
iso8583

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`iso8583` is a Python package that serializes and deserializes ISO8583 data between a `bytes` or `bytearray` instance containing ISO8583 data and a Python `dict`.

CHAPTER 1

At a Glance

`iso8583` package supports custom specifications. See `iso8583.specs` module.

Use `iso8583.decode()` to decode raw iso8583 message.

```
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> encoded_raw = b'020040000000000000000101234567890'
>>> decoded, encoded = iso8583.decode(encoded_raw, spec)
```

Use `iso8583.encode()` to encode updated ISO8583 message. It returns a raw ISO8583 message and a dictionary with encoded data.

```
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> decoded = {"t": "0200", "2": "1234567890", "39": "00"}
>>> encoded_raw, encoded = iso8583.encode(decoded, spec)
```

To install:

```
pip install pyiso8583
```

1.1 Intro

1.1.1 iso8583 - a Python package for parsing ISO8583 data

`iso8583` package serializes and deserializes ISO8583 data between a `bytes` or `bytearray` instance containing ISO8583 data and a Python dict.

`iso8583` package supports custom `specifications` that can define

- Field length and data encoding, such as BCD, ASCII, EBCDIC, etc.

- Field type, such as fixed, LLVAR, LLLVAR, etc.
- Maximum length
- Optional field description

Multiple specifications can co-exist to support ISO8583 messages for POS, ATM, file actions, and so on. Simply define a new specification dictionary. *iso8583* package includes a starter specification in *iso8583.specs* module that can be used as a base to create own custom/proprietary specifications.

Additional information is available on [RTD](#).

Install:

```
pip install pyiso8583
```

1.1.2 Encoding & Decoding

Use *iso8583.decode* to decode raw ISO8583 message. It returns two dictionaries: one with decoded data and one with encoded data.

```
>>> import pprint
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> encoded_raw = b'02004000000000000000101234567890'
>>> decoded, encoded = iso8583.decode(encoded_raw, spec)
>>> pprint.pp(decoded)
{'t': '0200', 'p': '4000000000000000', '2': '1234567890'}
>>> pprint.pp(encoded)
{'t': {'len': b'', 'data': b'0200'},
 'p': {'len': b'', 'data': b'4000000000000000'},
 '2': {'len': b'10', 'data': b'1234567890'}}
```

Modify the decoded message to send a response back. Change message type from '0200' to '0210'. Remove field 2 (PAN). And add field 39 (Response Code).

```
>>> decoded['t'] = '0210'
>>> decoded.pop('2', None)
'1234567890'
>>> decoded['39'] = '05'
```

Use *iso8583.encode* to encode updated ISO8583 message. It returns a raw ISO8583 message and a dictionary with encoded data.

```
>>> encoded_raw, encoded = iso8583.encode(decoded, spec)
>>> encoded_raw
bytearray(b'021000000000002000000005')
>>> pprint.pp(decoded)
{'t': '0210', 'p': '0000000000200000', '39': '05'}
>>> pprint.pp(encoded)
{'t': {'len': b'', 'data': b'0210'},
 'p': {'len': b'', 'data': b'0000000000200000'},
 '39': {'len': b'', 'data': b'05'}}
```

1.1.3 Pretty Print Messages

Use *iso8583.pp* to pretty print ISO8583 message.


```

>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> encoded_raw = b'020040000000000000000000101234567890'
>>> decoded, encoded = iso8583.decode(encoded_raw, spec)
>>> iso8583.pp(decoded, spec)
t  Message Type                : '0200'
p  Bitmap, Primary             : '4000000000000000'
2  Primary Account Number (PAN) : '1234567890'
>>> iso8583.pp(encoded, spec)
t  Message Type                : b'0200'
p  Bitmap, Primary             : b'4000000000000000'
2  Primary Account Number (PAN) : b'10' b'1234567890'

```

1.1.4 Contribute

iso8583 package is hosted on [GitHub](#).

Feel free to fork and send contributions over.

1.2 How-To

Note: The examples on this page use `pprint.pp()` which is available starting from Python 3.8. Alternatively, it's also possible to achieve the same result using `pprint.pprint()` with `sort_dicts=False` starting from Python 3.7. Earlier versions of Python 3 can use `pprint.pprint()` but it will sort the keys.

1.2.1 Create Own/Proprietary Specifications

iso8583 comes with specification sample in `iso8583.specs.py`. Feel free to copy sample specification dict and modify it to your needs. Refer to *iso8583.specs* for configuration details.

1.2.2 Create ISO8583 Message

iso8583 converts a Python dict into a bytearray. A dict must consists of `str` keys and `str` values.

At the minimum it must have key `'t'` which contains message type, e.g. `'0200'`.

```

>>> import pprint
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> decoded = {'t': '0200'}
>>> encoded_raw, encoded = iso8583.encode(decoded, spec)
>>> encoded_raw
bytearray(b'020000000000000000000000')
>>> pprint.pp(encoded)
{'t': {'len': b'', 'data': b'0200'},
 'p': {'len': b'', 'data': b'0000000000000000'}}
>>> pprint.pp(decoded)
{'t': '0200', 'p': '0000000000000000'}

```

Note that primary bitmap was generated automatically.

An ISO8583 message without any fields is not very useful. To add another field to the message simply add '2'-'128' keys with `str` data.

```
>>> decoded['2'] = 'cardholder PAN'
>>> decoded['3'] = '111111'
>>> decoded['21'] = '021'
>>> encoded_raw, encoded = iso8583.encode(decoded, spec)
>>> encoded_raw
bytearray(b'020060000800000000000014cardholder PAN111111021')
>>> pprint.pp(encoded)
{'t': {'len': b'', 'data': b'0200'},
 'p': {'len': b'', 'data': b'6000080000000000'},
 '2': {'len': b'14', 'data': b'cardholder PAN'},
 '3': {'len': b'', 'data': b'111111'},
 '21': {'len': b'', 'data': b'021'}}
>>> pprint.pp(decoded)
{'t': '0200',
 'p': '6000080000000000',
 '2': 'cardholder PAN',
 '3': '111111',
 '21': '021'}
```

Let's remove some fields.

```
>>> decoded.pop('2', None)
'cardholder PAN'
>>> decoded.pop('3', None)
'111111'
>>> encoded_raw, encoded = iso8583.encode(decoded, spec)
>>> encoded_raw
bytearray(b'0200000008000000000000021')
>>> pprint.pp(encoded)
{'t': {'len': b'', 'data': b'0200'},
 'p': {'len': b'', 'data': b'0000080000000000'},
 '21': {'len': b'', 'data': b'021'}}
>>> pprint.pp(decoded)
{'t': '0200', 'p': '0000080000000000', '21': '021'}
```

1.2.3 Add Secondary Bitmap

There is no need to explicitly add or remove secondary bitmap. It's auto generated when at least one '65'-'128' fields is present.

```
>>> import pprint
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> decoded = {
...     't': '0200',
...     '102': '111111'}
>>> encoded_raw, encoded = iso8583.encode(decoded, spec)
>>> encoded_raw
bytearray(b'020080000000000000000000000000400000006111111')
>>> pprint.pp(encoded)
{'t': {'len': b'', 'data': b'0200'},
```

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Even if secondary (or primary) bitmap is specified it's overwritten with correct value.

Secondary bitmap is removed if it's not required.

1.2.4 Check for Mandatory Fields

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```
>>> mandatory_fields = {'2', '102'}
>>> all(field in decoded.keys() for field in mandatory_fields)
False
>>> mandatory_fields = {'102'}
>>> all(field in decoded.keys() for field in mandatory_fields)
True
```

1.2.5 Convert to and from JSON

iso8583 output is JSON compatible.

```
>>> import json
>>> import pprint
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> encoded_raw = b'0200600008000000000014cardholder PAN111111021'
>>> decoded, encoded = iso8583.decode(encoded_raw, spec)
>>> pprint.pp(decoded)
{'t': '0200',
 'p': '6000080000000000',
 '2': 'cardholder PAN',
 '3': '111111',
 '21': '021'}
>>> decoded_json = json.dumps(decoded)
>>> decoded_json
'{"t": "0200", "p": "6000080000000000", "2": "cardholder PAN", "3": "111111", "21":
↪ "021"}'
```

And back.

```
>>> encoded_raw, encoded = iso8583.encode(json.loads(decoded_json), spec)
>>> encoded_raw
bytearray(b'0200600008000000000014cardholder PAN111111021')
```

iso8583.specs specifications are also JSON compatible.

```
>>> import json
>>> import pprint
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> spec_json = json.dumps(spec)
>>> decoded = {
...     't': '0200',
...     '2': 'PAN'}
>>> encoded_raw, encoded = iso8583.encode(decoded, json.loads(spec_json))
>>> encoded_raw
bytearray(b'020040000000000000000003PAN')
>>> pprint.pp(encoded)
{'t': {'len': b'', 'data': b'0200'},
 'p': {'len': b'', 'data': b'4000000000000000'},
 '2': {'len': b'03', 'data': b'PAN'}}
>>> pprint.pp(decoded)
{'t': '0200', '2': 'PAN', 'p': '4000000000000000'}
```

1.3 Specifications

An ISO8583 spec is a Python dict instance. It describes how each field needs to be encoded or decoded.

1.3.1 Fields

Supported fields:

- **h** - Message Header. If a specification does not have a header then set **max_len** to 0 to disable it.
- **t** - Message Type Identifier
- **p** - Primary Bitmap
- **1** - Secondary Bitmap
- **2 .. 128** - Regular fields

1.3.2 Field Properties

Each field defines these properties:

- **data_enc** - field's data encoding type, where:
 - Use `b` for binary-coded decimal data (e.g. an ABCD hex string is encoded as `\xAB\xCD` 2-byte value).
 - Otherwise, provide any valid Python encoding. For example, `ascii` or `latin-1` for ASCII data and `cp500` or similar for EBCDIC data.
- **len_enc** - field's length encoding type. Follows the same rules as **data_enc**. Some fields, such as ICC data, could have binary data but ASCII length. This parameter does not affect fixed-length fields.
- **len_type** - field's length type: fixed, LVAR, LLVAR, etc. Expressed as number of bytes in field length. For example, ASCII LLVAR length takes up 2 bytes (`b'00'` - `b'99'`). BCD LLVAR length can take up only 1 byte (`b'\x00'` - `b'\x63'`). **len_type** depends on the type of **len_enc** being used. BCD **len_enc** can fit higher length ranges in fewer bytes.

len_type	len_enc	
	ASCII / EBCDIC	Binary-Coded Decimal
Fixed	0	0
LVAR	1	1
LLVAR	2	1
LLLVAR	3	2
LLLLVAR	4	2

- **max_len** - field's maximum length in bytes. For fixed fields **max_len** defines the fixed length of the field.
- **desc** - field's description that's printed in a pretty format. **desc** plays no role in encoding or decoding data. It's safe to omit it from the specifications. If omitted `iso8583.pp()` may or may not work as expected.

1.3.3 Sample Field Specifications

Binary-coded decimal primary bitmap (the same applies to the secondary bitmap):

```
specification["p"] = {
  "data_enc": "b",
  "len_enc": "b",
  "len_type": 0,
  "max_len": 8,
  "desc": "BCD bitmap, e.g. \x12\x34\x56\x78\x90\xAB\xCD\xEF"
}
```

Hex string primary bitmap (the same applies to the secondary bitmap):

```
specification["p"] = {
  "data_enc": "ascii",
  "len_enc": "ascii",
  "len_type": 0,
  "max_len": 16,
  "desc": "Hex string bitmap, e.g 1234567890ABCDEF"
}
```

Field 2 that is a BCD fixed length field of 10 bytes:

```
specification["2"] = {
  "data_enc": "b",
  "len_enc": "b",
  "len_type": 0,
  "max_len": 10,
  "desc": "BCD fixed field"
}
```

Field 3 that is an ASCII LLVAR field of maximum 20 bytes:

```
specification["3"] = {
  "data_enc": "ascii",
  "len_enc": "ascii",
  "len_type": 2,
  "max_len": 20,
  "desc": "ASCII LLVAR field"
}
```

Field 4 that is an EBCDIC LLLVAR field of maximum 150 bytes:

```
specification["4"] = {
  "data_enc": "cp500",
  "len_enc": "cp500",
  "len_type": 3,
  "max_len": 150,
  "desc": "EBCDIC LLLVAR field"
}
```

1.3.4 Sample Message Specifications

ASCII/BCD

Bitmaps, MACs, PIN, and ICC data are in BCD:

```

default = {
  "h": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 0, "desc
↳": "Message Header"},
  "t": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Message Type"},
  "p": {"data_enc": "b", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Bitmap, Primary"},
  "1": {"data_enc": "b", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Bitmap, Secondary"},
  "2": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 19, "desc
↳": "Primary Account Number (PAN)"},
  "3": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "Processing Code"},
  "4": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Amount, Transaction"},
  "5": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Amount, Settlement"},
  "6": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Amount, Cardholder Billing"},
  "7": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Transmission Date and Time"},
  "8": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Amount, Cardholder Billing Fee"},
  "9": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Conversion Rate, Settlement"},
  "10": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Conversion Rate, Cardholder Billing"},
  "11": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "System Trace Audit Number"},
  "12": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "Time, Local Transaction"},
  "13": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Local Transaction"},
  "14": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Expiration"},
  "15": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Settlement"},
  "16": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Conversion"},
  "17": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Capture"},
  "18": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Merchant Type"},
  "19": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Acquiring Institution Country Code"},
  "20": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "PAN Country Code"},
  "21": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Forwarding Institution Country Code"},
  "22": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Point-of-Service Entry Mode"},
  "23": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "PAN Sequence Number"},
  "24": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Network International ID (NII)"},
  "25": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "Point-of-Service Condition Code"},

```

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```

"26": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "Point-of-Service Capture Code"},
"27": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 1, "desc
↳": "Authorizing ID Response Length"},
"28": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Transaction Fee"},
"29": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Settlement Fee"},
"30": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Transaction Processing Fee"},
"31": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Settlement Processing Fee"},
"32": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Acquiring Institution ID Code"},
"33": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Forwarding Institution ID Code"},
"34": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 28, "desc
↳": "Primary Account Number, Extended"},
"35": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 37, "desc
↳": "Track 2 Data"},
"36": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 104, "desc
↳": "Track 3 Data"},
"37": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Retrieval Reference Number"},
"38": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "Authorization ID Response"},
"39": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "Response Code"},
"40": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Service Restriction Code"},
"41": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Card Acceptor Terminal ID"},
"42": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 15, "desc
↳": "Card Acceptor ID Code"},
"43": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 40, "desc
↳": "Card Acceptor Name/Location"},
"44": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 25, "desc
↳": "Additional Response Data"},
"45": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 76, "desc
↳": "Track 1 Data"},
"46": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Additional Data - ISO"},
"47": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Additional Data - National"},
"48": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Additional Data - Private"},
"49": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Currency Code, Transaction"},
"50": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Currency Code, Settlement"},
"51": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Currency Code, Cardholder Billing"},
"52": {"data_enc": "b", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "PIN"},
"53": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Security-Related Control Information"},
"54": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 240, "desc
↳": "Additional Amounts"},

```

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```

"55": {"data_enc": "b",      "len_enc": "ascii", "len_type": 3, "max_len": 255, "desc
↳": "ICC data"},
"56": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved ISO"},
"57": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"58": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"59": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"60": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"61": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved Private"},
"62": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved Private"},
"63": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved Private"},
"64": {"data_enc": "b",      "len_enc": "ascii", "len_type": 0, "max_len": 8,   "desc
↳": "MAC"},
"65": {"data_enc": "b",      "len_enc": "ascii", "len_type": 0, "max_len": 8,   "desc
↳": "Bitmap, Extended"},
"66": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 1,   "desc
↳": "Settlement Code"},
"67": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2,   "desc
↳": "Extended Payment Code"},
"68": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3,   "desc
↳": "Receiving Institution Country Code"},
"69": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3,   "desc
↳": "Settlement Institution Country Code"},
"70": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3,   "desc
↳": "Network Management Information Code"},
"71": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4,   "desc
↳": "Message Number"},
"72": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4,   "desc
↳": "Message Number, Last"},
"73": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6,   "desc
↳": "Date, Action"},
"74": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Credits, Number"},
"75": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Credits, Reversal Number"},
"76": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Debits, Number"},
"77": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Debits, Reversal Number"},
"78": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Transfer, Number"},
"79": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Transfer, Reversal Number"},
"80": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Inquiries, Number"},
"81": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10,  "desc
↳": "Authorizations, Number"},
"82": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12,  "desc
↳": "Credits, Processing Fee Amount"},
"83": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12,  "desc
↳": "Credits, Transaction Fee Amount"},

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```

"84": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Debits, Processing Fee Amount"},
"85": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Debits, Transaction Fee Amount"},
"86": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Credits, Amount"},
"87": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Credits, Reversal Amount"},
"88": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Debits, Amount"},
"89": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Debits, Reversal Amount"},
"90": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 42, "desc
↳": "Original Data Elements"},
"91": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 1, "desc
↳": "File Update Code"},
"92": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "File Security Code"},
"93": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 5, "desc
↳": "Response Indicator"},
"94": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 7, "desc
↳": "Service Indicator"},
"95": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 42, "desc
↳": "Replacement Amounts"},
"96": {"data_enc": "b", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Message Security Code"},
"97": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 17, "desc
↳": "Amount, Net Settlement"},
"98": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 25, "desc
↳": "Payee"},
"99": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Settlement Institution ID Code"},
"100": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Receiving Institution ID Code"},
"101": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 17, "desc
↳": "File Name"},
"102": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 28, "desc
↳": "Account ID 1"},
"103": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 28, "desc
↳": "Account ID 2"},
"104": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 100, "desc
↳": "Transaction Description"},
"105": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"106": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"107": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"108": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"109": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"110": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"111": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"112": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},

```

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```

"113": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"114": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"115": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"116": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"117": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"118": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"119": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"120": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"121": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"122": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"123": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"124": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"125": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"126": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"127": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"128": {"data_enc": "b", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "MAC"}
}

```

ASCII

All fields are in ASCII:

```

default_ascii = {
"h": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 0, "desc
↳": "Message Header"},
"t": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Message Type"},
"p": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Bitmap, Primary"},
"1": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Bitmap, Secondary"},
"2": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 19, "desc
↳": "Primary Account Number (PAN)"},
"3": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "Processing Code"},
"4": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Amount, Transaction"},
"5": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Amount, Settlement"},
}

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```

"6": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Amount, Cardholder Billing"},
"7": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Transmission Date and Time"},
"8": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Amount, Cardholder Billing Fee"},
"9": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Conversion Rate, Settlement"},
"10": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Conversion Rate, Cardholder Billing"},
"11": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "System Trace Audit Number"},
"12": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "Time, Local Transaction"},
"13": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Local Transaction"},
"14": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Expiration"},
"15": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Settlement"},
"16": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Conversion"},
"17": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Date, Capture"},
"18": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Merchant Type"},
"19": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Acquiring Institution Country Code"},
"20": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "PAN Country Code"},
"21": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Forwarding Institution Country Code"},
"22": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Point-of-Service Entry Mode"},
"23": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "PAN Sequence Number"},
"24": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Network International ID (NII)"},
"25": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "Point-of-Service Condition Code"},
"26": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "Point-of-Service Capture Code"},
"27": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 1, "desc
↳": "Authorizing ID Response Length"},
"28": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Transaction Fee"},
"29": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Settlement Fee"},
"30": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Transaction Processing Fee"},
"31": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 9, "desc
↳": "Amount, Settlement Processing Fee"},
"32": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Acquiring Institution ID Code"},
"33": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Forwarding Institution ID Code"},
"34": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 28, "desc
↳": "Primary Account Number, Extended"},

```

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```

"35": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 37, "desc
↳": "Track 2 Data"},
"36": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 104, "desc
↳": "Track 3 Data"},
"37": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Retrieval Reference Number"},
"38": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "Authorization ID Response"},
"39": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "Response Code"},
"40": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Service Restriction Code"},
"41": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 8, "desc
↳": "Card Acceptor Terminal ID"},
"42": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 15, "desc
↳": "Card Acceptor ID Code"},
"43": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 40, "desc
↳": "Card Acceptor Name/Location"},
"44": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 25, "desc
↳": "Additional Response Data"},
"45": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 76, "desc
↳": "Track 1 Data"},
"46": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Additional Data - ISO"},
"47": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Additional Data - National"},
"48": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Additional Data - Private"},
"49": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Currency Code, Transaction"},
"50": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Currency Code, Settlement"},
"51": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Currency Code, Cardholder Billing"},
"52": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "PIN"},
"53": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Security-Related Control Information"},
"54": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 240, "desc
↳": "Additional Amounts"},
"55": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 510, "desc
↳": "ICC data"},
"56": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved ISO"},
"57": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"58": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"59": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"60": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved National"},
"61": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved Private"},
"62": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved Private"},
"63": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved Private"},

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```

"64": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "MAC"},
"65": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Bitmap, Extended"},
"66": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 1, "desc
↳": "Settlement Code"},
"67": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "Extended Payment Code"},
"68": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Receiving Institution Country Code"},
"69": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Settlement Institution Country Code"},
"70": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 3, "desc
↳": "Network Management Information Code"},
"71": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Message Number"},
"72": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 4, "desc
↳": "Message Number, Last"},
"73": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 6, "desc
↳": "Date, Action"},
"74": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Credits, Number"},
"75": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Credits, Reversal Number"},
"76": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Debits, Number"},
"77": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Debits, Reversal Number"},
"78": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Transfer, Number"},
"79": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Transfer, Reversal Number"},
"80": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Inquiries, Number"},
"81": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 10, "desc
↳": "Authorizations, Number"},
"82": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Credits, Processing Fee Amount"},
"83": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Credits, Transaction Fee Amount"},
"84": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Debits, Processing Fee Amount"},
"85": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 12, "desc
↳": "Debits, Transaction Fee Amount"},
"86": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Credits, Amount"},
"87": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Credits, Reversal Amount"},
"88": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Debits, Amount"},
"89": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Debits, Reversal Amount"},
"90": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 42, "desc
↳": "Original Data Elements"},
"91": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 1, "desc
↳": "File Update Code"},
"92": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 2, "desc
↳": "File Security Code"},

```

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```

"93": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 5, "desc
↳": "Response Indicator"},
"94": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 7, "desc
↳": "Service Indicator"},
"95": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 42, "desc
↳": "Replacement Amounts"},
"96": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc
↳": "Message Security Code"},
"97": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 17, "desc
↳": "Amount, Net Settlement"},
"98": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 25, "desc
↳": "Payee"},
"99": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Settlement Institution ID Code"},
"100": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 11, "desc
↳": "Receiving Institution ID Code"},
"101": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 17, "desc
↳": "File Name"},
"102": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 28, "desc
↳": "Account ID 1"},
"103": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 2, "max_len": 28, "desc
↳": "Account ID 2"},
"104": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 100, "desc
↳": "Transaction Description"},
"105": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"106": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"107": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"108": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"109": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"110": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"111": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for ISO Use"},
"112": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"113": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"114": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"115": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"116": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"117": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"118": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"119": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for National Use"},
"120": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},
"121": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc
↳": "Reserved for Private Use"},

```

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```

"122": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc": "Reserved for Private Use"},
"123": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc": "Reserved for Private Use"},
"124": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc": "Reserved for Private Use"},
"125": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc": "Reserved for Private Use"},
"126": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc": "Reserved for Private Use"},
"127": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 3, "max_len": 999, "desc": "Reserved for Private Use"},
"128": {"data_enc": "ascii", "len_enc": "ascii", "len_type": 0, "max_len": 16, "desc": "MAC"}
}

```

1.4 Functions

1.4.1 Main Functions

`iso8583.decode` (*s*: Union[bytes, bytearray], *spec*: Mapping[str, Mapping[str, Any]]) → Tuple[Dict[str, str], Dict[str, Dict[str, bytes]]]

Deserialize a bytes or bytearray instance containing ISO8583 data to a Python dict.

Parameters

- *s* (bytes or bytearray) – Encoded ISO8583 data
- *spec* (dict) – A Python dict defining ISO8583 specification. See `iso8583.specs` module for examples.

Returns

- `doc_dec` (dict) – Dict containing decoded ISO8583 data
- `doc_enc` (dict) – Dict containing encoded ISO8583 data

Raises

- `DecodeError` – An error decoding ISO8583 bytearray
- `TypeError` – *s* must be a bytes or bytearray instance

Examples

```

>>> import pprint
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> s = b"02004010100000000000161234567890123456123456111"
>>> doc_dec, doc_enc = iso8583.decode(s, spec)
>>> pprint.pprint(doc_dec)
{'12': '123456',
 '2': '1234567890123456',
 '20': '111',
 'p': '4010100000000000',
 't': '0200'}

```


`iso8583.encode(doc_dec: MutableMapping[str, str], spec: Mapping[str, Mapping[str, Any]]) → Tuple[bytearray, Dict[str, Dict[str, bytes]]]`
 Serialize Python dict containing ISO8583 data to a bytearray.

Parameters

- **doc_dec** (*dict*) – Dict containing decoded ISO8583 data
- **spec** (*dict*) – A Python dict defining ISO8583 specification. See `iso8583.specs` module for examples.

Returns

- **s** (*bytearray*) – Encoded ISO8583 data
- **doc_enc** (*dict*) – Dict containing encoded ISO8583 data

Raises

- `EncodeError` – An error encoding ISO8583 bytearray
- `TypeError` – `doc_dec` must be a dict instance

Examples

```
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> doc_dec = {
...     't': '0210',
...     '3': '111111',
...     '39': '05'}
>>> s, doc_enc = iso8583.encode(doc_dec, spec)
>>> s
bytearray(b'0210200000000200000011111105')
```

1.4.2 Exceptions

exception `iso8583.DecodeError(msg: str, s: Union[bytes, bytearray], doc_dec: Dict[str, str], doc_enc: Dict[str, Dict[str, bytes]], pos: int, field: str)`

Subclass of `ValueError` that describes ISO8583 decoding error.

Variables

- **msg** (*str*) – The unformatted error message
- **s** (*bytes or bytearray*) – The ISO8583 bytes instance being parsed
- **doc_dec** (*dict*) – Dict containing partially decoded ISO8583 data
- **doc_enc** (*dict*) – Dict containing partially encoded ISO8583 data
- **pos** (*int*) – The start index where ISO8583 bytes data failed parsing
- **field** (*str*) – The ISO8583 field where parsing failed

exception `iso8583.EncodeError(msg: str, doc_dec: MutableMapping[str, str], doc_enc: Dict[str, Dict[str, bytes]], field: str)`

Subclass of `ValueError` that describes ISO8583 encoding error.

Variables

- **msg** (*str*) – The unformatted error message

- **doc_dec** (*dict*) – Dict containing decoded ISO8583 data being encoded
- **doc_enc** (*dict*) – Dict containing partially encoded ISO8583 data
- **field** (*str*) – The ISO8583 field where parsing failed

1.4.3 Helper Functions

`iso8583.pp` (*doc*: `Union[Mapping[str, str], Mapping[str, Mapping[str, bytes]]]`, *spec*: `Mapping[str, Mapping[str, Any]]`, *desc_width*: `int = 30`, *stream*: `Optional[TextIO] = None`, *line_width*: `int = 80`)
→ None
Pretty Print Python dict containing ISO8583 data.

Parameters

- **doc** (*dict*) – Dict containing ISO8583 data
- **spec** (*dict*) – A Python dict defining ISO8583 specification. See `iso8583.specs` module for examples.
- **desc_width** (*int, optional*) – Field description width (default 30). Specify 0 to print no descriptions.
- **stream** (*stream, optional*) – An output stream. The only method used on the stream object is the file protocol's `write()` method. If not specified, the `iso8583.pp()` adopts `sys.stdout`.
- **line_width** (*int, optional*) – Attempted maximum width of output line (default 80).

Notes

For the most correct information to be displayed by `iso8583.pp()` it's recommended to call it after `iso8583.encode()` or `iso8583.decode()`.

Examples

```
>>> import iso8583
>>> from iso8583.specs import default_ascii as spec
>>> s = b"02004010100000000000161234567890123456123456840"
>>> doc_dec, doc_enc = iso8583.decode(s, spec)
>>> iso8583.pp(doc_dec, spec)
t  Message Type                : '0200'
p  Bitmap, Primary             : '4010100000000000'
2  Primary Account Number (PAN) : '1234567890123456'
12 Time, Local Transaction     : '123456'
20 PAN Country Code            : '840'
```

1.5 Change Log

1.5.1 2.0.2 - 2020-11-20

- Fixed issue #4. Encode secondary bitmap in upper case.

1.5.2 2.0.1 - 2020-08-22

- Include inline type information into the distribution according to [PEP 561](#).
- Address remaining type hint issues.

1.5.3 2.0.0 - 2020-02-21

Backwards incompatible:

- `iso8583.decode()` is updated not to produce bitmap key 'bm'.
- `iso8583.encode()` is updated not to expect bitmap key 'bm' to define fields to encode. The decision on what fields to encode is based on numeric fields in the range of '1'-'128' present in the decoded dictionary.
- `iso8583.add_field()` and `iso8583.del_field()` are removed. With the removal of bitmap set 'bm' default Python dictionary methods are enough.
- `iso8583.encode()` now removes secondary bitmap key '1' from the decoded dictionary if no '65'-'128' fields are present.
- `iso8583.pp()` function signature changed. The first parameter is renamed from `doc_dec` to `doc`.

Other changes:

- `iso8583.pp()` handles both encoded and decoded dictionary output.
- `iso8583.pp()` handles output folding. The default line width is set to 80. Line width can be configured using new `line_width` parameter.

1.5.4 1.0.2 - 2020-01-11

- Optional proprietary header can now be parsed using standard field settings
- Documentation improvements

1.5.5 1.0.1 - 2019-11-11

- `iso8583.decode()` and `iso8583.decode()` now return a tuple
- `iso8583.decode()` returns a tuple of decoded dict instance and encoded dict instance
- `iso8583.encode()` returns a tuple of encoded bytes instance and encoded dict instance
- Encoded and decoded dict instance keys are now all strings
- Specification keys are now all strings

1.5.6 1.0.0 - 2019-11-04

Initial release.

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