ISO/IEC 15961-2 DATA CONSTRUCTS REGISTER

Committee Approved: 2023-09-25

Data Constructs

There are four data constructs that are registered under the registration rules of ISO/IEC 15961-2:

- The AFI, used as a tag selection mechanism across the air interface to minimise the extent of communication transaction time with tags that do not carry the relevant AFI code.
- The data format, basically to enable a truncated or short form encoding of Object Identifiers (OIDs).
- The Object Identifier of the unique item identifier (UII). The UII is unique within the domain of the application and as defined by the scope of an application.
- The Object Identifier for other data that is possible to encode on the RFID tag. This is registered as a root-OID (as illustrated in the registered values).

Throughout the register hexadecimal values are shown using the format 0xHH, while decimal values are shown without any subscript.

There is a machine-readable table that shows the relationship of some of the data constructs, particularly the AFI relationship with the Object Identifier for the UII. When the data construct registers a Monomorphic-UII, this machine-readable table also specifies the encoding scheme used.

In addition, there are registrations of particular machine-readable tables used for some of the encoding schemes. These cover the following:

- Packed Objects
- Tag Data Profiles
- Mapping Tables (used to convert alphabetical or alpha-numeric codes to a numeric Relative-OID

AFI Assignments

This table is shown separately, because the Registration Authority expects that some AFIs can be used for different applications in a non-conflicting manner. The AFI codes are shown as hexadecimal values.

AFI (HEX)	Assigned Organisation or Function	Comments
0x00	AFI not configured	See ISO/IEC 15961-3
0x01 to 0x03	Assigned to closed application environments, which allows up to three means of selection across the air interface	See ISO/IEC 15961-3
0x04	Assigned to closed system data under the control of the manufacturer of the item associated with the RFID tag, when encoded in RFID tags with partitioned memory	See ISO/IEC 15961-3
0x05	Assigned to closed system data under the control of the transport company of the item associated with the RFID tag, when encoded in RFID tags with partitioned memory	See ISO/IEC 15961-3
0x06	Assigned to closed system data under the control of the end user of the item associated with the RFID tag, when encoded in RFID tags with partitioned memory	See ISO/IEC 15961-3
0x07	Assigned to closed systems control of re-circulating items (e.g., library items, media, returnable assets)	See ISO/IEC 15961-3
0x08 to 0x0F	Reserved for allocation to other closed system data or applications	See ISO/IEC 15961-3
0x10 to 0x8F	Not assigned by ISO/IEC 15961-2 RA	See ISO/IEC JTC 1/SC 17
0x90	Odette for Vehicle Identification using the ISO/IEC 15962 6-bit encoding Monomorphic-UII in ISO/IEC 18000-63 tags	The vehicle identification UII is prefixed by a Data Identifier from a limited set controlled by Odette.
0x91	IATA – for asset control, initially for ULD containers for cargo and passenger use	Compliant with IATA RP1640 standard
0x92	ISO/IEC JTC1 SC31 Secretariat	For use with ISO/IEC 20248
0x93 to 0x9F	RESERVED FOR FUTURE USE	

AFI (HEX)	Assigned Organisation or Function	Comments
0xA0	IPC – for postal items Monomorphic-UII using URN Code 40 compaction in ISO/IEC 18000-63 tags	
0xA1	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 product tagging	
0xA2	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 transport unit	
0xA3	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 returnable transport unit	
0xA4	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 product tagging, but for hazardous materials	**For Historical Use Only – Do NOT use in new applications**
0xA5	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 product packaging	
0xA6	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 product packaging, but for hazardous materials	**For Historical Use Only – Do NOT use in new applications**
0xA7	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 transport unit, but containing hazardous materials	**For Historical Use Only – Do NOT use in new applications**
0xA8	Monomorphic-UII using 6-bit encoding for ISO/IEC 17360 returnable transport unit, but containing hazardous materials	**For Historical Use Only – Do NOT use in new applications**
0xA9	EXPLICITLY RESERVED FOR ISO 17363	
0xAA	EXPLICITLY RESERVED FOR ISO 17363	**For Historical Use Only – Do NOT use in new applications**
0xAB	UII scheme and encoding format for Mobile AIDC services as defined in ISO/IEC 29174	Standard has been withdrawn
0xAC	Monomorphic-UII using 8-bit encoding for ISO/IEC 17360	
0xAD	Monomorphic-UII using binary encoding for ISO/IEC 17360	
0xAE	RAIN Alliance Inc.	Compliant with RAIN Alliance Inc. tag encoding guideline for use in ISO/IEC 18000-63 tags
0xAF	Managed by VDMA for electronic identification of animals in accordance with ISO 6881 Radio-frequency identification of animals – Code Structure Ultra High Frequency transponders	

AFI (HEX)	Assigned Organisation or Function	Comments
0xB0	6C Toll Operators Coalition Monomorphic-UII using 8-bit (Octet) encoding in ISO/IEC 18000-63 tags	
0xBA	RESERVED FOR FUTURE USE	
0xBB	ISBT – for blood, tissue, organ and cellular therapy products	Compliant with ISBT 128 & ISBT RFID Guidelines Because the encoding is not compliant with ISO/IEC 15962 Access Methods, the DSFID for this application is 0x3E
0xBC to 0xBF	RESERVED FOR FUTURE USE	
0xC0	Identification of rail vehicles	Compliant with CEN standard EN 17230.
0xC1	IATA – for baggage handling	Compliant with IATA RP1740C standard
0xC2	EDItEUR – for library items when on loan	• Compliant with ISO 28560 Parts 2 and 3 when using ISO/IEC 18000-3M1 tags. • Compliant with ISO TS 28560 Part 4 with Monomorphic-UII using URN Code 40 compaction in ISO/IEC 18000-63 tags
0xC3 to 0xCE	RESERVED FOR FUTURE USE	
0xCF	Reserved as an extension code for multiple byte **AFI** code values.	
0xD0 to 0xFF	Not assigned by ISO/IEC 15961-2 RA	See ISO/IEC JTC 1/SC 17

Data Format Table

This table is shown separately, because the Registration Authority expects that some Data Formats can be used for different applications in a non-conflicting manner. The Data Formats are shown as decimal values.

Data Format (Decimal)	Assigned Organisation or Function	Root-OID	Comments
0	Not-Formatted	Not applicable	This value is the default for an RFID tag yet to be formatted, so the system may assume that the tag has no encoded data The DSFID combining the Data Format with the Access Method) shall be 0x00.
1	Full-Featured	Not applicable	This is used where each OID has to be encoded in full, i.e. without truncating the Root-OID. This is relevant where the RFID tag is likely to contain a mixture of OIDs from different domains, or one from a minor domain.
2	Root-OID-Encoded	Encoded on the tag	This is useful for small domains requiring to encode a set of data. This data format requires the Root-OID to be encoded, but then truncates all OIDs so that only the Relative-OID needs to be encoded.
3	ISO/IEC 15434	1 0 15434	This standard supports a number of message structures originally intended for two-dimensional bar codes. An efficient encoding scheme is defined in ISO/IEC 15962:2013 in Annex T and Annex U.
4	ISO/IEC 6523	RESERVED for ICD 1 0 6523 (as assigned in ISO/IEC 15961:2004	This standard deals with the registration of domains to the level of the International Code Designator (ICD). This data format allows existing organisation structures to be supported with the minimum of change. A list of ICDs up to number 0183 is at: http://www.oid-isnfo.com/get/1.3 and at http://www.cyber-identity.com/download/ICD-list.pdf. **Registration under ISO/IEC 15961-2 should be for a particular ICD, and not all ICDs.**
5	ISO/IEC 15459	1 0 15459	ISO/IEC 15459 provides a mechanism to support unique identification codes across multiple industry and commercial sectors. The various parts of this standard provide the basis for track and trace codes for all levels in supply chains.
6	ISO 28560-2 and ISO TS 28560-4	1 0 15961 6	These standards address the encoding of data on RFID tags in the library community and defines all the Relative-OID values
7	ISO/IEC 29174	2 27	This root-OID applies only to the Relative-OID {1} for the unique Mobile Item Identifier (MII)

Data Format (Decimal)	Assigned Organisation or Function	Root-OID	Comments
8	ISO/IEC 15961-Combined	1 0 15961	This allows any combinations of OID that have the common root-OID {1 0 15961} to be encoded. The relative-OID then becomes the next arc (which can differ for different objects) followed by another arc identifying the particular data element. The structure was developed so that two, or more, related organisation could share encoding - by agreement – without one having all the encoding efficiencies. Joint registration by the relevant organisation should be a requirement for data constructs to be assigned.
9	GS1-AI	1 0 15961 9	This data format enables GS1 Application Identifiers to be used as the Relative-OID in an Object Identifier structure
10	ANS-DI-Algorithm	1 0 15961 10	This data format enables ANS MH10 Data Identifiers to be used as the Relative-OID in an Object Identifier structure. The alphanumeric DI is converted to a Relative-OID using an algorithm defined ISO/IEC 15961:2004 The preferred option for new applications is to use Data Format 13, which provides for more efficient encoding
11	IATA-Asset	1 0 15961 11	The data format is assigned to IATA for various low volume asset control applications, each of which will be registered. The Relative-OID values are assigned in various IATA standards, specifically: IATA RP1640 standard for ULD containers
12	IATA-Baggage	1 0 15961 12	The Relative-OID values are defined in the IATA RP1740C standard
13	ANSI-DI-Mapping Table	1 0 15961 13	This data format enables ANS MH10 Data Identifiers to be used as the Relative-OID in an Object Identifier structure in a more efficient encoding manner than data format 10. The current mapping table is available at: http://www.mhi.org/standards/di The mapping table is accessible from this link on the page: Assigned_Relative_OIDs_20140617.xls

Data Format (Decimal)	Assigned Organisation or Function	Root-OID	Comments
14	IPC-Postal	1 0 15961 14	The data format is assigned to IPC for various postal applications, each of which will be recorded in the registration table below. The Relative-OID values are assigned in various IPC standards, specifically: IPC RFID standard for: Identifying postal receptacles based on the UPU S9 code. IPC RFID standard for: Identifying postal items based on the UPU S10 code. IPC RFID standard for: Test letters IPC RFID Standard for: Receptacle Asset Identification IPC RFID standard for: Tracking Items based on a Universal Identifier
15	6C Toll Operators Coalition	1 0 15961 15	The Data Format only applies to the UII encoded in MB 01 of the 18000-63 tag. Data Format 30 is for MB 11, indicating that the encoding is based on a bit structure defined by the 6C Toll Operators Coalition
16	Odette for Vehicle Identification Number	1 0 15961 16	The Data Format only applies to the UII encoded in MB 01 of the 18000-63 tag. Data Formats 3 or 13 are used for MB 11, depending on the choice of the vehicle manufacturer and related to Model ID, colour, technical status or like other formatted according to ISO 15459 or 16022.
17	ISO/IEC 20248	1 0 20248	Digital Signatures for RFID
18 to 28	RESERVED		
29	Closed system data fully encoded to ISO/IEC 15962 rules	The Root-OID is implied.	This Data Format enables closed system or prototype data to be encoded in a manner compliant with the ISO/IEC 15962 encoding rules (i.e., by declaring the relevant Access Method). As those implementing the application know the interpretation of the Relative-OID values, the Root-OID is implied and does not require to exist or to be registered.
30	Closed system data not encoded to ISO/IEC 15962 rules	Not applicable	The complete DSFID shall be one of the following: 0x1E, 0x3E, 0x5E, 0x7E. 0x9E, 0xBE, 0xDE, 0xFE. These values indicate that the encoded bytes are passed through unchanged in ISO/IEC 15962 and ISO/IEC 24791 implementations
31	Extended Data Format	Not applicable	Various extension mechanisms are included in ISO/IEC 15962 Rev1 for the DSFID; one enables an additional 256 Data Formats to be assigned. If the First DSFID has the value 0x0F, then the Data Format that is encoded is one that is defined in the following rows on this table.
32	ISO 6881	Not applicable	Data structure according to ISO 6881 Radio-frequency identification of animals – Code Structure Ultra High Frequency transponders
33 to 287	RESERVED		

Data Constructs Register

The Data Constructs Register shows the combination of assignments of AFIs, Data Formats, together with the registration of Object Identifiers to organisations and to functions. In addition, the table indicates whether the Unique Item Identifier (UII) is encoded in a separate memory from other item-attendant data. The table clearly shows that it is the combination of AFI and Data Format(s) that provide the unique interpretation of data encoded on the RFID tag. This table is presented in AFI byte sequence.

Where a tag supports different memory areas for the UII and other Item-related data (e.g., ISO/IEC 18000-3 Mode 3, ISO/IEC 18000-63 [Type C] and ISO/IEC 18000-64 [Type D]) the *Data Format for additional data* column is encoded in the item-related memory area. This Data Format, and its associated Root-OID, may differ from that in the UII memory.

Organisation or Standard	AFI (HEX)	UII Encoded Data Format (Decimal)	Monomorphic-UII Compaction/ Encoding	Monomorphic-UII MH10 Data Identifier	Object Identifier for Unique Item Identifier (UII)	Data Format for additional data (Decimal)
Odette for Vehicle Identification Number (using 18000-63 tags, with separate UII memory)	0x90	16	6-bit	Not applicable	1 0 15961 16 See Note F	3 or 13
IATA RP1640 ULD containers (using 18000-63 tags, with separate UII memory) See Note A	0x91	11	Not applicable		1 0 15961 11 5	11
ISO IEC JTC1 SC31 Secretariat for ISO/IEC 20248 digital signatures for RFID, when using partitioned memory tags, e.g. ISO/IEC 18000-63	0x92	Not applicable	Application-defined 8-bit (octet)	Not applicable	1 0 20248 1	17
ISO IEC JTC1 SC31 Secretariat for ISO/IEC 20248 digital signatures for RFID, when using single memory tags, e.g., ISO/IEC 18000-3M1	0x92	17	Not applicable	Not applicable	1 0 20248 1	17
IPC: postal items (for 18000-63 tags, with separate UII memory)	0xA0	Not applicable	URN Code 40	Not applicable	1 0 15961 14 {App Type} See Note B	14
ISO/IEC 17360 for product tagging [separate UII memory, with Data Identifiers in separate memory] -	0xA1	Not applicable	6-bit	25S	1 0 15961 13 1	3 or 13
				25T	1 0 15961 13 3	
				I	1 0 15961 13 96	
ISO/IEC 17360 for transport unit [separate UII memory, with Data Identifiers in separate memory]	0xA2	Not applicable	6-bit	J	1 0 15961 13 4	3 or 13
				1J	1 0 15961 13 36	

Organisation or Standard	AFI (HEX)	UII Encoded Data Format (Decimal)	Monomorphic-UII Compaction/ Encoding	Monomorphic-UII MH10 Data Identifier	Object Identifier for Unique Item Identifier (UII)	Data Format for additional data (Decimal)
				2J	1 0 15961 13 156	
				3J	1 0 15961 13 157	
				4J	1 0 15961 13 159	
				5J	1 0 15961 13 37	
				6J	1 0 15961 13 38	
ISO/IEC 17360 for returnable transport item [separate UII memory, with Data Identifiers in separate memory]	0xA3	Not applicable	6-bit	1B	1 0 15961 13 112	3 or 13
				25B	1 0 15961 13 2	
ISO/IEC 17360 for product tagging, containing hazardous materials [separate UII memory, with Data Identifiers in separate memory] **For Historical Use Only – Do NOT use in new applications**	0xA4	Not applicable	6-bit	25S	1 0 15961 13 1	3 or 13
				25T	1 0 15961 13 3	
				I	1 0 15961 13 96	
ISO/IEC 17360 for product packaging [separate UII memory, with Data Identifiers in separate memory]	0xA5	Not applicable	6-bit	25S	1 0 15961 13 1	3 or 13
				25T	1 0 15961 13 3	
				I	1 0 15961 13 96	
ISO/IEC 17360 for product packaging, containing hazardous materials [separate UII memory, with Data Identifiers in separate memory] **For Historical Use Only – Do NOT use in new applications**	0xA6	Not applicable	6-bit	25S	1 0 15961 13 1	3 or 13
				25T	1 0 15961 13 3	
				I	1 0 15961 13 96	
ISO/IEC 17360: for transport unit, containing hazardous materials [separate UII memory, with Data Identifiers in separate memory]	0xA7	Not applicable	6-bit	J	1 0 15961 13 4	3 or 13
				1J	1 0 15961 13 36	
				2J	1 0 15961 13 156	
				3J	1 0 15961 13 157	
				4J	1 0 15961 13 159	
				5J	1 0 15961 13 37	
				6J	1 0 15961 13 38	

Organisation or Standard	AFI (HEX)	UII Encoded Data Format (Decimal)	Monomorphic-UII Compaction/ Encoding	Monomorphic-UII MH10 Data Identifier	Object Identifier for Unique Item Identifier (UII)	Data Format for additional data (Decimal)
ISO/IEC 17360 for returnable transport item, containing hazardous materials [separate UII memory, with Data Identifiers in separate memory] **For Historical Use Only – Do NOT use in new applications**	0xA8	Not applicable	6-bit	1B	1 0 15961 13 112	3 or 13
				25B	1 0 15961 13 2	
Explicitly reserved for ISO 17363	0xA9					
Explicitly reserved for ISO 17363 **For Historical Use Only – Do NOT use in new applications**	0xAA					
ISO/IEC 29174 for Mobile Item Identifier (MII) and additional data [separate UII memory, with Data Identifiers in separate memory] – Standard withdrawn	0xAB	7	Not applicable	Not applicable	2 27 1	13 (As required by ISO/IEC 29175)
ISO/IEC 17360supply chain applications of RFID – [separate UII memory, with Data Identifiers in separate memory]	0xAC	Not applicable	Application-defined 8-bit	Any Applicable DI	Not Applicable	3 or 13
RAIN Alliance Inc.	0xAE	Not applicable	Application-Binary	Not Applicable	Not Applicable	Not Applicable
6C Toll Operators Coalition See Note C	0xB0	30 encoded in DSFID = 0x3E	Application-defined 8-bit (octet)	Not applicable	1 0 159161 15	30 encoded in DSFID = 0x3E
ISBT – for blood, tissue, organ and cellular therapy products	0xBB	30 encoded in DSFID = 0x3E	Not applicable		Not applicable	30 encoded in DSFID = 0x3E
European rail vehicle standard EN17230	0xC0	Not applicable	6-bit	5R		
IATA RP1740C baggage handling [separate UII memory]	0xC1	12	Not applicable		1 0 15961 12 1	12
EDItEUR: library items (for 18000-3M1 tags, using ISO 28560 Part 2 and 3)	0xC2	6	Not applicable		1 0 15961 6 1	6

Organisation or Standard	AFI (HEX)	UII Encoded Data Format (Decimal)	Monomorphic-UII Compaction/ Encoding	Monomorphic-UII MH10 Data Identifier	Object Identifier for Unique Item Identifier (UII)	Data Format for additional data (Decimal)
EDItEUR: library items (for 18000-63 tags, with separate UII memory, using ISO TS 28560-4)	0xC2	Not applicable	URN Code 40		1 0 15961 6 0	6
GS1 EPCglobal (for 18000-63 tags, with separate UII memory) See Note D	N/A	Not applicable	Not applicable		Not applicable	9 See Note E

Additional Notes:

A. The registration for IATA for low volume assets, initially applies to IATA RP1640, with Relative-OID 5 assigned to the UII, and Relative-OIDs 6 and 7 reserved for possible alternative UIIs in future. Relative-OIDs 30 to 49 are used for encoding additional data in MB11. Some of these have values and functions assigned in RP1640, others are reserved under the control of IATA. As IATA defines other asset-related applications, they will require separate registration, using the same AFI and data format, but different Relative-OIDs.

B. The registration for IPC is intended to cover a number of different applications {App Type} over future years. Current applications address these postal functions with these {App Types}: "A" for UPU S10 standard, "B" for Test letters, "E" for UPU S9 standard, "G" for Universal identifiers, "1" for Receptacle assets". The {App Type} will have a different alphabetic or numeric character for each application. There is no requirement to assign additional data constructs, just to update this note.

C. The assignment to the 6C Toll Operators Coalition retains the AFI assigned to enable trials. The additional constructs are for an application-defined UII structure and for additional data bit-based data in MB11. The data encoding rules are defined by the Coalition. Standard ISO/IEC 15962 encoders can only pass through the bit encoding and shall not attempt to validate them, and decoders can only pass through the bit encoding to the application layer and not attempt to interpret them.

D. The encoding of the UII shall be to rules defined in the GS1 Tag Data Standard, which uses a different method than the AFI.

E. Data Format 9 refers specifically to GS1 Application Identifiers. In addition, any other registered Data Format may be used in Memory Bank 11.

F. Data Identifiers have prefixes assigned and include: "I" – pure VIN number according to ISO 3779, "4I" - VIN number + Licence Plate, "5I" – body tag number +product order number +VIN

Register of Packed Objects

Data Format	Organisation	URLs	
9	GS1	Packed Objects table	http://www.gs1.org/gsmp/kc/epcglobal/tds/15961-PO-Fmt9.csv
		Data Dictionary	http://www.gs1.org/barcodes/technical/genspecs#where

Register of Tag Data Profiles

None yet registered

Register of Mapping Tables

Data Format	Organisation: function	URL
13	ANSI MH10.8 Data Identifiers	http://www.mhi.org/standards/di The mapping table is accessible from this link on the page: Assigned_Relative_OID_DI_table_10SEP2014.xls
32	ISO 6881 Radio-frequency identification of animals – Code Structure Ultra High Frequency transponders.	https://www.iso.org/standard/82418.html