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Information technology — Automatic identification and data capture techniques — Syntax for high-capacity ADC media

Technologies de l'information — Techniques automatiques d'identification et de capture des données — Syntaxe pour supports de CAD à haute capacité

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

This fifth edition cancels and replaces the fourth edition (ISO/IEC 15434:2019), which has been technically revised.

The main changes are as follows:

— format “14” has been assigned to data structured with JSON syntax (see 5.3.2.16 and 5.4.15);

— format “15” has been assigned to data containing an ISO/IEC 20248 verifiable data construct (see 5.3.2.17 and 5.4.16);

— Annex B has been added to provide examples of syntax used to encode data into high-capacity ADC media.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

This document defines the manner in which data is transferred to high-capacity automatic data capture (ADC) media from a supplier's information system and the manner in which data is transferred to the recipient's information system. It does not define the internal data storage format for specific high-capacity ADC media. This document does not specify the application of data structures provided by a specific data syntax format. The application of the data structure may be specified by industry conventions.

Users of automatic identification and data capture (AIDC) techniques benefit by being able to receive data in a standard form and by being able to provide data in a standard form. Low capacity ADC media, such as linear bar code symbologies and optical character recognition, typically encode a single field of data. Most applications of these technologies involve the encoding of a single field of data by the supplier of the medium and the subsequent decoding of the data field by the recipient. Encoding single fields of data permits the supplier to perform the encoding from a single field within the supplier's information system. Decoding single fields of data permits the recipient to input this data into a single field in the recipient's information system, in lieu of key entry.

High-capacity ADC media, such as two-dimensional symbols, RFID transponders, contact memories and smart cards, encode multiple fields of data. These multiple fields are usually parsed by the recipient's information system and then mapped to specific fields of data in the recipient's information system. This document defines the syntax for high-capacity ADC media, so as to enable ADC users to utilize a single mapping utility, regardless of which high-capacity ADC medium is employed.

The benefits of using high-capacity ADC media come with challenges. The ability to convey both data and meaning (e.g. assuming an encoded serial number is "12345"; "12345" is the data and the understanding "12345" is a serial number is the meaning) within a single technology has been executed differently by many industries in a variety of ways. The widespread use of these different data and meaning formats has led to an additional challenge of identifying which format is being used. To address this challenge, this document assigns many of the data and meaning formats a unique two-digit number called a format indicator which identifies the data structure for the encoded data. These format indicators enable a user to employ one or more formats within a single high-capacity ADC media and accurately decode the data stream.

This document defines a syntax to indicate the message encoded in the high-capacity ADC media conforms to this document. Its defined syntax also indicates which data format or formats are being used to provide data and meaning. The purpose of the syntax is to provide a mechanism for an automated information system consuming data through high-capacity ADC media to adaptively interpret and parse the data meaningfully.

Information technology — Automatic identification and data capture techniques — Syntax for high-capacity ADC media

1 Scope

This document specifies a transfer structure, syntax, coding of messages and data formats when using high-capacity automatic data capture (ADC) media.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 646, *Information technology — ISO 7-bit coded character set for information interchange*

ISO/IEC 19762, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary*

ISO/IEC 21778, *Information technology — The JSON data interchange syntax*

ISO/IEC 20248, *Information technology — Automatic identification and data capture techniques — Digital signature data structure schema*

ANS MH10.8.2, *ASC MH 10 Data Identifiers and Application Identifiers*

ANS X12, *Electronic Data Interchange*

CII Syntax Rule (Vers 3.00), CII Syntax Rule Specifications (3.00) (Electronic Data Interchange — Japan)

GS1 General Specifications Standard

Airlines for America, *ATA Common Support Data Dictionary (CSDD)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Documentation notation conventions

This document uses the following typographical conventions in message examples.

a) **BOLD**: Text that shall be entered exactly as it appears. (In this document, $^{F}_{S}$, $^{G}_{S}$, $^{U}_{S}$, $^{R}_{S}$, $^{E}o_{T}$ are used to represent non-printable characters. The ISO/IEC 646 representation of non-printable characters that shall be used and is used in this document can be found in Annex A.)

b) *italic, lower case*: Variable parameters. The user shall supply an appropriate value. In some cases, default values are recommended in this document.

Non-printable characters in accordance with Annex A shall be used. These come from the ISO/IEC 646 set of characters and are as follows.

— $^{R}_{S}$, where the two-letter couplet, superscript R (i.e. ^{R}) and subscript S (i.e. $_{S}$), collectively represents a single non-printable format trailer character called record separator. The character $^{R}_{S}$ is encoded as a single byte of decimal value 030 (equivalently hexadecimal value 1E).

— $^{G}_{S}$, where the two-letter couplet, superscript G (i.e. ^{G}) and subscript S (i.e. $_{S}$), collectively represents a single non-printable data element separator character called group separator. The character $^{G}_{S}$ is encoded as a single byte of decimal value 029 (equivalently hexadecimal value 1D).

— $^{F}_{S}$, where the two-letter couplet, superscript F (i.e. ^{F}) and subscript S (i.e. $_{S}$), collectively represents a single non-printable segment terminator character called field separator. The character $^{F}_{S}$ is encoded as a single byte of decimal value 028 (equivalently hexadecimal value 1C).

— $^{U}_{S}$, where the two-letter couplet, superscript U (i.e. ^{U}) and subscript S (i.e. $_{S}$), collectively represents a single non-printable sub-element separator character. The character $^{U}_{S}$ is encoded as a single byte of decimal value 031 (equivalently hexadecimal value 1F).

— $^{E}o_{T}$ where the three-letter triplet, superscript E (i.e. ^{E}), small o (same font size, lower case o) and subscript T (i.e. $_{T}$), represents a single non-printable message trailer character called end of transmission. The character $^{E}o_{T}$ is encoded as a single byte of decimal value 04 (equivalently hexadecimal value 04).

NOTE If the literal letters RS, GS, FS, US or EoT were encoded in the data string, the resultant data would be in error, and would not be in conformance with this document. In an application built according to this document, such a data string would not be decoded, parsed or interpreted correctly.

In the following ISO/IEC 15434 message example, the non-printable characters are visually displayed as shown above; **[)>**$^{R}_{S}$**06**$^{G}_{S}$**25SUN98765432187654321A2B4C6D8E**$^{R}_{S}{}^{E}o_{T}$.

Each non-printable character is encoded according to its decimal or hexadecimal value (listed above and in Annex A), not according to the value for the individual letters. When they are decoded, and visual characters are used to represent the non-printable characters, they sometimes do not appear as shown in this document.

5 Message format

5.1 General

This clause defines how data shall be transferred from a high capacity ADC media reading device to the user's application software.

To allow multiple data formats to be contained within a data stream, a two-level structure of enveloping is employed. The outermost layer of the message is a message envelope that defines the beginning and end of the message. Within the message envelope, there is one or more format envelopes that contain the data (see Figure 1). Multiple formats in a single message should only be employed with bilateral agreement of the trading partners.

The message envelope shall consist of

— a message header,

— one or more format envelope(s), and

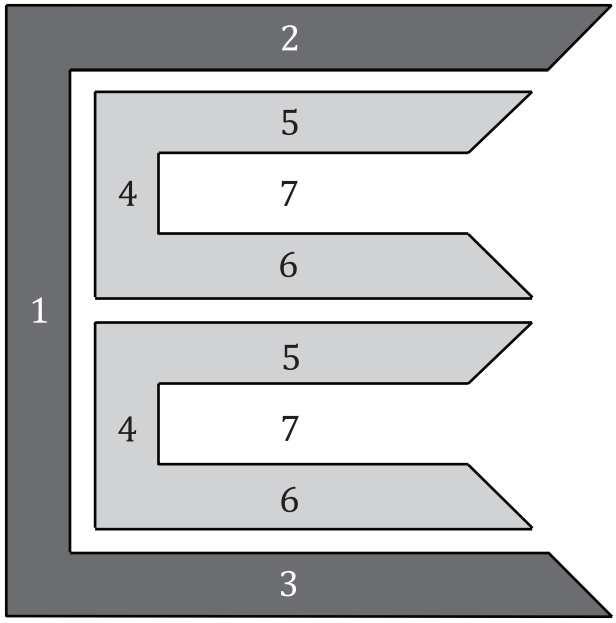
— a message trailer (when required).

Each format envelope within the message envelope shall consist of

— a format header,

— data, formatted according to the rules defined for that format, and

— a format trailer (when required).



Key

1 message envelope (see 5.2.1)
2 message header (see 5.2.2)
3 message trailer (see 5.2.3)
4 format envelope (see 5.3.1)
5 format header (see 5.3.2)
6 format trailer (see 5.3.3)
7 formatted data (see 5.4)

Figure 1 — Enveloping structure

5.2 Message envelope

5.2.1 General

The message envelope defines the start and end of the data contained within the data stream and provides the following functions:

— indicates that the message contained within this media is formatted in conformance with the rules of this document;

— indicates the character which has been defined to separate formats within this message;

— provides a unique character to indicate the end of the message.

The structure within a data stream is as follows:

a message, containing one or more formats;

a format, containing one or more segments;

a segment, containing one or more data elements;

a data element (field), potentially containing one or more sub-elements (sub-fields).

5.2.2 Message header

5.2.2.1 General

The message header consists of two parts:

— the three-character conformance indicator, and

— the format trailer character.

The complete message header is: **[)>**$^{R}_{S}$

5.2.2.2 Conformance indicator

The conformance indicator shall be the first three characters in the message header. It shall be **[)>** (left bracket, right parenthesis and greater than). See Annex A for a table of decimal and hexadecimal values used for characters in this document.

5.2.2.3 Format trailer character

The format trailer character shall be the fourth character in the message header. It shall be the non-printable character "$^{R}_{S}$" (see Annex A). The format trailer character is used throughout the message to indicate the end of a format envelope (see 5.3.3).

5.2.3 Message trailer

The message trailer identifies the end of the message within the data stream. It shall be the end of transmission character, "$^{E}o_{T}$" (see Annex A). The message trailer character shall not be used elsewhere in the message except in format "09" (binary data) where the "$^{E}o_{T}$" character can appear.

The message trailer shall not be used with formats "02" (complete EDI message / transaction) and "08" (structured data using CII syntax rules).

5.3 Format envelope

5.3.1 General

The format envelope defines the start and end of data in a given format. The format envelope provides the following functions:

— identifies the data format used within the envelope;

— defines the character(s) used to separate the segments, data elements (fields) and sub-elements (sub-fields) within this data format;

— indicates any applicable date, release or control information.

An example message for each format is provided in Annex B.

5.3.2 Format header

5.3.2.1 General

A format header shall consist of:

— a format indicator (a two-digit numeric identifier which identifies the rules governing the format);

— variable header data (if any) which defines the separators used, the version, the release, and the date or control information of the applicable standards.

Table 1 lists the format indicators and variable data associated with each format header.

Table 1 — Format header table showing associated separators

Format indicator	Variable header data	Format trailer	Format description
00			Reserved for future use
01	$^{G}_{S}vv$	$^{R}_{S}$	Transportation
02			Complete EDI message / transaction
03	$vvvrrr\ ^{F}_{S}{}^{G}_{S}{}^{U}_{S}$	$^{R}_{S}$	Structured data using ANSI ASC X12 segments
04	$vvvrrr\ ^{F}_{S}{}^{G}_{S}{}^{U}_{S}$	$^{R}_{S}$	Structured data using UN/EDIFACT segments
05	$^{G}_{S}$	$^{R}_{S}$	Data using GS1 application identifiers
06	$^{G}_{S}$	$^{R}_{S}$	Data using ASC MH10 data identifiers
07		$^{R}_{S}$	Free form text
08	*vvvvrrnn*		Structured data using CII syntax rules
09	$^{G}_{S}ttt...t^{G}_{S}ccc...c^{G}_{S}nnn...n^{G}_{S}$	$^{R}_{S}$	Binary data
10 to 11			Reserved for future use
12	$^{G}_{S}$	$^{R}_{S}$	Structured data following text element identifier rules
13			Blocked for use to avoid conflict with ISO/IEC 15961-2
14	$aaa...a^{G}_{S}$	$^{R}_{S}$	Data using JSON syntax
15	$nnn...n^{G}_{S}$	$^{R}_{S}$	ISO/IEC 20248 verifiable data construct
16 to 99			Reserved for future use

Key

vv	two-digit version of format "01" being used (see 5.4.3.1)
$^{R}_{S}$	format trailer character (see 5.3.3)
$^{F}_{S}$	segment terminator (see 5.3.2.2.2)
$^{G}_{S}$	segment terminator (see 5.3.2.2.2)
$^{U}_{S}$	sub-element separator (see 5.3.2.2.4)
vvvrrr	three-digit version (*vvv*) followed by the three-digit release (*rrr*) (see 5.3.2.6 and 5.3.2.7)
vvvvrrnn	four-character version (*vvvv*) followed by the two-character release (*rr*) followed by the two-character edition indicator (*nn*) (see 5.3.2.11)
ttt...t	file type name (see 5.3.2.12)
ccc...c	compression technique name (see 5.3.2.12)
nnn...n	number of bytes (see 5.3.2.12 and 5.3.2.17)
aaa...a	application name (see 5.3.2.16)
NOTE	ASC MH10 data identifiers were previously known as FACT data identifiers.

5.3.2.2 Separators and terminators

5.3.2.2.1 General

The separators and terminators are an integral part of the data stream. The separator and terminator characters shall not be used in non-binary data elsewhere in the message. For binary data strings (format "09"), special considerations apply (see 5.3.2.12).

5.3.2.2.2 Segment terminator

Each segment in format "03" and "04" shall be terminated by the segment terminator character, the non-printable character "$^{F}_{S}$" (see Annex A).