = yes, N = no)
5	Instant payment requested		AN1 (Y = yes, N = no)
6	Loyalty requested		AN1 (Y = yes, N = no)
7	Account balance requested		AN1 (Y = yes, N = no)

Dataset 0x76 – Additional Service Result Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Card activation result		AN2 (see Service Result Codes)

Dataset bit	Name	Format	Representation
3	Cash back result		AN2 (see Service Result Codes)
4	DCC result		AN2 (see Service Result Codes)
5	Instant payment result		AN2 (see Service Result Codes)
6	Loyalty result		AN2 (see Service Result Codes)
7	Account balance result		AN2 (see Service Result Codes)

Dataset 0x77 – Terminal Information

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Terminal serial number	LLVAR	ANS..50
3	Terminal software version	LLVAR	ANS..70
4	Terminal location, latitude and longitude	LLVAR	ANS..25
5	Terminal certification identification	LLVAR	ANS..35

Semantics

- Unknown dataset bits MUST be preserved end to end.

DE-035: Track 2 Data

Data Element: 35

Track 2 data encoded on the magnetic stripe per ISO/IEC 7813, including the field separator and discretionary data, but excluding the start sentinel, end sentinel, and LRC character.

Over-the-Wire Format

Attribute	Value
Notation	`z..37`
Length	Variable, up to 37 nibbles (19 bytes)
Length prefix	1 byte BCD (LL)
Encoding	BCD nibble-packed; odd length padded with trailing `F` nibble
Padding	Trailing `F` nibble if odd digit count

Sub-fields

Sub-field	Format	Notes
Primary Account Number	`z..19`	Up to 19 digits
Field Separator	`z1`	`D` (hex `0xD`)
Expiration Date	`z4`	`YYMM`
Service Restriction Code	`z3`	Three digits
Discretionary Data	`z..11`	Remaining digits up to field total of 37

Semantics

- The field separator is encoded as nibble value `0xD`, which is the Track 2 equivalent of the `=` character in ASCII representations.
- Condition code 02: present when track data is available.

DE-036: Track 3 Data

Data Element: 36

Track 3 data encoded on the magnetic stripe per ISO/IEC 4909, including the field separator and discretionary data, but excluding the start sentinel, end sentinel, and LRC character.

Over-the-Wire Format

Attribute	Value
Notation	`z..104`
Length	Variable, up to 104 nibbles (52 bytes)
Length prefix	2 bytes BCD (LLL)
Encoding	BCD nibble-packed; odd length padded with trailing F nibble
Padding	Trailing F nibble if odd digit count

Semantics

- Track 3 carries issuer-proprietary data and is not standardized across networks.
- Most modern card networks do not use Track 3; its presence is network-specific.
- Condition code 02: present when track 3 data is available.

DE-037: Retrieval Reference Number (RRN)

Data Element: 37

Data Element 37, the **Retrieval Reference Number (RRN)**, is a 12-character alphanumeric identifier assigned by the acquirer for retrieval and chargeback purposes. It uniquely identifies the transaction within the acquirer's system.

Over-the-Wire Format

Attribute	Value
Notation	`AN12`
Length	12 characters
Length prefix	None (fixed length)
Encoding	ASCII
Padding	Space-padded on the right if shorter

Semantics

- The RRN is **mandatory** in all request messages and MUST be echoed unchanged in responses (mandatory echo).
- It MUST be unique within the acquiring institution for a given calendar date.
- Implementations MUST preserve leading and trailing spaces if present.
- The RRN is used by issuers and acquirers for transaction matching during retrieval and chargeback cycles.

Sample Dump

RRN `000000123456`:

```
Wire    : 30 30 30 30 30 30 31 32 33 34 35 36
```

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DE-038: Approval Code

Data Element: 38

Data Element 38 contains the authorization code assigned by the issuer or authorization system when a transaction is approved. It is returned in the response message and must be stored by the acquirer for subsequent financial presentment and chargeback cycles.

Over-the-Wire Format

Attribute	Value
Notation	AN6
Length	6 characters
Length prefix	None (fixed length)
Encoding	ASCII
Padding	Space-padded on the right

Semantics

- The approval code is **mandatory in response messages when the transaction is approved** (Condition code 31).
- It MUST be included in financial presentment messages when Condition code 18 applies (i.e., if the approval code is required to be less than six characters, the remaining positions are spaces).
- Condition code 40: mandatory in retrieval, chargeback, and fee collection messages if provided in the original financial presentment.
- Implementations MUST treat this as an opaque string; its internal structure is issuer-defined.

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DE-039: Result Code

Data Element: 39

Data Element 39, also referred to as the **Action Code** in ISO 8583:2003/2023, is returned by the issuer or switch to indicate the outcome of the transaction. It is the primary field used to determine whether a transaction was approved, declined, or could not be processed.

Over-the-Wire Format

Attribute	Value
Notation	N4
Length	4 digits / 2 bytes
Length prefix	None (fixed length)
Encoding	BCD
Padding	Not applicable

Semantics

- The result code is **mandatory in all response messages**.
- It MUST be selected from the defined set in Appendix: Result Codes.
- Codes in the `0xxx` range indicate approval; codes in `1xxx` and `2xxx` indicate denial; codes in `9xxx` indicate processing errors or network conditions.
- The CMF result code space maps to ISO 8583:2023 action code ranges and is extended with CMF private-use codes in the `18001999` range.
- Implementations MUST NOT use a result code that is not defined in Appendix: Result Codes. When the appropriate code is unknown or no matching code is defined, use `9999` (Other errors).
- `0000` (Approved or completed successfully) is the expected result code for all approved transactions across all message classes.

Notes

- The result code drives the transaction processing path at the acquirer, switch, and application layers.
- jPOS models result codes as the `CMF` enum in `org.jpos.rc.CMF`, which maps to the wire value via the `ircString()` method.

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DE-040: Service Code

Data Element: 40

Data Element 40 contains the service code read from the magnetic stripe or chip of the card. It defines the conditions under which the card may be used and the type of service allowed.

Over-the-Wire Format

Attribute	Value
Notation	N3
Length	3 digits / 2 bytes (zero-padded)
Length prefix	None (fixed length)
Encoding	BCD, left zero-padded to 4 digits in 2 bytes
Padding	Leading zero digit

Semantics

- The service code is a 3-digit value encoded on the magnetic stripe per ISO 7813 and on chip cards per EMV specifications.
- Condition code 06: mandatory if track data is captured at the point of service.
- Digit 1 defines the interchange rules and technology applicable; digit 2 defines the authorization processing requirements; digit 3 defines the service type allowed.

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DE-041: Card Acceptor Terminal Identification

Data Element: 41

Data Element 41 uniquely identifies the physical or logical terminal at which the transaction was initiated within the card acceptor location.

Over-the-Wire Format

Attribute	Value
Notation	`AN16`
Length	16 characters
Length prefix	None (fixed length)
Encoding	ASCII
Padding	Space-padded on the right

Semantics

- The terminal identification is **mandatory** in all authorization and financial presentment request messages.
- It MUST be echoed unchanged in responses.
- The value is assigned by the acquiring institution and MUST be unique within the scope of the card acceptor identification code.
- Spaces MUST be used for padding when the effective terminal ID is shorter than 16 characters.

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DE-042: Card Acceptor Identification Code

Data Element: 42

Code identifying the card acceptor.

Over-the-Wire Format

Attribute	Value
Notation	ANS..35
Length	Variable, up to 35 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Semantics

- Assigned by the acquirer; format is acquirer-defined.
- Used in conjunction with DE-041 (Card Acceptor Terminal ID) to identify the originating merchant.
- Should be used consistently across all messages within a transaction life cycle.
- Condition code 33: mandatory once assigned, in all subsequent messages in the transaction.

DE-043: Card Acceptor Name and Location

Data Element: 43

Name and location of the card acceptor as known to the cardholder. This is a composite field encoded with a bitmap followed by optional sub-fields.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary — ISO bitmap followed by present sub-fields
Padding	None

The field is encoded as one or more **dataset envelopes**, each structured as:

```
1  1 byte —  Dataset identifier (0x01 for request, 0x71 for response)
2  2 bytes — Content length (big-endian)
3  N bytes — Content: DBM bitmap + present sub-field values (dataset 0x71
       )
4              or BER-TLV elements (dataset 0x01)
```

Dataset **0x01** (request) encodes sub-fields as BER-TLV, using tag values `0x80`–`0x8E` for sub-fields 2–14 respectively. Dataset **0x71** (response) encodes sub-fields using a DBM bitmap where each set bit indicates the presence of the corresponding sub-field value.

The jPOS `DatasetPackager` implements this encoding.

Sub-fields

Bit	Name	Format	Max length
2	Card acceptor name	`LLVAR ANS`	50 chars
3	Card acceptor street address	`LLVAR ANS`	99 chars
4	Card acceptor city	`LLVAR ANS`	50 chars
5	Card acceptor state, province, or region code	`ANS`	3 chars
6	Card acceptor postal code	`ANS`	10 chars
7	Card acceptor country code	`ANS`	3 chars

Bit	Name	Format	Max length
8	Card acceptor phone number	ANS	16 chars
9	Card acceptor customer service phone number	ANS	16 chars
10	Card acceptor additional contact information	LLVAR ANS	30 chars
11	Card acceptor internet URL	LLLVAR ANS	255 chars
12	Card acceptor e-mail address	LLVAR ANS	99 chars
13	Card acceptor geographic location	LLVAR ANS	19 chars
14	Card acceptor additional address information	LLLVAR AN	255 chars

Semantics

- All sub-fields are optional; only those relevant to the transaction need be included.
- Sub-fields 5, 6, and 7 are fixed-length ASCII; all others are length-prefixed.
- Condition code 02: present when card acceptor location data is available.

DE-044: Additional Response Data

Data Element: 44

Additional display and receipt data returned in response messages, along with issuer contact information. Structured as a dataset envelope.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary – one or more dataset envelopes
Padding	None

The field is encoded as a **dataset envelope**:

```
1 byte  -- Dataset identifier (0x71 for response)
2 bytes -- Content length (big-endian)
N bytes -- DBM bitmap + present sub-field values
```

Dataset 0x71 – Additional Response Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Card acceptor display data	`LLVAR`	`ANS..99`
3	Card acceptor receipt data	`LLVAR`	`ANS..99`
4	Card issuer telephone number		`ANS16`
5	Cardholder receipt data	`LLVAR`	`ANS..99`
6	Cardholder display data	`LLVAR`	`ANS..99`

Semantics

- Condition code 02: present in response messages when additional display or receipt data is provided by the issuer.

DE-045: Track 1 Data

Data Element: 45

Data Element 45 contains data read from Track 1 of the magnetic stripe on a payment card, as defined by ISO 7813. Track 1 carries the account number, cardholder name, expiration date, service code, and discretionary data.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..76`
Length	Up to 76 characters
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	ASCII

Semantics

- Condition code 06: mandatory if track data is captured at the point of service.
- Track 1 data MUST be transmitted unmodified from the card reader.
- The data includes the start sentinel (%), format code, PAN, separator (^), name, separator, expiration/service code/discretionary data, and end sentinel (?) plus LRC, though sentinels and LRC are typically stripped before transmission.
- PCI DSS prohibits storage of full Track 1 data after authorization.

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DE-046: Amounts, Fees

Data Element: 46

Fees associated with the transaction. A repeating constructed data element of up to six fee sets, each 36 characters, for a maximum total of 216 characters.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..216`
Length	Variable, up to 216 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Fee Set Structure

Each fee set occupies exactly 36 characters:

Sub-field	Name	Format	Position	Notes
46-1	Fee type code	`N2`	1–2	See fee type codes below
46-2	Amount fee	`XN13`	3–15	Currency code N3 + minor unit N1 + value N8 (with sign)
46-3	Conversion rate fee	`N8`	16–23	Implied decimal; 0 = not applicable
46-4	Amount reconciliation fee	`XN13`	24–36	Currency code N3 + minor unit N1 + value N8 (with sign)

The field may contain 1 to 6 consecutive fee sets with no separator.

Fee Type Codes

Code	Description
`00`	Transaction fee
`02`	Fee collection fee
`07`	Card acceptor service fee

Semantics

- Each `XN13` amount is a constructed value: `N3` currency code + `N1` currency minor unit + `N8` signed value (first character is `C` for credit or `D` for debit).
- Condition code 01: present when fees affect reconciliation.

DE-049: Verification Data

Data Element: 49

Format: `B..9999`, `LLLLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary — ISO bitmap followed by present sub-fields
Padding	None

The field is encoded as one or more **dataset envelopes**, each structured as:

```
1 byte — Dataset identifier (0x01 for request, 0x71 for response)
2 bytes — Content length (big-endian)
N bytes — Content: DBM bitmap + present sub-field values (dataset 0x71
    )
            or BER-TLV elements (dataset 0x01)
```

Dataset **0x01** (request) encodes sub-fields as BER-TLV. Dataset **0x71** (response) encodes sub-fields using a DBM bitmap. Bit 16, when set, indicates that one or more trailing BER-TLV elements follow the bitmap-addressed sub-fields (TLV continuation).

The jPOS `DatasetPackager` implements this encoding.

Description

Composite data element containing additional data used to identify a person or account through address verification, account verification, or other identification (national ID, driver's license, CVV2, CVC2, 4DBC, etc.).

Dataset 71—Request

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Card verification data		N4
3	Cardholder billing street address		ANS40
4	Cardholder billing postal code		ANS10
5	Cardholder billing address compressed		ANS16
6	Additional identification type		N1
7	Additional identification reference number	LLVAR	ANS..30
8-15	Reserved for ISO use		
16	Multiple TLV sub-elements	LLLVAR	B..255

Dataset 72—Response

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Address verification result code		AN1 (see AVS Codes)
3	Card verification value for card-not-present		AN2
4	Card verification value for card-present		AN2
5	ICC data validation		AN2
6-15	Reserved for ISO use		ANS40
16	Multiple TLV sub-elements	LLLVAR	B..255

DE-051: Customer Related Data

Data Element: 51

Composite field carrying customer identity, wallet provider, and account owner data associated with a transaction. Structured as typed dataset envelopes.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary – one or more dataset envelopes
Padding	None

The field is encoded as one or more **dataset envelopes**, each structured as:

```
1 byte  -- Dataset identifier
2 bytes -- Content length (big-endian)
N bytes -- Content: DBM bitmap + sub-field values (datasets 0x71-0x75)
           or BER-TLV elements (datasets 0x01-0x05)
```

Dataset 0x71 – Payment Account Reference

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Payment account reference (PAR)	`LLVAR`	`AN..35`
3	PAN reference identifier	`LLVAR`	`ANS..35`

Dataset 0x72 – Customer Contact Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Customer phone number, home	`LLVAR`	`ANS..16`

Dataset bit	Name	Format	Representation
3	Customer phone number, business	LLVAR	ANS..16
4	Customer phone number, mobile	LLVAR	ANS..16
5	Customer phone number, other	LLVAR	ANS..16
6	Customer e-mail address, personal	LLVAR	ANS..99
7	Customer e-mail address, business	LLVAR	ANS..99
8	Customer e-mail address, other	LLVAR	ANS..99

Dataset 0x73 – Customer Identification

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Passport	LLVAR	ANS..35
3	Passport issuing country code		N3
4	National identification	LLVAR	ANS..35
5	National identification issuing country code		N3
6	Driver license	LLVAR	ANS..35
7	Driver license issuing country code		N3
8	Driver license issuing state, province, or region code		ANS3
9	Social security number	LLVAR	ANS..35
10	Tax identification	LLVAR	ANS..35
11	Tax identification issuing country code		N3
12	Proxy identification	LLVAR	ANS..99
13	Customer identification, unspecified	LLVAR	ANS..99

Dataset 0x74 – Wallet Provider Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Wallet provider identification	LLVAR	ANS..35
3	Wallet provider identification assigner	LLVAR	ANS..35
4	Wallet provider country code		N3
5	Wallet provider short name	LLVAR	ANS..35

Dataset bit	Name	Format	Representation
6	Wallet additional data	LLVAR	ANS..256

Dataset 0x75 – Account Owner Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Account reference code		N2
3	Account owner designation		N2
4	Account owner name, full	LLVAR	AN..99
5	Account owner name, given	LLVAR	AN..99
6	Account owner name, middle	LLVAR	AN..35
7	Account owner name, last	LLVAR	AN..35
8	Account owner address line 1	LLVAR	ANS..99
9	Account owner address line 2	LLVAR	ANS..99
10	Account owner postal code	LLVAR	ANS..16
11	Account owner city name	LLVAR	ANS..50
12	Account owner country	LLVAR	A3

Semantics

- Dataset 0x71 carries the **Payment Account Reference (PAR)** — a stable, token-agnostic identifier assigned by the card network that links all tokens and the underlying PAN for a given account.
- Unknown dataset bits MUST be preserved end to end.
- Condition code 02: present when customer data is available.

DE-052: PIN Data

Data Element: 52

Data Element 52 carries the encrypted Personal Identification Number (PIN) block. The PIN is encrypted at the PIN Entry Device (PED) and transmitted to the issuer for verification without ever being exposed in plaintext.

Over-the-Wire Format

Attribute	Value
Notation	B8
Length	8 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	Not applicable

Semantics

- The PIN block is 8 bytes and MUST be encrypted using a PIN Encryption Key (PEK) before transmission.
- The PIN block format MUST comply with ISO 9564 (formats 0, 1, 3, or 4 are common).
- Condition code 02: mandatory if information is available and PIN entry occurred.
- The PEK used MUST be managed under the key hierarchy defined in DE-053 or via the HSM configuration of the interchange.
- Implementations MUST NEVER log or store the contents of this field.
- The corresponding Key Serial Number (KSN) for DUKPT-based encryption is carried in DE-113.52.

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DE-053: Security-Related Control Information

Data Element: 53

Security-related control information transmitted between communicating parties. The specific content and structure are network-defined and may carry key management data, cryptographic check values, or other security parameters.

Over-the-Wire Format

Attribute	Value
Notation	B..48
Length	Variable, up to 48 bytes
Length prefix	1 byte BCD (LL)
Encoding	Binary
Padding	None

Semantics

- Content is network-defined; the ISO 8583 standard does not prescribe sub-field layout.
- Typical uses include key management information and cryptographic verification values.
- Condition code 02: present when required by the applicable network specification.

DE-054: Additional Amount(s)

Data Element: 54

Format: AN..126, LLLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..126
Length	Variable, up to 126 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

The field contains 1 to 6 consecutive amount sets, each exactly 21 characters, with no separator between sets.

Description

Constructed data element composed of up to six 21-digit amounts.

Sub-fields

Name	Format
Account type	N2 (see DE-003)
Amount type	N2 (01 = Account ledger/current balance, 02 = Account available balance, 07 = Destination account ledger balance, 08 = Destination account available balance, 20 = Amount remaining this cycle, 40 = Amount cash, 42 = Amount surcharge, 80 = Gratuity, 81 = Amount taxed)
Currency code	N3
Currency minor unit	N1

Name	Format
Amount sign	`A1` (C = credit, D = debit)
Value amount	`N12`

DE-055: Integrated Circuit Card (ICC) Related Data

Data Element: 55

ICC-related data in BER-TLV format, as defined by ISO/IEC 7816-4 and EMV specifications. Carries the cryptographic and application data exchanged between the ICC and the terminal during an EMV transaction.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Raw BER-TLV (ISO/IEC 7816-4)
Padding	None

Unlike other composite fields in CMF, DE-055 does **not** use a dataset identifier and length envelope. The payload is raw BER-TLV data, concatenated directly after the LLLL length prefix.

The jPOS `ICCDataPackager` implements this encoding. Each TLV element in the payload follows BER-TLV encoding rules:

```
Tag — 1 or more bytes (EMV tag)
Length — 1 byte (short form) or 2 bytes (long form, 0x81 prefix)
Value — Length bytes of data
```

Common EMV Tags

The following EMV tags are commonly present in DE-055. This is not an exhaustive list; the full set is defined in the EMV Contactless Book C and Book 3 specifications.

Tag	Name
`9F26`	Application Cryptogram (AC)
`9F27`	Cryptogram Information Data
`9F10`	Issuer Application Data
`9F37`	Unpredictable Number
`9F36`	Application Transaction Counter (ATC)

Tag	Name
95	Terminal Verification Results (TVR)
9A	Transaction Date
9C	Transaction Type
9F02	Amount, Authorised
5F2A	Transaction Currency Code
82	Application Interchange Profile (AIP)
9F1A	Terminal Country Code
84	Dedicated File (DF) Name

Semantics

- Present in authorization requests and responses for EMV (ICC and contactless) transactions.
- The issuer uses the Application Cryptogram (tag 9F26) and related data for online cryptogram validation.
- Unknown or proprietary tags MUST be preserved end to end.
- Condition code 02: present when ICC data is available from the terminal.

DE-056: Original Data Elements

Data Element: 56

Data Element 56 identifies the original transaction being reversed, charged back, or otherwise referenced. It carries key identifiers from the original message.

Over-the-Wire Format

Attribute	Value
Notation	`N..41`
Length	Up to 41 digits
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	BCD

The field contains the following concatenated sub-fields (all BCD):

Subfield	Length	Description
MTI	4 digits	Message type indicator of the original message
STAN	6 digits	Systems trace audit number of the original
Transmission date/time	10 digits	DE-007 of the original (MMDDhhmmss)
Acquiring institution code	Up to 11 digits	DE-032 of the original

Semantics

- Mandatory in reversal messages (Condition code 03).
- The values MUST match exactly those transmitted in the original message.
- Implementations MUST use this field rather than DE-037 (RRN) as the primary linkage in reversal matching.

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DE-057: Authorization Life Cycle Code

Data Element: 57

Data Element 57 indicates the life cycle status of the authorization, including whether it has expired, been extended, or is subject to supplementary controls.

Over-the-Wire Format

Attribute	Value
Notation	N3
Length	3 digits / 2 bytes (zero-padded)
Length prefix	None (fixed length)
Encoding	BCD, left zero-padded to 4 digits in 2 bytes
Padding	Leading zero digit

Semantics

- Used in pre-authorization and authorization extension flows.
- Condition code 08: mandatory in replacement, previously authorized, retrieval, representment, partial reversal, or partial chargeback messages.
- Values are defined by bilateral agreement or scheme rules.

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DE-058: Authorizing Agent Institution Identification Code

Data Element: 58

Data Element 58 identifies the institution that authorized the transaction on behalf of the issuer. It is used when stand-in processing or proxy authorization is performed.

Over-the-Wire Format

Attribute	Value
Notation	`N..11`
Length	Up to 11 digits
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	BCD
Padding	Trailing `F` nibble if odd digit count

Semantics

- Condition code 20: mandatory when the processing institution differs from the institution identified by the PAN.
- Used by switches that perform stand-in authorization.

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DE-059: Transport Data

Data Element: 59

Data supplied by the message originator that must be returned unaltered in the response message. Used to carry application-level routing, correlation, or context information end-to-end through the network.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..999`
Length	Variable, up to 999 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Semantics

- Content is application-defined; intermediaries MUST pass it through unchanged.
- The originator may use this field for transaction correlation, session tokens, or routing hints.
- Condition code 02: present when transport data is supplied by the originator.

DE-060: Reserved for National Use

Data Element: 60

Reserved for national use. Content and structure are defined by the applicable national network.

Over-the-Wire Format

Attribute	Value
Notation	ANS..999
Length	Variable, up to 999 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

DE-062: Reserved for Private Use

Data Element: 62

Reserved for private use. Content and structure are defined by bilateral agreement.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..999`
Length	Variable, up to 999 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

DE-063: Display Message

Data Element: 63

A locale-aware display message associated with the result code returned in the response. The message is intended for presentation to the cardholder or operator and is generated by the authorizing host based on the locale specified in the request.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..999`
Length	Variable, up to 999 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Semantics

- The message text is determined by the result code and the locale requested by the originator.
- Locale identifiers are defined at CMF configuration time.
- This field uses the ISO 8583 “reserved for private use” bit 63 and is specific to jPOS CMF deployments.
- Condition code 02: present in response messages when a display message is available.

DE-064: Message Authentication Code (MAC)

Data Element: 64

Message Authentication Code used to verify the integrity of the message. Calculated over defined data elements using an agreed algorithm and key.

Over-the-Wire Format

Attribute	Value
Notation	B4
Length	4 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	None

Semantics

- The MAC is calculated over specific fields as defined by the network security specification.
- Condition code 02: present when message authentication is required.

DE-065: Reserved for ISO Use

Data Element: 65

Reserved for future ISO use.

Over-the-Wire Format

Attribute	Value
Notation	B8
Length	8 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	None

DE-066: Amounts, Original Fees

Data Element: 66

Original fee amounts from the originating message. Same repeating structure as DE-046 (Amounts, Fees), carrying the original fee sets prior to any adjustment. Up to six fee sets, each 36 characters.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..216`
Length	Variable, up to 216 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Fee Set Structure

Each fee set occupies exactly 36 characters (same structure as DE-046):

Sub-field	Name	Format	Position
66-1	Original fee type code	`N2`	1–2
66-2	Original amount fee	`XN13`	3–15
66-3	Original conversion rate fee	`N8`	16–23
66-4	Original amount reconciliation fee	`XN13`	24–36

Semantics

- Used in reversal and chargeback messages to carry the original fee amounts.
- Condition code 02: present when original fee data is available.

DE-067: Extended Payment Data

Data Element: 67

Extended payment data indicator.

Over-the-Wire Format

Attribute	Value
Notation	N2
Length	2 digits / 1 byte (fixed)
Length prefix	None
Encoding	BCD
Padding	None

DE-068: Batch/File Transfer Message Control

Data Element: 68

Batch or file transfer message control data, identifying the acknowledgement type and sequence position of a message within a batch transfer.

Over-the-Wire Format

Attribute	Value
Notation	AN9
Length	9 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	Space-padded

Sub-fields

The sub-fields are positionally encoded within the fixed-length ASCII value. There is no length prefix or separator; callers extract sub-fields by character offset.

Sub-field	Format	Position
Batch/file transfer acknowledgement code	AN1	1
Batch/file transfer message seq number	N8	2–9

Semantics

- Condition code 02: present in batch and file transfer messages.

DE-069: Batch/File Transfer Control Data

Data Element: 69

Batch or file transfer control data providing a message count and a unique file identifier for the batch.

Over-the-Wire Format

Attribute	Value
Notation	`ANS40`
Length	40 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	Space-padded

Sub-fields

The sub-fields are positionally encoded within the fixed-length ASCII value. There is no length prefix or separator; callers extract sub-fields by character offset.

Sub-field	Format	Position
Batch/file transfer message count	`N8`	1–8
Batch/file transfer file identification	`ANS32`	9–40

Semantics

- The message count indicates the total number of messages in the batch or file transfer.
- The file identification is a unique identifier assigned to the batch by the originator.
- Condition code 02: present in batch and file transfer messages.

DE-070: File Transfer Description Data

Data Element: 70

Descriptive data about a file transfer operation, including file size and record counts.

Over-the-Wire Format

Attribute	Value
Notation	N18
Length	18 digits / 9 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

Sub-fields

Sub-field	Name	Format	Position
70-1	File transfer file size	N6	1–6
70-2	File transfer elementary data record count	N6	7–12
70-3	File transfer remaining elementary data record count	N6	13–18

Semantics

- Used in file action (06xx) messages.
- Condition code 02: present when file description data is available.

DE-071: Additional Transaction Specific Data

Data Element: 71

Additional transaction-specific data structured as dataset envelopes. Used for exchange rate information and other transaction-level data.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary – one or more dataset envelopes
Padding	None

Dataset 0x71 – Exchange Rate Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Exchange rate provider	`LLVAR`	`ANS..70`
3	Exchange rate identification	`LLVAR`	`ANS..70`
4	Exchange rate		`N8`
5	Base currency code, originator		`N3`
6	Counter currency code, originator		`N3`
7	Exchange rate, originator		`N8`
8	Exchange rate type, originator		`N1`
9	Exchange rate agreement type, originator		`N1`

Semantics

- Unknown dataset bits MUST be preserved end to end.
- Condition code 02: present when additional transaction-specific data is available.

DE-072: Data Record

Data Element: 72

Other data required to support an administrative or file action message. The content and structure are defined by the specific administrative transaction type.

Over-the-Wire Format

Attribute	Value
Notation	B..9999
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary
Padding	None

Semantics

- Used in administrative (08xx) and file action (06xx) message classes.
- Content is message-type-specific; the receiving party interprets the payload based on the function code in DE-024.
- Condition code 02: present when the administrative action requires accompanying data.

DE-073: Date, Action

Data Element: 73

Data Element 73 specifies the date on which the action requested by the message is to take effect. It is used in administrative and file action messages.

Over-the-Wire Format

Attribute	Value
Notation	N8
Length	8 digits / 4 bytes
Length prefix	None (fixed length)
Encoding	BCD
Format	CCYYMMDD
Padding	Not applicable

Semantics

- Used in file action and administrative messages to specify when the action (e.g., card activation, parameter update) should take effect.
- A future date indicates a scheduled action; the current processing date indicates an immediate action.

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DE-074: Reconciliation Data, Primary

Data Element: 74

Number and amount values required to complete reconciliation of financial totals. Six pairs of amount and transaction counter values covering credits, debits, and their corresponding chargebacks and reversals.

Over-the-Wire Format

Attribute	Value
Notation	`N156`
Length	156 digits / 78 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

All 12 sub-fields are always present and in fixed positions. The jPOS `GenericSubFieldPackager` packs them consecutively with no separator.

Sub-fields

ID	Name	Format	BCD bytes	Cumulative bytes
1	Credits amount	`N16`	8	8
2	Credits number	`N10`	5	13
3	Credits chargeback amount	`N16`	8	21
4	Credits chargeback number	`N10`	5	26
5	Credits reversal amount	`N16`	8	34
6	Credits reversal number	`N10`	5	39
7	Debits amount	`N16`	8	47
8	Debits number	`N10`	5	52
9	Debits chargeback amount	`N16`	8	60
10	Debits chargeback number	`N10`	5	65
11	Debits reversal amount	`N16`	8	73
12	Debits reversal number	`N10`	5	78

Each `N16` amount is a constructed value using the same currency encoding as DE-004: `N3` currency code + `N1` currency minor unit + `N12` amount value.

Semantics

- Used in reconciliation (08xx) messages.
- All counters represent the number of transactions in the reconciliation period.
- Condition code 12: mandatory if the transaction affects reconciliation and this data element was not provided in the request.

DE-093: Transaction Destination Institution Identification Code

Data Element: 93

Data Element 93 identifies the institution that is the ultimate destination of the transaction.

Over-the-Wire Format

Attribute	Value
Notation	`N..11`
Length	Up to 11 digits
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	BCD
Padding	Trailing `F` nibble if odd

Semantics

- Condition code 19: mandatory when the receiving institution is not the same as the final destination of the message.
- Condition code 33: mandatory once assigned in all subsequent messages.

ewpage

DE-094: Transaction Originator Institution Identification Code

Data Element: 94

Data Element 94 identifies the institution that originated the transaction.

Over-the-Wire Format

Attribute	Value
Notation	`N..11`
Length	Up to 11 digits
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	BCD
Padding	Trailing `F` nibble if odd

Semantics

- Condition code 33: mandatory once assigned.
- Identifies the original source institution when messages pass through multiple intermediaries.

ewpage

DE-095: Card Issuer Reference Data

Data Element: 95

Reference data supplied by the card issuer, returned unaltered in the response. Used to carry issuer-specific transaction identifiers or authorization reference values.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..99`
Length	Variable, up to 99 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Semantics

- Content is issuer-defined; intermediaries and acquirers MUST pass it through unchanged.
- Condition code 33: mandatory once assigned, in all subsequent messages in the transaction.

ISO 8583:2003 compatibility
In ISO 8583:2003, bit 95 was defined as **Replacement Amounts** (`N96`, fixed)—a constructed field carrying corrected transaction, settlement, and cardholder billing amounts for use in reversal and adjustment messages. This semantic was removed in ISO 8583:2023; the replacement amounts concept is now handled by DE-030 (Amounts, Original).
CMF targets ISO 8583:2023. The `cmf.xml` packager retains the ISO 8583:2003 layout for backward compatibility with v2003 deployments; `cmfv3.xml` implements the ISO 8583:2023 definition.

DE-096: Key Management Data

Data Element: 96

Key management data used to exchange cryptographic key information between communicating parties. The content and structure are network-defined.

Over-the-Wire Format

Attribute	Value
Notation	`B..999`
Length	Variable, up to 999 bytes
Length prefix	2 bytes BCD (LLL)
Encoding	Binary
Padding	None

Semantics

- Content is network-defined; format is determined by the key management scheme in use.
- Condition code 02: present when required by the applicable key management protocol.

DE-075: Reconciliation Data, Secondary

Data Element: 75

Secondary reconciliation data providing authorization and transaction counts by type. Companion to DE-074 (Reconciliation Data, Primary).

Over-the-Wire Format

Attribute	Value
Notation	`N90`
Length	90 digits / 45 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

Sub-fields

All 9 sub-fields are always present in fixed positions:

ID	Name	Format	BCD bytes	Cumulative bytes
75-1	Authorizations number	`N10`	5	5
75-2	Authorizations reversal number	`N10`	5	10
75-3	Inquiries reversal number	`N10`	5	15
75-4	Inquiries number	`N10`	5	20
75-5	Fee collections number	`N10`	5	25
75-6	Payments number	`N10`	5	30
75-7	Payments reversal number	`N10`	5	35
75-8	Transfer number	`N10`	5	40
75-9	Transfer reversal number	`N10`	5	45

Semantics

- Used in reconciliation (08xx) messages.
- Condition code 12: mandatory if the transaction affects reconciliation and this data element was not provided in the request or advice message.

DE-076 through DE-092: Reserved for ISO Use

Data Elements: 76–92

These data elements are reserved for future ISO use. The ISO 8583:2023 standard allocates bits 76–92 for ISO-defined purposes not yet specified.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary
Padding	None

Semantics

- Reserved; implementations MUST NOT define content for these fields without ISO authorization.
- Unknown content MUST be preserved end to end.

DE-097: Amount, Net Reconciliation

Data Element: 97

Data Element 97 contains the net settlement amount calculated during reconciliation. It represents the algebraic sum of credits, debits, and fees between the reconciling parties.

Over-the-Wire Format

Attribute	Value
Notation	`xN20`
Length	11 bytes total (1 sign byte + 10 BCD bytes)
Length prefix	None (fixed length)
Encoding	ISO 8583:2003 amount encoding (`IFB_AMOUNT2003`)
Padding	Not applicable

- **Byte 0 (sign)**: `0xC0` = net credit (institution owed funds), `0xD0` = net debit (institution owes funds)
- **Bytes 1–10**: BCD-encoded amount

Semantics

- Mandatory in reconciliation response messages.
- Condition code 13: mandatory if the reconciliation is not in balance.
- The sign byte indicates the direction of the net settlement from the perspective of the reporting institution.

ewpage

DE-098: Payee

Data Element: 98

Data Element 98 identifies the payee by name in payment transactions where the funds are being directed to a specific named recipient.

Over-the-Wire Format

Attribute	Value
Notation	AN25
Length	25 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	Space-padded on the right

Semantics

- Used in payment transactions (e.g., bill payment, person-to-person transfer) to identify the recipient.
- The name is free-form text and is space-padded to 25 characters.
- Implementations MUST truncate if the name exceeds 25 characters.

ewpage

DE-099: Settlement Institution Identification Code

Data Element: 99

Data Element 99 identifies the institution responsible for settlement of the transaction.

Over-the-Wire Format

Attribute	Value
Notation	`AN..11`
Length	Up to 11 characters
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	ASCII

Notes

- Note: the packager defines this as `IFB_LLCHAR` (ASCII LLVAR) while DE-100 and similar institution ID fields use `IFB_LLNUM` (BCD LLVAR). This is intentional — some institution codes include non-numeric characters.

Semantics

- Condition code 33: mandatory once assigned.

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DE-100: Receiving Institution Identification Code

Data Element: 100

Data Element 100 identifies the institution that is the immediate receiver of the message. It may differ from the ultimate destination institution identified in DE-093.

Over-the-Wire Format

Attribute	Value
Notation	`N..11`
Length	Up to 11 digits
Length prefix	`LLVAR` (2-digit BCD length prefix)
Encoding	BCD
Padding	Trailing `F` nibble if odd

Semantics

- Condition code 19: mandatory when the receiving institution is not the same as the final destination.
- Condition code 33: mandatory once assigned.
- In simple two-party exchanges, DE-100 and DE-093 identify the same institution.

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DE-101: File Name or Transaction Modifier

Data Element: 101

For file action messages, contains the actual or abbreviated file name being transferred. For authorization or financial transactions, MAY contain a network-defined transaction modifier.

Over-the-Wire Format

Attribute	Value
Notation	ANS..99
Length	Variable, up to 99 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Semantics

- For file action messages (06xx): contains the actual or abbreviated file name being transferred.
- For authorization or financial messages: MAY contain a network-defined transaction modifier.
- Condition code 02: present when required by the transaction type.

DE-102: Account Identification 1

Data Element: 102

Identifies the source account in a funds transfer transaction.

Over-the-Wire Format

Attribute	Value
Notation	ANS..28
Length	Variable, up to 28 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Semantics

- Identifies the source account in a funds transfer transaction.
- Format is network-defined; typically an account number or IBAN.
- Condition code 02: present in transfer messages when a source account identifier is required.

DE-103: Account Identification 2

Data Element: 103

Identifies the destination account in a funds transfer transaction.

Over-the-Wire Format

Attribute	Value
Notation	ANS..28
Length	Variable, up to 28 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Semantics

- Identifies the destination account in a funds transfer transaction.
- Format is network-defined; typically an account number or IBAN.
- Condition code 02: present in transfer messages when a destination account identifier is required.

DE-111: Discretionary Handback Data

Data Element: 111

Format: `B..9999`, `LLLLBINARY`

Description

Optional user field echoed back by a jPOS Common Message Format-based system.

DE-112: Discretionary Transport Data

Data Element: 112

Format: `B..9999`, `LLLLBINARY`

Description

Optional user field handled by a jPOS Common Message Format-based system and transmitted to destination stations.

DE-104: Transaction Specific Data

Data Element: 104

Transaction-specific data structured as dataset envelopes. Carries invoice data, anticipated dates, and free-form description data.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary – one or more dataset envelopes
Padding	None

Dataset 0x71 – Free-form and Invoice Data

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Free-form description data	`LLLVAR`	`ANS..999`
3	Invoice card acceptor order number	`LLVAR`	`AN..15`
4	Invoice card acceptor invoice reference number	`LLVAR`	`AN..12`
5	Invoice card acceptor customer reference number	`LLVAR`	`AN..17`
6	Invoice amount total tax		`N12`
7	Invoice amount duty		`N12`
8	Invoice amount freight excluding tax		`N12`
9	Invoice amount freight including tax		`N12`
10	Invoice amount bottom line discount		`N12`
11	Invoice alternate tax identifier		`ANS15`
12	Invoice amount alternate tax		`N12`
13	Invoice amount alternate tax indicator		`AS1` (Y/N/space)

Dataset 0x7A – Anticipated Date

Dataset bit	Name	Format	Representation
1	Continuation bit		
2	Date, anticipated		N8 (CCYYMMDD)

Semantics

- Unknown dataset bits MUST be preserved end to end.
- Condition code 02: present when transaction-specific data is available.

DE-105 through DE-108: Reserved for ISO Use

Data Elements: 105–108

These data elements are reserved for future ISO use.

Over-the-Wire Format

Attribute	Value
Notation	B..9999
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary
Padding	None

DE-109: Reconciliation Fee Amounts, Credit

Data Element: 109

Reconciliation fee amounts for credit transactions.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..144`
Length	Variable, up to 144 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Sub-fields

Up to four fee sets of 36 characters each:

Sub-field	Name	Format	Position
109-1	Fee type code	`N2`	1–2
109-2	Amount fee total	`N12`	3–14
109-3	Number fee total	`N10`	15–24

DE-110: Reconciliation Fee Amounts, Debit

Data Element: 110

Reconciliation fee amounts for debit transactions. Same structure as DE-109.

Over-the-Wire Format

Attribute	Value
Notation	`ANS..144`
Length	Variable, up to 144 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Sub-fields

Up to four fee sets of 36 characters each:

Sub-field	Name	Format	Position
110-1	Fee type code	`N2`	1–2
110-2	Amount fee total	`N12`	3–14
110-3	Number fee total	`N10`	15–24

DE-122: Reserved for National Use

Data Element: 122

Reserved for national use. Content and structure are defined by the applicable national network.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary
Padding	None

DE-124 through DE-127: Reserved for Private Use

Data Elements: 124–127

Reserved for private use. Content and structure are defined by bilateral agreement.

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	Binary
Padding	None

DE-128: Message Authentication Code (MAC)

Data Element: 128

Secondary Message Authentication Code for the tertiary bitmap extension. Same encoding as DE-064.

Over-the-Wire Format

Attribute	Value
Notation	B4
Length	4 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	None

DE-113: TPP and Custom Data Elements

Data Element: 113

Format: `B..9999`, `LLLLBINARY`

Description

Data Element 113 is a composite container for application-specific sub-elements used by TPP and other extensions. It provides an **opaque envelope** for custom datasets that are not part of the ISO-8583 base specification.

Sub-elements are identified by dataset identifiers and defined in the **jCard Data Elements** section. Implementations MUST treat unknown sub-elements as opaque and MUST preserve their contents end to end.

DE-114: ISO 20022 Message Transport

Data Element: 114

Carries a single ISO 20022 message in XML format, enabling jPTS to act as a transport bridge between ISO 8583 transaction flows and ISO 20022 financial messaging. The payload is a well-formed, fully self-describing XML document conforming to the ISO 20022 Universal Financial Industry Message Scheme [3].

Over-the-Wire Format

Attribute	Value
Notation	`B..9999`
Length	Variable, up to 9999 bytes
Length prefix	2 bytes BCD (LLLL)
Encoding	UTF-8 XML
Padding	None

The payload begins immediately after the 2-byte BCD length prefix. No dataset envelope or additional wrapper is applied; the XML document occupies the entire field value.

Payload Structure

The payload is a complete ISO 20022 XML document, including the XML declaration and the `Document` root element. The namespace URI follows the pattern `urn:iso:std:iso:20022:tech:xsd:<scheme>` where `<scheme>` is the full message identifier including version (e.g., `pacs.008.001.12`):

```
<?xml version="1.0" encoding="UTF-8"?>
<Document xmlns="urn:iso:std:iso:20022:tech:xsd:pacs.008.001.12">
  ...
</Document>
```

Common message families transported in this field include:

Namespace URI	Message name
`urn:iso:std:iso:20022:tech:xsd:pain.001.001.*`	Customer Credit Transfer Initiation

Namespace URI	Message name
`urn:iso:std:iso:20022:tech:xsd:pain.002.001.*`	Customer Payment Status Report
`urn:iso:std:iso:20022:tech:xsd:camt.052.001.*`	Bank-to-Customer Account Report
`urn:iso:std:iso:20022:tech:xsd:camt.053.001.*`	Bank-to-Customer Statement
`urn:iso:std:iso:20022:tech:xsd:camt.054.001.*`	Bank-to-Customer Debit/Credit Notification
`urn:iso:std:iso:20022:tech:xsd:pacs.002.001.*`	Payment Status Report
`urn:iso:std:iso:20022:tech:xsd:pacs.008.001.*`	FI-to-FI Customer Credit Transfer

The `*` represents the version number (e.g., `08`, `12`). The full catalogue of ISO 20022 message definitions is maintained at `https://www.iso20022.org`.

Semantics

- The XML content MUST be well-formed and MUST conform to the ISO 20022 XSD for the declared message type.
- Encoding MUST be UTF-8. The XML declaration (`<?xml ... encoding="UTF-8"?>`) SHOULD be present.
- The receiving party MUST extract the namespace URI from the `Document` element to determine the message type before processing.
- The ISO 8583 MTI and processing code govern routing and authorization flow; DE-114 carries supplemental ISO 20022 payload data and does not alter the ISO 8583 transaction semantics.
- Maximum field length is 9999 bytes. Messages exceeding this limit must be segmented at the application level before transport; no fragmentation mechanism is defined within DE-114 itself.
- Condition code 02: present when an ISO 20022 message is associated with the transaction.

DE-115: Customer Expansion Field

Data Element: 115

Format: `B..9999`, `LLLLBINARY`

Description

DE-115 is the designated expansion field for customer-specific data that is neither defined by the ISO 8583 base specification nor covered by the jCard/jPTS extensions in DE-113. Customers MUST NOT use this field for data that could be expressed through existing standard or jCard sub-elements.

The internal layout—inner fields, dataset envelopes, TLV structures, or any other encoding—is entirely customer-defined. Each customer deployment MUST supply an annex to this specification describing the sub-element structure, encoding rules, and conditionality applicable to their implementation.

Packager Configuration

The `cmfv3.xml` packager in the jPOS distribution defines DE-115 as a flat binary field. Customer implementations that require structured sub-fields SHOULD replace this definition using an XML entity expansion point.

The recommended approach is to declare a `de115` entity in the customer's packager DTD override and reference it in a customized `cmfv3.xml`:

```
<!DOCTYPE isopackager [
  <!ENTITY de115 SYSTEM "de115-customer.xml">
]>
```

Where `de115-customer.xml` contains the replacement <`isofieldpackager`> block following the same pattern as DE-113:

```
<isofieldpackager
    id="115"
    length="9999"
    name="Customer Expansion Field"
    class="org.jpos.iso.IFB_LLLLBINARY"
    packager="org.jpos.iso.packager.GenericSubFieldPackager">
  <!-- customer sub-fields defined here -->
</isofieldpackager>
```

The customer annex MUST document every sub-field or dataset defined within this expansion, including its `id`, format, length, encoding, and conditionality.

Semantics

- Content is entirely customer-defined. This specification does not prescribe any sub-element layout for DE-115.
- Implementations that receive a DE-115 value they cannot interpret MUST treat it as opaque and MUST preserve its contents end to end.
- The customer annex takes precedence over any default handling for this field.
- Condition code 02: present when customer-specific expansion data is available.

DE-116: Reserved for National Use

Data Element: 116

Format: `B..9999`, `LLLLBINARY`

Description

Reserved for national use. Content depends on the acquiring institution country code (DE-019).

Country-Specific Sub-fields

- 032—Argentina: 116.1 CUIT/CUIL (`AN11`), 116.2 VAT (IVA) amount (`N16`), 116.3 Perception tax amount (`N16`).
- 076—Brazil: 116.1 CPF/CNPJ (`AN14`), 116.2 ISS tax amount (`N16`), 116.3 ICMS tax amount (`N16`).
- 356—India: 116.1 GSTIN (`AN15`), 116.2 GST amount (`N16`), 116.3 TDS amount (`N16`).
- 566—Nigeria: 116.1 TIN (`AN10`), 116.2 VAT amount (`N16`), 116.3 Withholding tax amount (`N16`).
- 724—Spain: 116.1 NIF (`AN9`), 116.2 VAT (IVA) amount (`N16`), 116.3 SII reporting indicator (`N1`).
- 840—United States: 116.1 Sales tax amount (`N16`), 116.2 Merchant category code (`N4`), 116.3 Tax jurisdiction code (`AN10`).
- 858—Uruguay: 116.1 Taxable amount (`N16`), 116.2 Taxable benefit amount (`N16`), 116.3 Tax benefit points (`N3`), 116.4 Law limit reached (`AN1`, Y or N), 116.5 Law indicator (`N1`), 116.6 Law description (`AN..20`).

DE-123: Reserved for Customer-Specific Use

Data Element: 123

Format: `B..9999`, `LLLLBINARY`

Description

Reserved for customer-specific use. Defined as a binary field to allow flexible configuration as a composite jPOS field. Customers can define their own sub-fields as inner fields within the composite element.

B. Not Defined by CMF

The following data elements are not defined by CMF and are intentionally omitted from this document: DE-061, DE-117, DE-118, DE-119, DE-120, DE-121,

C. jCard Data Elements

DE-113.2: Protocol Version

Data Element: 113.2

Format: `AN..20`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..20`
Length	Variable, up to 20 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

jPOS-CMF version used by the client.

DE-113.3: First Name

Data Element: 113.3

Format: `AN..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer or contact first name.

DE-113.4: Middle Name

Data Element: 113.4

Format: `AN..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer or contact middle name.

DE-113.5: Last Name

Data Element: 113.5

Format: `AN..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer or contact last name.

DE-113.6: Secondary Last Name

Data Element: 113.6

Format: `AN..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer or contact secondary last name.

DE-113.7: Email

Data Element: 113.7

Format: ANS..99, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..99
Length	Variable, up to 99 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer or contact email address.

DE-113.8: Status Flags

Data Element: 113.8

Format: `B1`

Over-the-Wire Format

Attribute	Value
Notation	`B1`
Length	1 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	None

Description

Single-byte flags field. Individual flag values are:

- `0x01` — ACTIVE
- `0x02` — SUSPENDED

DE-113.9: Honorific

Data Element: 113.9

Format: `AN..10`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..10`
Length	Variable, up to 10 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer or contact honorific.

DE-113.10: Gender

Data Element: 113.10

Format: AN1

Over-the-Wire Format

Attribute	Value
Notation	ANS1
Length	1 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	None

Description

Gender indicator per ISO 5218[1].

Semantics

Value	Meaning
0	Not known
1	Male
2	Female
9	Not applicable

[1] ISO 5218:2004 — Information technology — Codes for the representation of human sexes [4].

DE-113.11: Address 1

Data Element: 113.11

Format: `AN..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer, merchant, or contact address line 1.

DE-113.12: Address 2

Data Element: 113.12

Format: `AN..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer, merchant, or contact address line 2.

DE-113.13: City

Data Element: 113.13

Format: `AN..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer, merchant, or contact city.

DE-113.14: State, Province, or Region Code

Data Element: 113.14

Format: ANS3

Over-the-Wire Format

Attribute	Value
Notation	ANS3
Length	3 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	None

Description

State, province, or region code of the customer or contact address. Follows the subdivision code conventions of ISO 3166-2, using the local subdivision portion without the country prefix (e.g., NY for New York, ON for Ontario, NSW for New South Wales, ENG for England).

Semantics

- Maximum 3 characters to accommodate all ISO 3166-2 subdivision code lengths.
- Use in conjunction with DE-113.16 (Country Code) to unambiguously identify the subdivision.

DE-113.15: Zip Code

Data Element: 113.15

Format: `AN..10`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..10`
Length	Variable, up to 10 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer, merchant, or contact ZIP or postal code.

DE-113.16: Country Code

Data Element: 113.16

Format: AN2

Over-the-Wire Format

Attribute	Value
Notation	ANS2
Length	2 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	None

Description

Customer, merchant, or contact ISO-3166 two-letter country code.

DE-113.17: Phone

Data Element: 113.17

Format: `AN..20`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..20`
Length	Variable, up to 20 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Customer, merchant, or contact primary phone number.

DE-113.18: Notes

Data Element: 113.18

Format: AN..99, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..99
Length	Variable, up to 99 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

General-purpose notes field.

DE-113.19: Dates

Data Element: 113.19

Format: `N..32`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`N..32`
Length	Variable, 8 to 32 digits (multiple of 8)
Length prefix	1 byte BCD (LL)
Encoding	BCD
Padding	None

Description

General-purpose date field carrying one to four dates in `YYYYMMDD` format, packed consecutively with no separator. Each date occupies exactly 8 digits (4 BCD bytes). The number of dates present is determined by dividing the field length by 8.

The meaning of each date position is application-defined and established by bilateral agreement between sender and receiver.

Semantics

- Field length MUST be a multiple of 8.
- Up to 4 dates may be carried in a single field.

DE-113.20: Alternate Identifier

Data Element: 113.20

Format: AN..64, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..64
Length	Variable, up to 64 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Application-specific alternate customer identifier.

DE-113.21: Card Product ID

Data Element: 113.21

Format: `N..16`, `LLNUM`

Over-the-Wire Format

Attribute	Value
Notation	`N..16`
Length	Variable, up to 16 digits
Length prefix	1 byte BCD (LL)
Encoding	BCD
Padding	None

Description

Application-specific card product identifier.

DE-113.22: UUIDs or Correlation ID

Data Element: 113.22

Format: ANS..221, LLLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..221
Length	Variable, up to 221 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Description

General-purpose field carrying one to six comma-separated UUIDs, or custom idempotency and correlation IDs used by REST APIs and tokenization services.

The maximum length of 221 characters accommodates six canonical UUIDs (xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx, 36 chars each) separated by commas (6 × 36 + 5 = 221).

Semantics

- UUIDs SHOULD be in canonical lowercase hyphenated format (RFC 4122).
- When multiple values are present they are comma-separated with no spaces.
- The meaning and ordering of each value is application-defined.

DE-113.23: Social Security Number

Data Element: 113.23

Format: `ANS11`

Over-the-Wire Format

Attribute	Value
Notation	`ANS11`
Length	11 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	None

Description

US Social Security Number in `XXX-XX-XXXX` format (digits and hyphens).

Semantics

- Format is always `DDD-DD-DDDD` where `D` is a decimal digit.
- This field contains sensitive personally identifiable information (PII) and MUST be protected in transit and at rest.

DE-113.24: Installments Information

Data Element: 113.24

Format: N4

Over-the-Wire Format

Attribute	Value
Notation	N4
Length	4 digits / 2 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

Description

Used to specify installment transactions.

Sub-fields

Subfield	Values
Installment Plan Type	N2: 10 = Merchant Financed Plan, 11 = Issuer Financed Plan, 12 = Acquirer Financed Plan
Number of installments	N2

DE-113.25: Network Name

Data Element: 113.25

Format: ANS..64, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..64
Length	Variable, up to 64 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Network name.

DE-113.26: Device ID or IMEI

Data Element: 113.26

Format: N..16, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	N..16
Length	Variable, up to 16 digits
Length prefix	1 byte BCD (LL)
Encoding	BCD
Padding	None

Description

Device identifier or IMEI (International Mobile Equipment Identity).

DE-113.27: Geolocation

Data Element: 113.27

Format: `ANS..64`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..64`
Length	Variable, up to 64 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Geolocation expressed as a comma-separated latitude and longitude pair (e.g., `40.7128,-74.0060`).

DE-113.28: Cardholder Identification Data

Data Element: 113.28

Format: ANS..64, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..64
Length	Variable, up to 64 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Cardholder identification data. Content is application-defined.

DE-113.29: Invoice

Data Element: 113.29

Format: ANS..64, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..64
Length	Variable, up to 64 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Invoice reference or number associated with the transaction.

DE-113.30: Presentment Sequence Count

Data Element: 113.30

Format: N2

Over-the-Wire Format

Attribute	Value
Notation	N2
Length	2 digits / 1 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

Description

Total number of presentment records for the authorization.

DE-113.31: Presentment Sequence Number

Data Element: 113.31

Format: N2

Over-the-Wire Format

Attribute	Value
Notation	N2
Length	2 digits / 1 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

Description

Sequence number that distinguishes a specific presentment message among multiple presentment messages submitted for a single authorization.

DE-113.32: Origin Transaction Identifier

Data Element: 113.32

Format: ANS..99, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..99
Length	Variable, up to 99 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Transaction identifier generated by the origin.

DE-113.33: Related Transaction Identifier

Data Element: 113.33

Format: ANS..22

Over-the-Wire Format

Attribute	Value
Notation	ANS..99
Length	Variable, up to 99 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Transaction identifier of the related transaction, such as the original transaction ID for reversals or the initial transaction ID for recurring transactions.

DE-113.39: Remote Result Code

Data Element: 113.39

Format: AN..4

Over-the-Wire Format

Attribute	Value
Notation	ANS..4
Length	Variable, up to 4 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Remote ISO result code.

DE-113.52: New PIN Block for PIN Change

Data Element: 113.52

Format: B8

Over-the-Wire Format

Attribute	Value
Notation	B8
Length	8 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	None

Description

PIN-related data in ISO 9564-1 format used to define the new PIN for the PIN change operation.

DE-113.53: Security-Related Control Information

Data Element: 113.53

Format: B..48, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	B..48
Length	Variable, up to 48 bytes
Length prefix	1 byte BCD (LL)
Encoding	Binary
Padding	None

Description

Contains the KSN used for encryption of DE-113.52 when using DUKPT.

DE-113.63: Additional Data, Private Use

Data Element: 113.63

Format: `ANS..9999`, `LLLLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..9999`
Length	Variable, up to 9999 characters
Length prefix	2 bytes BCD (LLLL)
Encoding	ASCII
Padding	None

Description

Reserved for implementation-specific additional data.

DE-113.64: Source Station

Data Element: 113.64

Format: `ANS..50`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..50`
Length	Variable, up to 50 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Source station name.

DE-113.65: Destination Station

Data Element: 113.65

Format: `ANS..50`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..50`
Length	Variable, up to 50 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Destination station name.

DE-113.66: Card Scheme

Data Element: 113.66

Format: ANS..32, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..32
Length	Variable, up to 32 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Card scheme symbolic name.

DE-113.67: Tokenization Data

Data Element: 113.67

Format: B..999

Description

Constructed data element composed of tokenization-related additional data elements defined below.

Sub-elements

- DE-113.67.0 Subfield Bitmap
- DE-113.67.1 PAN Source
- DE-113.67.2 Payment Application Instance ID
- DE-113.67.3 Active Tokens Count
- DE-113.67.6 Token Type
- DE-113.67.7 Consumer Language
- DE-113.67.8 Device Location
- DE-113.67.9 Device Fingerprint

Sub-fields DE-113.67.4 (Wallet Provider Account Hash) and DE-113.67.5 (Tokenization Cardholder Name) have been removed in CMF v3.0. Use DE-051 dataset 0x74 for wallet provider identification and DE-051 dataset 0x75 for cardholder name.

DE-113.67.0: Subfield Bitmap

Data Element: 113.67.0

Format: b64

Over-the-Wire Format

Attribute	Value
Notation	B8
Length	8 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	None

Description

Subfield bitmap supporting up to 64 sub-fields.

DE-113.67.1: PAN Source

Data Element: 113.67.1

Format: AN1

Over-the-Wire Format

Attribute	Value
Notation	ANS1
Length	1 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	None

Description

PAN source.

Values

- 1 - Card on file
- 2 - Manual entry
- 3 - Application entry

DE-113.67.2: Payment Application Instance ID

Data Element: 113.67.2

Format: AN..255

Over-the-Wire Format

Attribute	Value
Notation	ANS..255
Length	Variable, up to 255 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Payment application instance ID used in pre- and post-tokenization messages.

DE-113.67.3: Active Tokens Count

Data Element: 113.67.3

Format: N2

Over-the-Wire Format

Attribute	Value
Notation	N2
Length	2 digits / 1 bytes (fixed)
Length prefix	None
Encoding	BCD
Padding	None

Description

Active tokens count.

DE-113.67.4: Wallet Provider Account Hash *(Removed in v3.0)*

This sub-field has been **removed in CMF v3.0**. Use DE-051 dataset 0x74 (Wallet Provider Data) for wallet provider identification. See the migration guide for details.

DE-113.67.5: Tokenization Cardholder Name *(Removed in v3.0)*

This sub-field has been **removed in CMF v3.0**. Use DE-051 dataset 0x75 (Account Owner Data) for cardholder name data. See the migration guide for details.

DE-113.67.6: Token Type

Data Element: 113.67.6

Format: AN..16

Over-the-Wire Format

Attribute	Value
Notation	ANS..16
Length	Variable, up to 16 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Token type.

DE-113.67.7: Consumer Language

Data Element: 113.67.7

Format: AN2

Over-the-Wire Format

Attribute	Value
Notation	ANS2
Length	2 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	None

Description

Consumer language.

DE-113.67.8: Device Location

Data Element: 113.67.8

Format: AN..255

Over-the-Wire Format

Attribute	Value
Notation	ANS..255
Length	Variable, up to 255 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Device location information.

DE-113.67.9: Device Fingerprint

Data Element: 113.67.9

Format: AN..999 (JSON/Base64)

Over-the-Wire Format

Attribute	Value
Notation	ANS..999
Length	Variable, up to 999 characters
Length prefix	2 bytes BCD (LLL)
Encoding	ASCII
Padding	None

Description

Base64-encoded JSON payload containing device fingerprint data, such as device name, source IP, geolocation data, and IMEI or mobile number.

DE-113.68: PayFac Marketplace Data

Data Element: 113.68

Format: B..999

Description

Constructed data element composed of payment facilitator marketplace data elements defined below.

Sub-elements

- DE-113.68.0 Subfield Bitmap
- DE-113.68.1 PayFac ID
- DE-113.68.2 PayFac MID

DE-113.68.0: Subfield Bitmap

Data Element: 113.68.0

Format: b64

Over-the-Wire Format

Attribute	Value
Notation	B8
Length	8 bytes (fixed)
Length prefix	None
Encoding	Binary
Padding	None

Description

Subfield bitmap supporting up to 64 sub-fields.

DE-113.68.1: PayFac ID

Data Element: 113.68.1

Format: ANS..15, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	ANS..15
Length	Variable, up to 15 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Payment facilitator identifier assigned by the card network. Alphanumeric to accommodate both Visa (8-digit numeric) and Mastercard (up to 15-character alphanumeric) PayFac ID formats.

DE-113.68.2: PayFac MID

Data Element: 113.68.2

Format: AN15

Over-the-Wire Format

Attribute	Value
Notation	ANS15
Length	15 characters (fixed)
Length prefix	None
Encoding	ASCII
Padding	None

Description

Payment facilitator sub-merchant ID.

DE-113.69: Card Token

Data Element: 113.69

Format: `ANS..40`, `LLVAR`

Over-the-Wire Format

Attribute	Value
Notation	`ANS..40`
Length	Variable, up to 40 characters
Length prefix	1 byte BCD (LL)
Encoding	ASCII
Padding	None

Description

Card identifier generated by the Token Processing Platform (TPP).

DE-113.70: Transaction ID

Data Element: 113.70

Format: N..19, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	N..19
Length	Variable, up to 19 digits
Length prefix	1 byte BCD (LL)
Encoding	BCD
Padding	None

Description

Transaction identifier generated by the Token Processing Platform (TPP).

DE-113.71: Transaction Group ID

Data Element: 113.71

Format: N..19, LLVAR

Over-the-Wire Format

Attribute	Value
Notation	N..19
Length	Variable, up to 19 digits
Length prefix	1 byte BCD (LL)
Encoding	BCD
Padding	None

Description

Transaction identifier of the related transaction generated by the Token Processing Platform (TPP). Used to link related transactions — for example, the original transaction ID for reversals, or the initial transaction ID for recurring transactions.

D. Conditionals

This appendix defines the condition codes used in the mandatory and conditional data element tables throughout this specification. Each code appears in the presence columns of message class definitions to indicate when a data element is required.

The definitions are normative and align with ISO 8583:2023, Annex E, Table E.1.

Presence indicators used in message tables:

- **M** — Mandatory. The data element shall be present.
- **ME** — Mandatory echo. The data element shall be present and shall contain the same value as in the original message.
- **—** — Optional. Inclusion is subject to bilateral agreement.
- **NN** — Conditional. The data element shall be present if the condition identified by code NN applies; otherwise its inclusion is subject to bilateral agreement.

D.1. Condition Codes

Code	Condition
01	Mandatory if fees affect reconciliation.
02	Mandatory if information is available and not read electronically from the card (e.g., manual card entry).
03	Mandatory; shall contain the same data as the original authorization (1xx) or financial presentment (2xx) message.
04	Mandatory if Amount, Cardholder Billing or Amount, Cardholder Billing Fee is present.
05	Mandatory when the reconciliation and transaction currencies differ and this data element was not provided in the request or advice message.
06	Mandatory if track data is captured at the point of service.
07	Mandatory if the Primary Account Number conforms to ISO 7812.
08	Mandatory in a replacement, previously authorised, retrieval, representment, partial reversal, or partial chargeback. Mandatory in a supplementary authorization, if available.
10	Mandatory when the forwarding institution is not the same as the institution originating the message.
12	Mandatory if the transaction affects reconciliation and this data element was not provided in the request or advice message.

Code	Condition
13	Mandatory if the reconciliation is not in balance. Contains the value calculated by the institution sending the reconciliation advice response.
14	Mandatory if the transaction affects reconciliation, checkpoint reconciliation is used, and this data element was not provided in the request or advice message.
15	Mandatory if available.
16	Mandatory in a response message if the data element was present in the original request or advice message. If present, it shall contain the same data as the original message.
17	Mandatory in the advice or notification if the data element was present in the original authorization or financial presentment request, advice, or notification message. If present, it shall contain the same data as the original message.
18	Mandatory if the approval code is required to be less than six characters.
19	Mandatory when the receiving institution is not the same as the final destination of the message.
20	Mandatory when the institution that processed (approved or denied) an authorization or financial presentment is not the same institution identified in the Primary Account Number.
21	Mandatory if a partial approval, declined, or rejected transaction.
22	Mandatory if different from Date and Time, Local Transaction.
23	Mandatory if the transaction affects reconciliation and checkpoint reconciliation is used.
24	Mandatory if this message is used for cutover or checkpoint reconciliation.
25	Mandatory if this message is used for checkpoint reconciliation.
26	Mandatory for all processing codes except inquiry services (i.e., processing code 3xxx).
27	Mandatory; shall echo the first two positions of the Processing Code in the original message.
28	Mandatory if Function Code indicates card administration.
29	Mandatory if Function Code is other than card administration.
30	Mandatory in real-time transactions.

Code	Condition
31	Mandatory if approved.
32	Mandatory if batch or file transfer control data elements do not uniquely identify the file to be loaded.
33	Mandatory once assigned, in all subsequent messages in the transaction (e.g., responses, acknowledgements, advices, notifications, and instructions) and all messages in related transactions (e.g., financial presentments, chargebacks, reversals, and retrievals). Shall contain the same value as originally assigned.
34	Mandatory if fee collection is relevant to the life cycle of the transaction.
35	Mandatory in a network management message when Function Code indicates a key is being delivered and Encryption Data is not present.
36	Mandatory in request response or advice response messages if the receiver detects an error in the request, repeat, advice, or repeat messages.
37	Mandatory in the error notification message if present in the messages that contained the error condition, if the receiver can parse that message.
38	Mandatory in network management messages that denote the start or end of a file transfer.
39	Mandatory in messages submitted as part of a batch or file transfer.
40	Mandatory in retrieval, chargeback, and fee collection messages if provided in an original financial presentment. Shall contain the same values as used in the original transaction.
41	Mandatory if Function Code is not 650 or 651.
42	Mandatory when the transaction is an accumulation transaction and the value applies to all transactions within the accumulated total.
43	Mandatory if Function Code is 111.
44	Mandatory if the transaction involves a PAN.
45	Mandatory if Function Code is 109, 110, 112, or 113.
46	Mandatory if Encryption Data is not present.
47	Mandatory if Security Related Information and Key Management Data are not present.

Code	Condition
48	Mandatory when Function Code indicates a key is being delivered and Key Management Data is not present.
49	Mandatory when PAN is not present, or when the Receiving Institution Identification Code is not the same as the final destination of the message.

Codes 00, 09, and 11 are reserved for ISO use and are not assigned conditions in the current version of the standard.

E. Result Codes

Result codes are transmitted in DE-039 and indicate whether the transaction was approved, declined, or could not be processed. The code space is organized by message class.

Codes in the ranges 0000–0999, 1000–1999, 2000–2999, 3000–3999, 4000–4999, 5000–5999, 6000–6999, 7000–7999, 8000–8999, and 9000–9999 are defined by ISO 8583:2023, Annex D. The 1800–1999 range is reserved for private use by the standard; CMF uses a subset of that range for implementation-specific conditions.

Codes 10000, 19999, and 90000 are jPOS-internal sentinel values. They are **never transmitted on the wire** and appear only within jPOS processing logic.

E.1. Approved (0000–0999)

Used in 110, 120, 121, 140, 210, 220, 221, and 240 messages to indicate that the transaction has been approved.

Code	Description
0000	Approved or completed successfully.
0001	Honour with identification.
0002	Approved for partial amount.
0003	Approved (VIP).
0004	Approved, update track 3.
0005	Approved; account type specified by card issuer.
0006	Approved for partial amount; account type specified by card issuer.
0007	Name format error.
0008	Approved but fees disputed.
0009	Approved with overdraft.
0010	Approved; customer reactivated.
0011	Approved; unable to process online.
0012	Approved; transaction processed offline.
0013	Approved; transaction processed offline after referral.
0085	No reason to decline.

E.2. Denied Authorization (1000–1999)

Used in 110, 114, 120, 121, 124, 140, 144, and 154 messages to indicate that the transaction has been denied, not requiring a card pick-up.

Code	Description
1000	Do not honour.
1001	Expired card.
1002	Suspected fraud.
1003	Card acceptor contact acquirer.
1004	Restricted card.
1005	Card acceptor call acquirer's security department.
1006	Allowable number of PIN tries exceeded.
1007	Refer to card issuer.
1008	Refer to card issuer's special conditions.
1009	Invalid merchant.
1010	Invalid amount.
1011	Invalid card number (no such number).
1012	PIN data required.
1013	Unacceptable transaction fee.
1014	No account of type requested.
1015	Requested function not supported.
1016	Not sufficient funds.
1017	Incorrect personal identification number.
1018	No card record.
1019	Transaction not permitted to cardholder.
1020	Transaction not permitted to terminal.
1021	Exceeds withdrawal amount limit.
1022	Security violation.
1023	Exceeds withdrawal frequency limit.
1024	Transaction cannot be completed — violation of law.
1025	Card not effective.
1026	Invalid PIN block.
1027	PIN length error.
1028	Key sync error.
1029	Suspected counterfeit card.

Code	Description
1030	Currency unacceptable to card issuer.
1031	Not authorized and fees disputed.
1032	Lost/stolen card.
1033	Authorization lifecycle unacceptable.
1034	Authorization lifecycle has expired.
1035	Closed account, or restricted for closing.
1036	Closed savings account, or restricted for closing.
1037	Closed credit account, or restricted for closing.
1038	Closed credit facility cheque account, or restricted for closing.
1039	Closed cheque account, or restricted for closing.
1040	Bad debt.
1041	From account bad status.
1042	To account bad status.
1043	Cheque already posted.
1044	Information not on file.
1045	Verification data failed.
1046	Amount not found.
1047	PIN change required.
1048	New PIN invalid.
1049	Bank not found.
1050	Bank not effective.
1051	Customer vendor not found.
1052	Customer vendor not effective.
1053	Customer vendor account invalid.
1054	Vendor not found.
1055	Vendor not effective.
1056	Vendor data invalid.
1057	Payment date invalid.
1058	Personal identification not found.
1059	Scheduled transactions exist.
1060	Transaction did not complete normally at terminal.
1061	Transaction not supported by the card issuer.
1062	Cashback not allowed.
1063	Cashback amount exceeded.

Code	Description
1064	Declined; transaction processed offline.
1065	Declined; unable to process offline.
1066	Declined; transaction processed offline after referral.
1067	Additional consumer authentication required.
1068	Identification number invalid.
1069	Driver number invalid.
1070	Vehicle number invalid.
1071	Digital certificate expired.
1072	Surcharge amount not permitted for card product.
1073	Surcharge not permitted by selected network.
1074	Exceeds pre-authorized amount.
1075	Stop payment order — specific pre-authorized payment.
1076	Stop payment order — all pre-authorized payments for merchant.
1077	Stop payment order — account.
1078	Transaction does not fulfill Anti-Money Laundering requirements.
1079	Exceeds withdrawal amount limit.
1080	PIN is not allowed for this transaction.
1081	Message number out of sequence.
1082	Original transaction was declined.

ICC/Chip Offline Decision Codes (1500–1511)

These codes indicate the reason a chip card transaction was sent online rather than processed offline at the terminal.

Code	Description
1500	ICC application unable to process.
1502	ICC random selection.
1503	Terminal random selection.
1504	Terminal not able to process ICC.
1505	Online forced by ICC.
1506	Online forced by card acceptor.
1507	Online forced by CAD.
1508	Online forced by terminal.

Code	Description
1509	Online forced by card issuer.
1510	Over floor limit.
1511	Card acceptor suspicious.

CMF Private-Use Codes (1800–1833)

The range 1800–1999 is reserved for private use by ISO 8583. CMF defines the following codes within that range for implementation-specific conditions not covered by the standard's public codes.

Code	Description
1802	Missing required fields.
1803	Extra unexpected fields present.
1804	Invalid card number.
1806	Card not active.
1808	Card not configured.
1811	System error — database.
1812	System error — transaction processing.
1813	Cardholder not active.
1814	Cardholder not configured.
1815	Cardholder expired.
1816	Original transaction not found.
1817	Usage limit reached.
1818	Configuration error.
1819	Invalid terminal.
1820	Inactive terminal.
1821	Invalid merchant.
1822	Duplicate entity.
1823	Invalid acquirer.
1824	Previously reversed.
1825	Further activity prevents reversal.
1826	Further activity prevents void.
1827	Original transaction has been voided.
1828	Card tokenization not supported.
1830	Invalid field.

Code	Description
1831	Misconfigured endpoint.
1832	Invalid request.
1833	Host unreachable.

E.3. Denied Financial — Pick-Up Required (2000–2999)

Used in 110, 114, 120, 121, 124, 140, 144, and 210 messages to indicate that the transaction has been denied and the card should be picked up.

Code	Description
2000	Pick-up.
2001	Expired card — pick-up.
2002	Suspected fraud — pick-up.
2003	Card acceptor contact acquirer — pick-up.
2004	Restricted card — pick-up.
2005	Card acceptor call acquirer security — pick-up.
2006	Allowable PIN tries exceeded — pick-up.
2007	Pick-up card, special condition.
2008	Lost card — pick-up.
2009	Stolen card — pick-up.
2010	Suspected counterfeit card — pick-up.
2011	Daily withdrawal uses exceeded.
2012	Daily withdrawal amount exceeded.

Chargeback Pick-Up Resolution Codes (2013–2023)

Code	Description
2013	Chargeback remedied; see corresponding documentation.
2014	Duplicate chargeback.
2015	Past chargeback time limit.
2016	Requested transaction documentation provided (hardship variance).
2017	Invalid member message text.

Code	Description
2018	Correct card acceptor category code provided.
2019	Authorization advised suspicious.
2020	No authorization request required or attempted.
2021	Account not listed on the applicable warning bulletin as of the transaction date.
2022	Documentation received was illegible.
2023	Documentation received was invalid or incomplete.

E.4. File Action (3000–3999)

Used in 314, 324, 325, and 344 messages to indicate the result of a file action.

Code	Description
3000	Successful.
3001	File update not supported by receiver.
3002	Unable to locate record on file.
3003	Duplicate file update record; old record replaced.
3004	File update field edit error.
3005	File update file locked out.
3006	File update not successful.
3007	Format error.
3008	Duplicate; new record rejected.
3009	Unknown file.
3010	Invalid card/cardholder number.

E.5. Reversal and Chargeback (4000–4999)

Reversal Results (4000–4021)

Used in 430, 432, 440, and 442 messages to indicate the result of a reversal or chargeback.

Code	Description
4000	Accepted.

Code	Description
4001	Unspecified; no action taken.
4002	Suspected malfunction.
4003	Format error; no action taken.
4004	Completed partially.
4005	Original amount incorrect.
4006	Response received too late.
4007	Card acceptor device unable to complete transaction.
4008	Deposit out of balance.
4009	No check in envelope.
4010	Payment out of balance.
4011	Deposit out of balance/applied contents.
4012	Payment out of balance/applied contents.
4013	Unable to deliver message to point of service.
4014	Suspected malfunction; card retained.
4015	Suspected malfunction; card returned.
4016	Suspected malfunction; track 3 not updated.
4017	Suspected malfunction; no cash dispensed.
4018	Timed out at taking money; no cash dispensed.
4019	Timed out at taking card; card retained and no cash dispensed.
4020	Invalid response; no action taken.
4021	Timeout waiting for response.

Chargeback and Retrieval Reason Codes (4501–4596)

Code	Description
4501	Requested transaction information not received.
4502	Requested or required information illegible or missing.
4507	Warning bulletin file.
4508	Requested or required authorization not obtained.
4512	Account number not on file.
4524	Earlier warning bulletin protection.
4531	Transaction amount differs.
4534	Duplicate processing.

Code	Description
4535	Card not valid or expired.
4537	No cardholder authorization.
4540	Fraudulent processing of transaction.
4541	Cancelled recurring transaction.
4542	Late presentment.
4546	Correct transaction currency code not provided.
4547	Exceeds floor limit; not authorized — a fraudulent transaction.
4549	Questionable card acceptor activity.
4550	Credit posted as a purchase.
4553	Not as described.
4554	Cardholder dispute; not elsewhere classified.
4555	Non-receipt of merchandise.
4556	Defective merchandise.
4557	Card activated telephone transaction.
4559	Services not rendered.
4560	Credit not processed.
4562	Counterfeit transaction; magnetic stripe authorization fraud.
4563	Non-receipt of required documentation to support representment.
4564	Documentation received was illegible.
4565	Documentation received was invalid or incomplete.
4566	Chargeback contained a valid acquirer's reference number.
4567	Invalid acquirer's reference number on representment; documentation received or not required.
4568	Invalid acquirer's reference number on representment; documentation received.
4573	Expired card.
4578	Ineligible transaction.
4579	Requested transaction receipt not received.
4580	Processing error.
4581	Missing imprint.
4583	Non-possession of card.
4584	Missing signature.
4586	Alteration of amount.
4587	Domestic transaction receipt processing violation.

Code	Description
4590	Non-receipt of merchandise; non-receipt of cash at ATM or load transaction value at ATM or load device.
4594	Cancelled guaranteed reservation.
4595	Advance lodging deposit.
4596	Transaction exceeds limited amount.

E.6. Reconciliation (5000–5999)

Used in 510, 512, 530, and 532 messages to indicate the result of a reconciliation.

Code	Description
5000	Reconciled; in balance.
5001	Reconcile error.
5002	Amount not reconciled; totals provided.
5003	Totals not available.
5004	Not reconciled; totals provided.

E.7. Administrative (6000–6999)

Used in 6xx messages to indicate the result of an administrative activity.

Code	Description
6000	Accepted.

Retrieval and Copy Request Reason Codes (6005–6049)

Code	Description
6005	Cardholder does not agree with amount billed.
6021	Cardholder does not recognize transaction.
6022	ICC transaction certificate and associated data requested.
6023	Cardholder needs information for personal records.
6028	Request for copy bearing signature.

Code	Description
6029	Travel and entertainment document request.
6032	Copy request because original lost in transit.
6035	Written cardholder request for original due to inadequate copy of mail/phone order or recurring transaction receipt.
6036	Legal process request for original (e.g., a subpoena).
6037	Received copy illegible.
6038	Paper/handwriting analysis request.
6041	Fraud investigation.
6042	Potential arbitration, chargeback, or compliance documentation required.
6043	Retrieval not fulfilled — not able to trace original transaction.
6044	Retrieval not fulfilled — invalid reference number.
6045	Retrieval not fulfilled — reference number/PAN incompatible.
6046	Requested documentation supplied.
6047	Retrieval cannot be fulfilled — required or requested documentation is not available.
6048	Retrieval will not be fulfilled — request for an item that is not required to be provided.
6049	Retrieval cannot be fulfilled — ICC transaction certificate and associated data is not available.

E.8. Fee Collection (7000–7999)

Used in 720, 721, 740, 722, 723, and 742 messages to indicate the result of a fee collection.

Code	Description
7000	Accepted.

E.9. Network Management (8000–8999)

Used in 8xx network management messages to indicate the result of a network management activity.

Code	Description
8000	Accepted.
8001	Currently unable to perform request; try later.
8002	Key verification failed — key check value does not match.

Key Exchange and Lifecycle Management Codes (8100–8105)

Code	Description
8100	Standard key exchange/activation — key lifecycle.
8101	Standard key exchange/activation — keys out of sync.
8102	Standard key exchange/activation — security reasons.
8103	Standard key exchange — key deactivation.
8104	Standard key exchange verification — key lifecycle.
8105	Standard key exchange verification — keys out of sync.

E.10. Error and Miscellaneous (9000–9999)

Used in all message types to indicate error or response actions.

Code	Description
9000	Advice acknowledged; no financial liability accepted.
9001	Advice acknowledged; financial liability accepted.
9100	One or more data element errors (see Message Error Indicator).
9102	Invalid transaction.
9103	Re-enter transaction.
9105	Acquirer bank not supported.
9106	Cutoff in process (switch ending a day’s business and starting the next; transaction can be retried in a few minutes).
9107	Issuer or switch is inoperative.
9108	Financial institution or intermediate network facility cannot be found for routing.
9109	System malfunction.
9110	Card issuer signed off.

Code	Description
9111	Card issuer timed out.
9112	Card issuer unavailable.
9113	Duplicate transmission.
9114	No matching original transaction.
9115	Reconciliation cutover or checkpoint error.
9116	MAC incorrect.
9117	MAC key sync error.
9118	No communication keys available for use.
9119	Encryption key sync error.
9120	Security software/hardware error — try again.
9121	Security software/hardware error — do not retry.
9122	Message sequence number error.
9123	Request in progress.
9124	Invalid security code.
9125	Database error.
9126	No such issuer (invalid IIN).
9128	Customer vendor format error.
9132	Recurring data error.
9133	Update not allowed.
9350	Violation of business arrangement.
9999	Other errors.

F. Function Codes

The following table specifies the Function Codes associated with DE-024.

Table 245: Function Codes

Range	Code	Description
000-099 Reserved for ISO use	000-099	Reserved
100-199Used in 100, 101, 120, 121, and 140 messages to indicate type of authorization or verification transaction	100	Original authorization - amount accurate
	101	Original authorization - amount estimated
	102	Replacement authorization - amount accurate
	103	Replacement authorization - amount estimated
	108	Inquiry
	113	Account verification
	114-159	Reserved for ISO use
	160-179	Reserved for national use
	180	Internal API call
	181	Partial authorization supported by terminal
	182	jCard private use: DE-002 contains customer ID or DE-102 and DE-103 contains source and destination accounts
	183	jCard private use: DE-002 contains token ID
	184	jCard private use: DE-113.20 contains wallet ID
	185	Partial authorization supported by terminal, Support approved only the purchase and not the cashback
	186	Token Eligibility
	187	jCard private use
	188	Token Authorization
	189	Token Activation Code Notification
	190	Token Complete Notification
	191	Token Event Notification

Range	Code	Description
	192-199	Reserved for private use
200-299Used in 200, 201, 220, 221, 240, and 241 messages to indicate type of financial transaction	200	Original financial request
	201	Original financial request, customer present
	202	Original financial request and completion of prior authorization
	220-240	Reserved for ISO use
	280-299	Reserved for private use
300-399Used in 300, 301, 320, and 321 messages to indicate type of file action	300	Add record
	301	Change record
	302	Delete record
	303	Replace record
	304	Inquiry
	305	Verify
	306-319	Reserved for ISO use
	320-339	Reserved for national use
	340-399	Reserved for private use
400-499Used in 400, 401, 420, 421, 440, and 441 messages to indicate type of reversal	400	Full reversal, all authorizations
	401	Full reversal, final authorization
	402	Partial reversal
	403-419	Reserved for ISO use
	420-439	Reserved for national use
	440-499	Reserved for private use

Range	Code	Description
800-899Used in 800, 801, 820, and 821 messages to indicate network management function	800	Sign-on
	801	Sign-off
	802	Echo test
	803	Key change
	804	Reconciliation
	805-819	Reserved for ISO use
	820	Reserved for national use
	821	System accounting/cutover
	840-899	Reserved for private use

G. Reason Codes

Reason codes provide additional detail about transaction declines and errors.

(Complete reason codes to be extracted from reason_codes.xml)

Table: Reason Codes

H. Error Codes

Message error codes are carried in DE-018 (Message Error Indicator), subfield positions 3–6. They identify the category of field-level error detected by the receiver when parsing or validating an incoming message.

These codes are distinct from Result Codes, which convey the outcome of a transaction. Message error codes describe *what was wrong* with a specific data element in the request.

H.1. Message Error Codes

Code	Description
0001	Required data element missing.
0002	Invalid length.
0003	Invalid value.
0004	Amount format error.
0005	Date format error.
0006	Account format error.
0007	Name format error.
0008	Other format error.
0009	Data inconsistent with POS data code (e.g., track data absent when magnetic stripe read is indicated).
0010	Data inconsistent with original request.
0011	Other inconsistent data.
0012	Recurring data error.
0013	Customer vendor format error.
0014–3999	Reserved for ISO use.
4000–5999	Reserved for national use.
6000–9999	Reserved for private use.

Result code `9100` (One or more data element errors) in DE-039 indicates that DE-018 is present and contains at least one error set. See DE-039 Result Code and Result Codes.

I. Merchant Category Codes

Merchant Category Codes (MCC) classify card acceptors by business type, as carried in DE-026. The code space follows the structure defined in ISO 18245.

The table below lists all defined and reserved codes. Reserved ranges are included to document the full code space; they do not carry operational meaning in CMF.

Code	Description
Reserved	
0500–0599	Reserved for national use
0600–0699	Reserved for private use
Agricultural Services	
0742	Veterinary services
0743	Wine producers
0744	Champagne producers
0745–0762	Reserved for ISO use
0763	Agricultural cooperatives
0764–0779	Reserved for ISO use
0780	Landscaping and horticultural services
0781–0819	Reserved for ISO use
0820–0879	Reserved for national use
0880–0999	Reserved for private use
Contracted Services	
1520	Residential and commercial general contractors
1521–1710	Reserved for ISO use
1711	HVAC and plumbing contractors
1712–1730	Reserved for national use
1731	Electrical trade contractors
1732–1739	Reserved for ISO use
1740	Masonry, tile, plastering and insulation contractors
1741–1749	Reserved for ISO use
1750	Carpentry trade contractors
1751–1760	Reserved for ISO use
1761	Roofing, siding and sheet metal contractors
1762–1770	Reserved for national use
1771	Concrete trade contractors
1772–1798	Reserved for ISO use
1799	Specialty trade contractors—not otherwise classified
1800–2199	Reserved for ISO use
2200–2740	Reserved for ISO use
2741	Publishing and printing services
2742–2790	Reserved for national use
2791	Typesetting and platemaking services

Code	Description
2792–2841	Reserved for national use
2842	Specialty cleaning and sanitation products
2843–2999	Reserved for national use
Transportation	
4011	Railroads
4012–4110	Reserved for ISO use
4111	Local and suburban passenger transportation including ferries
4112	Rail passenger services
4113–4118	Reserved for ISO use
4119	Emergency ambulance services
4120	Reserved for ISO use
4121	Taxis and limousine services
4122–4130	Reserved for ISO use
4131	Bus lines
4132–4213	Reserved for ISO use
4214	Motor freight carriers and trucking—local and long distance, moving and storage companies and local delivery
4215	Courier services—air, ground and freight forwarders
4216–4224	Reserved for ISO use
4225	Public warehousing and storage—farm products, refrigerated goods and household goods
4226–4299	Reserved for ISO use
4230–4410	Reserved for national use
4411	Cruise lines and steamship services
4412–4456	Reserved for private use
4457	Boat rental and lease services
4458–4467	Reserved for private use
4468	Marinas and marine supplies
4469–4510	Reserved for private use
4511	Airlines and air transport services
4512–4581	Reserved for private use
4582	Airports and aviation facilities
4583–4656	Reserved for private use
4657–4721	Reserved for national use
4722	Travel agencies and package tour operators
4723–4783	Reserved for private use
4784	Tolls and bridges fees
4785–4788	Reserved for ISO use
4789	Transportation services—not otherwise classified
4790–4799	Reserved for national use
Utilities	
4812	Telecommunications equipment retail
4813	Reserved for private use

Code	Description
4814	Telecommunication services, including local and long distance calls, credit card calls, call through use of magnetic stripe reading telephones and faxes
4815	Monthly summary telephone charges
4816	Network and internet information services
4817–4820	Reserved for ISO use
4821	Telegraphic message services
4822–4828	Reserved for national use
4829	Wire transfer and money order services
4830–4895	Reserved for ISO use
4896–4898	Reserved for private use
4899	Cable and subscription television services
4900	Utilities—electric, gas, water and sanitary
4901–4974	Reserved for private use
4975–4999	Reserved for national use
Retail Outlets — Wholesale and Distribution	
5013	Motor vehicle parts and accessories
5014–5020	Reserved for ISO use
5021	Commercial and office furniture
5022–5038	Reserved for ISO use
5039	Construction materials—not otherwise classified
5040–5043	Reserved for ISO use
5044	Office imaging and reprographic equipment
5045	Computers, computer peripheral equipment—not otherwise classified
5046	Commercial equipment—not otherwise classified
5047	Medical, dental and laboratory equipment
5048–5050	Reserved for ISO use
5051	Metal distribution and service centers
5052–5064	Reserved for ISO use
5065	Electrical components and equipment
5066–5071	Reserved for ISO use
5072	Hardware tools and supplies
5073	Reserved for ISO use
5074	Plumbing and heating materials
5075–5084	Reserved for ISO use
5085	Industrial supplies—not otherwise classified
5086–5093	Reserved for ISO use
5094	Precious metals, gems and watches
5095–5098	Reserved for ISO use
5099	Durable goods—not otherwise classified
5100–5110	Reserved for ISO use
5111	Stationery, office supplies and printing and writing paper
5112–5121	Reserved for ISO use
5122	Drugs, drug proprietors

Code	Description
5123–5130	Reserved for ISO use
5131	Piece goods, notions and other dry goods
5132–5136	Reserved for ISO use
5137	Men's, women's and children's uniforms and commercial clothing
5138	Reserved for ISO use
5139	Commercial footwear
5140–5168	Reserved for national use
5169	Chemicals and allied products—not otherwise classified
5170–5171	Reserved for ISO use
5172	Petroleum and petroleum products
5173–5191	Reserved for national use
5192	Books, periodicals and newspapers
5193	Florists' supplies, nursery stock and flowers
5194–5197	Reserved for ISO use
5198	Paints, varnishes and supplies
5199	Non-durable goods—not otherwise classified
5200	Home supply warehouse outlets
5201–5210	Reserved for ISO use
5211	Lumber and building materials outlets
5212–5230	Reserved for national use
5231	Glass, paint and wallpaper shops
5232–5250	Reserved for ISO use
5251	Hardware shops
5252–5260	Reserved for ISO use
5261	Lawn and garden supplies outlets, including nurseries
5262–5270	Reserved for ISO use
5271	Mobile home dealers
5272–5291	Reserved for ISO use
5292–5299	Reserved for private use
5300	Wholesale clubs
5301–5308	Reserved for private use
5309	Duty-free shops
5310	Discount shops
5311	Department stores
5312–5330	Reserved for private use
5331	Variety stores
5332–5398	Reserved for private use
5399	Miscellaneous general merchandise
5400–5410	Reserved for private use
5411	Groceries and supermarkets
5412–5421	Reserved for private use
5422	Freezer and locker meat provisioners
5423–5440	Reserved for private use

Code	Description
5441	Candy, nut and confectionery shops
5442–5450	Reserved for private use
5451	Dairies
5452–5461	Reserved for private use
5462	Bakeries
5463–5498	Reserved for private use
5499	Miscellaneous food shops—convenience and speciality retail outlets
Automobiles and Vehicles	
5511	Car and truck dealers (new and used) sales, services, repairs, parts and leasing
5512–5520	Reserved for private use
5521	Car and truck dealers (used only) sales, service, repairs, parts and leasing
5522–5530	Reserved for private use
5531	Auto and home supply outlets
5532	Automotive tyre outlets
5533	Automotive parts and accessories outlets
5534–5540	Reserved for private use
5541	Service stations (with or without ancillary services)
5542	Automated fuel dispensers
5543–5550	Reserved for private use
5551	Boat dealers
5552–5560	Reserved for ISO use
5561	Camper, recreational and utility trailer dealers
5562–5570	Reserved for private use
5571	Motorcycle shops and dealers
5572–5591	Reserved for national use
5592	Motor home dealers
5593–5597	Reserved for national use
5598	Snowmobile dealers
5599	Miscellaneous automotive, aircraft and farm equipment dealers—not otherwise classified
Clothing and Apparel	
5612–5620	Reserved for ISO use
5621	Women’s ready-to-wear shops
5622–5630	Reserved for ISO use
5631	Women’s accessory and speciality shops
5632–5640	Reserved for national use
5641	Children’s and infants’ wear shops
5642–5650	Reserved for private use
5651	Family clothing shops
5652–5654	Reserved for national use
5655	Sports and riding apparel shops
5656–5660	Reserved for national use
5661	Shoe shops
5662–5680	Reserved for private use

Code	Description
5681	Furriers and fur shops
5682–5690	Reserved for private use
5691	Men’s and women’s clothing shops
5692–5696	Reserved for private use
5697	Tailors, seamstresses, mending and alterations
5698	Wig and toupee shops
5699	Miscellaneous apparel and accessory shops
Miscellaneous Retail	
5915–5920	Reserved for national use
5921	Package shops—beer, wine and liquor
5922–5930	Reserved for national use
5931	Used merchandise and second-hand shops
5932	Antique shops—sales, repairs and restoration services
5933	Pawn shops
5934	Reserved for national use
5935	Wrecking and salvage yards
5936	Reserved for national use
5937	Antique reproduction shops
5938–5939	Reserved for national use
5940	Bicycle shops—sales and service
5941	Sporting goods shops
5942	Bookshops
5943	Stationery, office and school supply shops
5944	Jewellery, watch, clock and silverware shops
5945	Hobby, toy and game shops
5946	Camera and photographic supply shops
5947	Gift, card, novelty and souvenir shops
5948	Luggage and leather goods shops
5949	Sewing, needlework, fabric and piece goods shops
5950	Glassware and crystal shops
5951–5959	Reserved for national use
5960	Direct marketing—insurance services
5961	Reserved for national use
5962	Telemarketing—travel-related arrangement services
5963	Door-to-door sales
5964	Direct marketing—catalogue merchants
5965	Direct marketing—combination catalogue and retail merchants
5966	Direct marketing—outbound telemarketing merchants
5967	Direct marketing—inbound telemarketing merchants
5968	Direct marketing—continuity/subscription merchants
5969	Direct marketing/direct marketers—not otherwise classified
5970	Artist supply and craft shops
5971	Art dealers and galleries

Code	Description
5972	Stamp and coin shops
5973	Religious goods and shops
5974	Reserved for national use
5975	Hearing aids—sales, service and supplies
5976	Orthopaedic goods and prosthetic devices
5977	Cosmetic shops
5978	Typewriter outlets—sales, service and rentals
5979–5982	Reserved for national use
5983	Fuel dealers—fuel oil, wood, coal and liquefied petroleum
5984–5991	Reserved for national use
5992	Florists
5993	Cigar shops and stands
5994	Newsagents and news-stands
5995	Pet shops, pet food and supplies
5996	Swimming pools—sales, supplies and services
5997	Electric razor shops—sales and service
5998	Tent and awning shops
5999	Miscellaneous apparel and speciality retail outlets
Financial Services	
6010	Financial institutions—manual cash disbursements
6011	Financial institutions—automated cash disbursements
6012	Financial institutions—merchandise and services
6013–6049	Reserved for ISO use
6050	Reserved for private use
6051	Non-financial institutions—foreign currency, money orders (not wire transfer), scrip and travellers' checks
6052–6210	Reserved for ISO use
6211	Securities—brokers and dealers
6212–6299	Reserved for ISO use
6300	Insurance sales, underwriting and premiums
6301–6528	Reserved for ISO use
6529–7010	Reserved for private use
Lodging and Personal Services	
7011	Lodging—hotels, motels and resorts
7012	Timeshares
7013–7031	Reserved for private use
7032	Sporting and recreational camps
7033	Trailer parks and camp-sites
7034–7041	Reserved for private use
7042–7211	Reserved for national use
7210	Laundry, cleaning and garment services
7211	Laundry services—family and commercial
7212–7215	Reserved for national use

Code	Description
7216	Dry cleaners
7217	Carpet and upholstery cleaning
7218–7220	Reserved for national use
7221	Photographic studios
7222–7229	Reserved for national use
7230	Beauty and barber shops
7231–7250	Reserved for national use
7251	Shoe repair shops, shoe shine parlours and hat cleaning shops
7252–7260	Reserved for national use
7261	Funeral services and crematoriums
7262–7272	Reserved for national use
7273	Dating and escort services
7274–7275	Reserved for national use
7276	Tax preparation services
7277	Counselling services—debt, marriage and personal
7278	Buying and shopping services and clubs
7279–7295	Reserved for national use
7296	Clothing rentals—costumes, uniforms and formal wear
7297	Massage parlours
7298	Health and beauty spas
7299	Miscellaneous personal services—not otherwise classified
Business Services	
7311	Advertising services
7312–7320	Reserved for ISO use
7321	Consumer credit reporting agencies
7322	Debt collection agencies
7323–7332	Reserved for ISO use
7333	Commercial photography, art and graphics
7334–7337	Reserved for ISO use
7338	Quick copy, reproduction and blueprinting services
7339	Stenographic and secretarial support services
7340–7341	Reserved for ISO use
7342	Exterminating and disinfecting services
7343–7348	Reserved for ISO use
7349	Cleaning, maintenance and janitorial services
7350–7360	Reserved for ISO use
7361	Employment agencies and temporary help services
7362–7371	Reserved for ISO use
7372	Computer programming, data processing and integrated systems design services
7373–7374	Reserved for ISO use
7375	Information retrieval services
7376–7378	Reserved for ISO use
7379	Computer maintenance and repair services—not otherwise classified

Code	Description
7380–7391	Reserved for ISO use
7392	Management, consulting and public relations services
7393	Detective agencies, protective agencies and security services, including armoured cars and guard dogs
7394	Equipment, tool, furniture and appliance rentals and leasing
7395	Photofinishing laboratories and photo developing
7396–7398	Reserved for ISO use
7399	Business services—not otherwise classified
7400–7406	Reserved for ISO use
7407–7487	Reserved for private use
7488–7510	Reserved for national use
7511	Reserved for private use
7512	Automobile rentals
7513	Truck and utility trailer rentals
7514–7518	Reserved for national use
7519	Motor home and recreational vehicle rentals
7520–7522	Reserved for national use
7523	Parking lots and garages
7524–7529	Reserved for national use
Repair Services	
7531	Automotive body repair shops
7532–7533	Reserved for ISO use
7534	Tyre retreading and repair shops
7535	Automotive paint shops
7536–7537	Reserved for ISO use
7538	Automotive service shops (non-dealer)
7539–7541	Reserved for ISO use
7542	Car washes
7543–7548	Reserved for ISO use
7549	Towing services
7550–7600	Reserved for ISO use
7601–7606	Reserved for national use
7607–7621	Reserved for private use
7622	Electronics repair shops
7623	Air conditioning and refrigeration repair shops
7624–7628	Reserved for national use
7629	Electrical and small appliance repair shops
7630	Reserved for national use
7631	Watch, clock and jewellery repair shops
7632–7640	Reserved for national use
7641	Furniture reupholstery, repair and refinishing
7642–7690	Reserved for private use
7691	Reserved for national use

Code	Description
7692	Welding services
7693–7698	Reserved for national use
7699	Miscellaneous repair shops and related services
7700–7799	Reserved for ISO use
Amusement and Entertainment	
7829	Motion picture and video tape production and distribution
7830–7831	Reserved for ISO use
7832	Motion picture theatres
7833–7840	Reserved for ISO use
7841	Video tape rentals
7842–7893	Reserved for national use
7894–7910	Reserved for private use
7911	Dance halls, studios and schools
7912–7921	Reserved for private use
7922	Theatrical producers (except motion pictures) and ticket agencies
7923–7928	Reserved for private use
7929	Bands, orchestras and miscellaneous entertainers—not otherwise classified
7930–7931	Reserved for private use
7932	Billiard and pool establishments
7933	Bowling alleys
7934–7940	Reserved for private use
7941	Commercial sports, professional sports clubs, athletic fields and sports promoters
7942–7959	Reserved for private use
7960–7990	Reserved for national use
7991	Tourist attractions and exhibits
7992	Public golf courses
7993	Video amusement game supplies
7994	Video game arcades and establishments
7995	Betting, including lottery tickets, casino gaming chips, off-track betting and wagers at race tracks
7996	Amusement parks, circuses, carnivals and fortune tellers
7997	Membership clubs (sports, recreation, athletic), country clubs and private golf courses
7998	Aquariums, seaquariums and dolphinariums
7999	Recreation services—not otherwise classified
Professional and Membership Services	
8011	Doctors and physicians—not otherwise classified
8012–8020	Reserved for ISO use
8021	Dentists and orthodontists
8022–8030	Reserved for ISO use
8031	Osteopaths
8032–8040	Reserved for national use
8041	Chiropractors
8042	Optometrists and ophthalmologists

Code	Description
8043	Opticians, optical goods and eyeglasses
8044–8048	Reserved for national use
8049	Podiatrists and chiropodists
8050	Nursing and personal care facilities
8051–8061	Reserved for ISO use
8062	Hospitals
8063–8070	Reserved for ISO use
8071	Medical and dental laboratories
8072–8098	Reserved for ISO use
8099	Medical services and health practitioners—not otherwise classified
8100–8110	Reserved for ISO use
8111	Legal services and attorneys
8112–8210	Reserved for ISO use
8211	Elementary and secondary schools
8212–8219	Reserved for ISO use
8220	Colleges, universities, professional schools and junior colleges
8221–8240	Reserved for ISO use
8241	Correspondence schools
8242–8243	Reserved for ISO use
8244	Business and secretarial schools
8245–8248	Reserved for ISO use
8249	Trade and vocational schools
8250–8298	Reserved for ISO use
8299	Schools and educational services—not otherwise classified
8300–8350	Reserved for ISO use
8351	Child care services
8352–8397	Reserved for national use
8398	Charitable and social service organizations
8399–8492	Reserved for ISO use
8493–8640	Reserved for private use
8641	Civic, social and fraternal associations
8642–8650	Reserved for national use
8651	Political organizations
8652–8660	Reserved for national use
8661	Religious organizations
8662–8674	Reserved for private use
8675	Automobile associations
8676–8698	Reserved for private use
8699	Membership organizations—not otherwise classified
8700–8733	Reserved for private use
8734	Testing laboratories (non-medical)
8735–8910	Reserved for private use
8911	Architectural, engineering and surveying services

Code	Description
8912–8930	Reserved for private use
8931	Accounting, auditing and bookkeeping services
8932–8998	Reserved for national use
8999	Professional services—not otherwise classified
Government Services	
9211	Court costs, including alimony and child support
9212–9221	Reserved for ISO use
9222	Fines
9223	Bail and bond payments
9224–9291	Reserved for ISO use
9311	Tax payments
9312–9388	Reserved for private use
9389–9398	Reserved for national use
9399	Government services—not otherwise classified
9400–9401	Reserved for national use
9402	Postal services—government only
Other	
9500–9699	Reserved for ISO use
9700–9799	Reserved for private use
9800–9999	Reserved for national use

J. Service Result Codes

Service result codes for specific service operations.

(Complete service result codes to be extracted from service_result_codes.xml)

Table: Service Result Codes

K. AVS Codes

Address Verification Service (AVS) codes indicate the result of address verification checks.

Table 248: AVS Codes

Code	Description
A	Address matches, ZIP does not
B	Address information not provided
C	Street address and postal code not verified
D	Street address and postal code match
E	AVS error
F	Address and postal code match (UK only)
G	Non-U.S. issuer does not participate
I	Address information not verified
M	Street address and postal code match
N	No match
P	Postal code matches, address does not
R	Retry - system unavailable
S	Service not supported
U	Address information unavailable
W	9-digit ZIP matches, address does not
X	Exact match
Y	Address and 5-digit ZIP match
Z	5-digit ZIP matches, address does not

L. Revision History

Migration Guide: CMF v2.0 to v3.0

This appendix documents breaking changes, field redefinitions, and behavioral differences between CMF v2.0 and CMF v3.0. Implementers upgrading from v2.0 should review each entry and assess the impact on their integration.

Wire Format Changes

L.0.1. DE-072: Data Record — length prefix corrected

	v2.0	v3.0
Class	`IFB_LLLBINARY`	`IFB_LLLLBINARY`
Max length	999 bytes	9999 bytes
Length prefix	3-digit BCD (LLL)	4-digit BCD (LLLL)

ISO 8583 defines DE-072 as `LLLLVAR b..9999`. CMF v2.0 incorrectly used a 3-digit length prefix. Any implementation that encodes or decodes DE-072 must be updated to use a 4-byte (LLLL) length prefix.

L.0.2. DE-095: Field redefined between ISO 8583:2003 and ISO 8583:2023

	ISO 8583:2003 / CMF v2.0	ISO 8583:2023 / CMF v3.0
Name	Replacement Amounts	Card Issuer Reference Data
Format	`N96` (fixed)	`LLVAR ANS..99`

Bit 95 was redefined between versions of the ISO 8583 standard. CMF v3.0 targets ISO 8583:2023. The `cmf.xml` packager retains the v2003 layout for backward compatibility; `cmfv3.xml` implements the ISO 8583:2023 definition.

Implementations using `cmfv3.xml` must migrate any DE-095 usage from the “Replacement Amounts” semantics to “Card Issuer Reference Data”.

L.0.3. DE-096: Corrected definition in cmfv3.xml

	v2.0 (cmfv3.xml)	v3.0 (cmfv3.xml)
Name	Reserved for ISO use	Key Management Data
Class	`IFB_LLLLBINARY`	`IFB_LLLBINARY`
Max length	9999 bytes	999 bytes

Composite Field Encoding

CMF v3.0 adds first-class support for ISO 8583:2003/2023 composite dataset fields. Fields DE-034, DE-043, DE-049, DE-055, DE-071, and DE-104 now use `DatasetPackager` or `ICCDataPackager` in `cmfv3.xml`, encoding each field as one or more dataset envelopes (1-byte identifier + 2-byte length + DBM or BER-TLV content).

CMF v2.0 implementations that treated these fields as opaque binary blobs (`IFB_LLLLBINARY`) will continue to interoperate at the byte level, but cannot access individual sub-fields through the packager API.

L.0.1. DE-043: Missing sub-fields added

Two sub-fields defined in ISO 8583:2023 Annex C were absent in v2.0:

Bit	Name	Format
13	Card acceptor geographic location	`LLVAR ANS..19`
14	Card acceptor additional address information	`LLLVAR AN..255`

jCard Field Changes

L.0.1. DE-113.10: Gender — values changed to ISO 5218

	v2.0	v3.0
`M`	Male	*(removed)*
`F`	Female	*(removed)*

	v2.0	v3.0
0	*(not defined)*	Not known
1	*(not defined)*	Male
2	*(not defined)*	Female
9	*(not defined)*	Not applicable

CMF v2.0 used M/F values. CMF v3.0 adopts ISO 5218 numeric codes. Implementations must migrate stored and transmitted gender values.

L.0.2. DE-113.14: State Code — widened and renamed

	v2.0	v3.0
Name	State Code	State, Province, or Region Code
Format	AN2	ANS3
Scope	US states only	All ISO 3166-2 subdivisions

CMF v2.0 defined this field as 2 characters covering US states only. CMF v3.0 widens it to 3 characters to align with ISO 8583:2023 DE-043 sub-field 5 and accommodate international subdivision codes (e.g., NSW, ENG).

Existing 2-character values remain valid. No data loss on upgrade; senders sending 3-character codes to v2.0 receivers will be truncated.

New Fields in v3.0

L.0.1. DE-051: Customer Related Data (new)

DE-051 is a new ISO 8583:2023 composite field added in CMF v3.0. It carries customer identity, wallet provider, and account owner data through five datasets:

Dataset	Contents
0x71	Payment Account Reference (PAR) and PAN reference identifier
0x72	Customer contact data (phone numbers, email addresses)

Dataset	Contents
0x73	Customer identification (passport, national ID, driver license, SSN)
0x74	Wallet provider data (ID, assigner, country code, short name)
0x75	Account owner name and address

The **PAR (Payment Account Reference)** in dataset 0x71 is the primary motivation for this field. It is a stable, token-agnostic account identifier assigned by card networks (Visa, Mastercard) that links all tokens and the underlying PAN for a given account.

jCard DE-113.67 Changes

L.0.1. DE-113.67.4 and DE-113.67.5 removed

Two DE-113.67 sub-fields that overlapped with DE-051 have been removed:

Sub-field	v2.0	v3.0 replacement
DE-113.67.4	Wallet Provider Account Hash	DE-051 dataset 0x74 (Wallet provider identification)
DE-113.67.5	Tokenization Cardholder Name	DE-051 dataset 0x75 (Account owner name)

Implementations using these sub-fields MUST migrate to DE-051.

Packager Compatibility

CMF v3.0 ships two packager definitions:

- **cmf.xml** — backward-compatible with ISO 8583:2003 deployments. Retains DE-095 as "Replacement Amounts" and does not implement composite dataset fields for DE-034, DE-043, DE-049, etc.
- **cmfv3.xml** — implements ISO 8583:2023 semantics. Use this packager for new deployments.

Mixing packagers between endpoints will cause failures on composite fields and DE-095. Ensure both sides of a connection use the same packager definition.

Table 257: Revision History

Date	Version	Author	Description
Feb, 2026	1.0.20.rc20	Gregorio Osorio	Added result code 1828 (see Result Codes).
Oct, 2025	1.0.20.rc18	Federico González	Added function code 821 (see Function Codes).
Aug, 2025	1.0.20.rc17	Federico González	Added result code 9107 (see Result Codes).
Jul, 2025	1.0.20.rc16	Federico González	Added Data element 16 — Conversion date.
Jul, 2025	1.0.20.rc15	Federico González	Added function code 187 — Incremental authorization. Added reason code 4351 — Authorization expired.
Jul, 2025	1.0.20.rc14	Federico González	Added table of Address Verification result codes (see AVS Codes).
Mar, 2025	1.0.20.rc13	Federico González	Added data element 34 - Electronic commerce data. Removed data element 48.
Mar, 2025	1.0.20.rc12	Alejandro Revilla	Added 3DS reference to data element 48. Added data element 116 with sub-elements. Added data element 123.
Mar, 2025	1.0.20.rc11	Federico González	Added data element 48 - Additional private data.
Feb, 2025	1.0.20.rc10	Federico González	Added data element 9 - Conversion rate, settlement. Added data element 10 - Conversion rate, cardholder billing.
Jan, 2025	1.0.20.rc9	Orlando Pagano	Added ‘113.69’ - Card Token. Added ‘113.70’ - Transaction ID. Added ‘113.71’ - Transaction GroupID.
Dec, 2024	1.0.20.rc8	Barzilai Spinak	Various updates.

(Complete revision history to be extracted from revision_history.xml)

M. License

License Terms

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Figure 1: Creative Commons License

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N. Glossary of Terms

Global Revision History

Date	Message	Author	Hash
2026-04-01	Merge pull request #13 from ar/feature/de-115-customer-expansion	A.Revilla	e991578
2026-04-01	docs(de-115): define as Customer Expansion Field	a.ar-agt	549ef44
2026-04-01	Merge pull request #12 from ar/feature/de-114-iso20022-transport	A.Revilla	5ea12cf
2026-04-01	fix(de-114): correct ISO 20022 namespace URI format	a.ar-agt	de88409
2026-03-31	docs(de-114): document ISO 20022 XML message transport	a.ar-agt	41dce1f
2026-03-31	Merge pull request #11 from ar/feature/token-function-codes	A.Revilla	6956b23
2026-03-31	docs: expand function codes 186-191 with token messaging types	a.ar-agt	e37c448
2026-03-29	chore: add WORKLOG.md with session notes and pending items	a.agt	5ba202a
2026-03-29	Move transaction definitions to chapter 3	A.Revilla	10d898a
2026-03-29	fix(transactions): move to chapter 3; jPTS columns first; replace placeholder with em-dash; clean legend	a.agt	fe8b0d6
2026-03-29	fix(transactions): update all MTIs to ISO 8583:2023 version prefix 2 (2100/2110 etc.)	a.agt	a1dafad
2026-03-29	feat(transactions): enable all transaction chapters; rewrite with combined jCard/jPTS tables and Mermaid flows	a.agt	49b7cfd
2026-03-29	feat(transactions): add Authorization transaction definition with Mermaid flow and combined jCard/jPTS field table	a.agt	21b0e09
2026-03-29	feat(de): add all previously omitted standard fields with wire format documentation	a.agt	6dd0c9d
2026-03-29	fix: remove DE-096 from intentionally omitted list (already included)	a.agt	9590e4a
2026-03-29	fix(terminology): normalize sub-field/sub-element terminology across all files	a.agt	d3724f8
2026-03-29	feat(de-030,036,044): complete Amounts Original, add Track 3 Data and Additional Response Data	a.agt	ada3276
2026-03-29	feat(jcard): add Over-the-Wire Format sections to all 38 remaining fields; normalize table widths	a.agt	f123364
2026-03-29	fix(de-113.69-71): restore variable-length notation (ANS..40, N..19 LLVAR)	a.agt	6f7fe31
2026-03-29	fix(de-113.69-71): expand TPP acronym; correct format notation to fixed-length; add wire format sections	a.agt	3d4e959
2026-03-29	feat(de-051): add Customer Related Data; remove overlapping DE-113.67 sub-fields	a.agt	6961993
2026-03-29	fix(de-113.68.1): correct PayFac ID format from AN1 to ANS..15 LLVAR	a.agt	4fb0a83
2026-03-29	fix(jcard): add wire format and length prefixes to DE-113.25-29, 63-66	a.agt	e469567

Date	Message	Author	Hash
2026-03-29	fix(de-113.23): correct format from A11 to ANS11; rename to full title; add PII note	a.agt	eef2ddd
2026-03-29	fix(de-113.22): correct format to ANS..221 LLLVAR; add wire format section and UUID semantics	a.agt	bc9cb3f
2026-03-29	fix(de-113.19): clarify multi-date packing structure and wire format	a.agt	0ee447a
2026-03-29	fix(de-113.14): widen to ANS3, rename to state/province/region; update migration guide	a.agt	3ab42dd
2026-03-29	docs(de-113.10): add ISO 5218 footnote and bibliography entry	a.agt	81ef5be
2026-03-29	feat: add v2-to-v3 migration guide; update DE-113.10 gender to ISO 5218 codes	a.agt	cb9582d
2026-03-29	fix(jcard): remove double newpage from all 57 files; fix DE-113.8 flag values to single-byte 0x01/0x02	a.agt	d424996
2026-03-29	fix(spec): correct stale include filenames; add DE-096; remove orphan files	a.agt	6c2e6db
2026-03-29	docs(preface): update to CMF v3.0; clarify dataset/DBM/BER-TLV history; remove jPOS-specific class references	a.agt	d132cc5
2026-03-29	fix(de): normalize all tables within each file to same rendered width (19 files)	a.agt	5089978
2026-03-29	fix(de-035): align Over-the-Wire and Sub-fields table widths	a.agt	71ddabb
2026-03-29	fix(de): normalize table separator widths across all 72 DE files; uniform dataset table widths in DE-034	a.agt	5aa7205
2026-03-29	fix(de-034): replace em-dashes with hyphens in code blocks; normalize table widths; add dataset 0x01 TLV section; rename dataset headers with hex identifiers	a.agt	6576a97
2026-03-29	fix(de-034): correct dataset identifier range — 0x01 request, 0x73-0x77 response	a.agt	ddd3d30
2026-03-29	fix(de-043,049): correct wire format description to dataset envelope encoding	a.agt	2aeeef4
2026-03-29	fix(de-043): add geographic location and additional address sub-fields; remove deferred note	a.agt	4587795
2026-03-29	feat(de-074): complete Reconciliation Data Primary definition (N156/78 bytes BCD)	a.agt	8c0d3b0
2026-03-29	feat(de-055): complete ICC Related Data definition with BER-TLV encoding and common EMV tags	a.agt	a11a099
2026-03-29	feat(de-054): add wire format section and fix double newpage	a.agt	778dd31
2026-03-29	feat(de-049): add wire format and DatasetPackager encoding description	a.agt	4b323af
2026-03-29	feat(de-046): complete Amounts Fees definition with fee set structure	a.agt	e35b5d8
2026-03-29	feat(de-043): complete Card Acceptor Name/Location definition with DatasetPackager encoding	a.agt	a85c08d
2026-03-29	feat(de-034): add wire format and DatasetPackager encoding description	a.agt	d267605

Date	Message	Author	Hash
2026-03-28	feat(de-027): complete POS Capability definition with full bit tables and sub-field layout	a.agt	8713907
2026-03-28	feat(de-101,102,103): complete File Name, Account Identification 1 and 2 definitions	a.agt	5ea873e
2026-03-28	feat(de-096): complete Key Management Data definition (LLLVAR b..999)	a.agt	1e67308
2026-03-28	feat(de-030,095): add wire format to DE-030; complete DE-095 with 2003 compat note	a.agt	912251a
2026-03-28	fix(de): normalize condition codes to two-digit and add #conditionals hyperlinks	a.agt	9d478ae
2026-03-28	feat(de-072): complete Data Record definition (LLLLVAR b..9999)	a.agt	2ae1c1f
2026-03-28	feat(de-068,069): complete Batch/File Transfer Message Control and Control Data definitions	a.agt	a100e7d
2026-03-28	feat(de-063): complete Display Message definition	a.agt	0a69a3a
2026-03-28	feat(de-059): complete Transport Data definition	a.agt	754aa8a
2026-03-28	feat(de-053): complete Security-Related Control Information definition	a.agt	472fc7c
2026-03-28	feat(de-042): complete Card Acceptor Identification Code definition	a.agt	008b18e
2026-03-28	feat(de-035): complete Track 2 Data definition	a.agt	dacdbbb
2026-03-28	docs(de-022): add bit numbering convention note with HDLC rationale	a.agt	715053b
2026-03-28	fix(de): change odd-length BCD padding from F-nibble to left zero-pad	a.agt	5925d20
2026-03-28	Add upload command	A.Revilla	1affb27
2026-03-28	fix: add missing \newpage to 39 DE and appendix files	a.agt	adc96b8
2026-03-28	Merge pull request #10 from ar/feat/de-020-021	A.Revilla	1713c40
2026-03-28	feat(de): complete definitions for DE-020 and DE-021	a.agt	dd376d8
2026-03-28	Fix table width	A.Revilla	32db161
2026-03-28	Merge pull request #9 from ar/feat/de-018-message-error-indicator	A.Revilla	c1d547a
2026-03-28	feat(de-018): complete normative definition of Message Error Indicator	a.agt	9b31e39
2026-03-27	fix tables width	A.Revilla	5ef782f
2026-03-27	Merge pull request #8 from ar/fix/mcc-complete	A.Revilla	8116b6c
2026-03-27	fix(mcc): complete ISO 18245 MCC table from DocBook source	a.agt	367d5fd
2026-03-27	Merge pull request #7 from ar/fix/de-housekeeping	A.Revilla	0d9de94
2026-03-27	fix(de): rename bare de-NNN.md files to descriptive names (007-021)	a.agt	c4f9a0a
2026-03-27	fix(de): rename bare de-NNN.md files and fix bold subheadings	a.agt	7c5e5e2
2026-03-27	Merge pull request #6 from ar/fix/de-bulk-field-definitions	A.Revilla	4f1e339
2026-03-27	feat(de): add complete definitions for 40 data elements	a.agt	a766285
2026-03-27	Merge pull request #5 from ar/fix/de-000-mti	A.Revilla	f12ccff
2026-03-27	fix(de-000): correct MTI to N4, clarify version-digit convention	a.agt	eb66c30

Date	Message	Author	Hash
2026-03-27	Merge pull request #4 from ar/fix/de-cleanup-newpages-jcard	A.Revilla	6249cce
2026-03-27	fix(de): move \newpage to end of section instead of start	a.agt	5fe338f
2026-03-27	fix(de): cleanup duplicates, fix jcard headings, add newpages	a.agt	e6fc2c2
2026-03-27	Merge pull request #3 from ar/fix/de-headings-unnumbered	A.Revilla	be541ba
2026-03-27	fix(de-headings): add DE-XXX prefix to 000-006, apply .unnumbered to all DE headings	a.agt	4fc9825
2026-03-27	Merge pull request #2 from ar/fix/result-codes-complete	A.Revilla	b6f62da
2026-03-27	fix(result-codes): replace placeholder with complete ISO 8583:2023 aligned table	a.agt	112f113
2026-03-27	Merge pull request #1 from ar/fix/conditionals-align-iso8583	A.Revilla	774bb0f
2026-03-27	fix(conditionals): align condition codes with ISO 8583:2023 Annex E Table E.1	a.agt	836e696
2026-03-01	Backport PR 39	A.Revilla	21c3eed
2026-02-25	Clarified subfield format	A.Revilla	2b8a248
2026-02-23	Work on migration to MD	A.Revilla	4d50e1d
2026-01-15	add DE-006	A.Revilla	219ab07
2026-01-12	add DE-005, Transaction reconciliation	A.Revilla	629c1b1
2026-01-11	add DE-004, Transaction amount	A.Revilla	b71565a
2026-01-07	add DE-003, processing code	A.Revilla	074bff8
2026-01-05	unlist some level 3 sections	A.Revilla	edcb6b3
2026-01-05	add field 2, PAN	A.Revilla	6be1564
2026-01-04	add bitmap	A.Revilla	4192a63
2025-12-30	minimal reorg, add DE-000 MTI	A.Revilla	cd2890e
2025-12-30	renamed directories to avoid syntax highlight	A.Revilla	959f2b2
2025-12-30	normalized abbreviations	A.Revilla	71a6db6
2025-12-28	moved message_components to ch02	A.Revilla	dec78e5
2025-12-28	unified field representation	A.Revilla	12bc5ad
2025-12-26	add structure and transport considerations	A.Revilla	a581474
2025-12-26	move data elements t Appendix A	A.Revilla	91870d1
2025-12-26	added encoding	A.Revilla	21da5db
2025-12-25	work on ch01	A.Revilla	83a78a0
2025-12-23	add preface	A.Revilla	b491f46
2025-12-22	initial document setup	A.Revilla	a93c4fd
2025-12-22	add doc recipe	A.Revilla	0928ed3
2025-12-22	Initial take at markdown conversion	A.Revilla	9ffa29e

References

[1] *ISO 7372:1993 — trade data interchange — directory of data elements*. Geneva, Switzerland: International Organization for Standardization; ISO, 1993.

[2] *ISO 8583 — financial transaction card originated messages — interchange message specifications*. Geneva, Switzerland: International Organization for Standardization; ISO, 2003.

[3] *ISO 20022 — financial services — universal financial industry message scheme*. Geneva, Switzerland: International Organization for Standardization; ISO, 2013.

[4] *ISO 5218:2004 — information technology — codes for the representation of human sexes*. Geneva, Switzerland: International Organization for Standardization; ISO, 2004.