

DTDevices

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# Contents



# Chapter 1

## Deprecated List

**Member** [\[DTDevices btDiscoverDevices:maxTime:codTypes:error:\]](#)

This function is not recommended to be called on the main thread, use `btDiscoverDevicesInBackground` instead

**Member** [\[DTDevices btGetDeviceName:error:\]](#)

This function complements the `btDiscoverDevices/btDiscoverPrinters` and as such is not recommended, use `btDiscoverDevicesInBackground` instead

**Member** [\[DTDevices voltageSetEncryptionType:error:\]](#)

**Member** [\[DTDevices voltageSetIdentityString:error:\]](#)

**Member** [\[DTDevices voltageSetKeyRolloverDays:numberOfTransactions:error:\]](#)

**Member** [\[DTDevices voltageSetPublicParameters:error:\]](#)

**Member** [\[DTDevices voltageSetSettingsVersion:error:\]](#)

**Member** [DTMV2Info::DEPRECATED\\_ATTRIBUTE](#)

use `contactlessConfigurationVersion` instead



## Chapter 2

# Module Documentation

### 2.1 SmartCard APDU Encryption Algorithms

Supported encryption algorithms for smartcard apdus.

#### Macros

- `#define ALG_MANUAL -1`  
*No card encryption is performed, you have to manually.*
- `#define ALG_APDU_DUKPT 0`  
*DUKPT encryption algorithm returning the data in:*

#### 2.1.1 Detailed Description

Supported encryption algorithms for smartcard apdus.

#### 2.1.2 Macro Definition Documentation

##### 2.1.2.1 ALG\_APDU\_DUKPT

```
#define ALG_APDU_DUKPT 0
```

DUKPT encryption algorithm returning the data in:

- Data length inside the encrypted block (2 bytes, MSB), i.e. if only SW1 and SW2 are inside, the length will be 2 while the encrypted block - 8
- Encrypted apdu response (variable, 00 for padding)
- SW1 and SW2 in plain (2 bytes)
- KSN (10 bytes)

### 2.1.2.2 ALG\_MANUAL

```
#define ALG_MANUAL -1
```

No card encryption is performed, you have to manually.

- Data length inside the encrypted block (2 bytes, MSB), i.e. if only SW1 and SW2 are inside, the length will be 2 while the encrypted block - 8
- Encrypted apdu response (variable, 00 for padding)
- SW1 and SW2 in plain (2 bytes)
- KSN (10 bytes)



## 2.2 Magnetic Card Encryption Algorithms

Supported encryption algorithms for magnetic track data on various devices.

### Macros

- `#define ALG_AES256 0`  
*AES 256 encryption algorithm.*
- `#define ALG_EH_ECC 1`  
*Encrypted Head ECC encryption algorithm.*
- `#define ALG_EH_AES256 2`  
*Encrypted Head AES256 encryption algorithm.*
- `#define ALG_EH_IDTECH 3`  
*Encrypted Head IDTECH encryption algorithm, please refer to IDTECH documentation for detailed format and examples.*
- `#define ALG_EH_IDTECH_AES128 0x0b`  
*Encrypted Head IDTECH encryption algorithm, please refer to IDTECH documentation for detailed format and examples.*
- `#define ALG_EH_MAGTEK 4`  
*Encrypted Head MAGTEK encryption algorithm, please refer to MAGTEK/MAGNASAFE documentation for detailed format and examples.*
- `#define ALG_EH_MAGTEK_AES128 0x0c`  
*Encrypted Head MAGTEK encryption algorithm, please refer to MAGTEK/MAGNASAFE documentation for detailed format and examples.*
- `#define ALG_EH_3DES 5`  
*Encrypted Head 3DES encryption algorithm.*
- `#define ALG_EH_RSA_OAEP 6`  
*Encrypted Head RSA encryption algorithm.*
- `#define ALG_PPAD_3DES_CBC 7`  
*Pinpad 3DES format, containing:*
- `#define ALG_EH_VOLTAGE 8`  
*Encrypted Head Voltage encryption algorithm.*
- `#define ALG_EH_AES128 9`  
*Encrypted Head AES128 encryption algorithm.*
- `#define ALG_PPAD_DUKPT 10`  
*Pinpad DUKPT format, containing:*
- `#define ALG_TRANSARMOR 13`  
*TransArmor packet format consisting of one or more data blocks, each separated with |.*
- `#define ALG_PPAD_DUKPT_SEPARATE_TRACKS 14`  
*Pinpad DUKPT format, consisting of one or more blocks of data.*
- `#define ALG_TRANSARMOR_DUKPT 15`  
*Pinpad DUKPT format, consisting of one or more blocks of data.*
- `#define ALG_RSA_OEAP_SHA256 16`  
*TransArmor packet format consisting of one or more data blocks, each separated with |.*
- `#define ALG_MILES_MORE 17`
- `#define ALG_ONE_WAY_HASH 18`
- `#define ALG_PPAD_AES256_CBC 19`  
*Pinpad AES256 format, containing:*
- `#define ALG_PPAD_AES128_CBC 20`  
*Pinpad AES128 format, containing:*

## 2.2.1 Detailed Description

Supported encryption algorithms for magnetic track data on various devices.

## 2.2.2 Macro Definition Documentation

### 2.2.2.1 ALG\_AES256

```
#define ALG_AES256 0
```

AES 256 encryption algorithm.

### 2.2.2.2 ALG\_EH\_3DES

```
#define ALG_EH_3DES 5
```

Encrypted Head 3DES encryption algorithm.

### 2.2.2.3 ALG\_EH\_AES128

```
#define ALG_EH_AES128 9
```

Encrypted Head AES128 encryption algorithm.

Encryption type is CBC. After decryption, the result data will be as follows:

- Random data (4 bytes)
- Device identification text (16 ASCII characters, unused bytes are 0)
- Processed track data in the format: 0xF1 (track1 data), 0xF2 (track2 data) 0xF3 (track3 data). It is possible some of the tracks will be empty, then the identifier will not be present too, for example 0xF1 (track1 data) 0xF3 (track3 data)
- End of track data (byte 0x00)
- CRC16CCIT (2 bytes) - the CRC is performed from the start of the encrypted block (the Random Data block) to the end of the track data (including the 0x00 byte). The data block is rounded to 16 bytes

#### 2.2.2.4 ALG\_EH\_AES256

```
#define ALG_EH_AES256 2
```

Encrypted Head AES256 encryption algorithm.

Encryption type is CBC. After decryption, the result data will be as follows:

- Random data (4 bytes)
- Device identification text (16 ASCII characters, unused bytes are 0)
- Processed track data in the format: 0xF1 (track1 data), 0xF2 (track2 data) 0xF3 (track3 data). It is possible some of the tracks will be empty, then the identifier will not be present too, for example 0xF1 (track1 data) 0xF3 (track3 data)
- End of track data (byte 0x00)
- CRC16CCIT (2 bytes) - the CRC is performed from the start of the encrypted block (the Random Data block) to the end of the track data (including the 0x00 byte). The data block is rounded to 16 bytes

#### 2.2.2.5 ALG\_EH\_ECC

```
#define ALG_EH_ECC 1
```

Encrypted Head ECC encryption algorithm.

#### 2.2.2.6 ALG\_EH\_IDTECH

```
#define ALG_EH_IDTECH 3
```

Encrypted Head IDTECH encryption algorithm, please refer to IDTECH documentation for detailed format and examples.

Data, that is received via magneticCardEncryptedData has the following format:

- (1 byte) card encoding type, can ignore
- (1 byte) bits marking which track is present
- (1 byte) track 1 UNENCRYPTED length
- (1 byte) track 2 UNENCRYPTED length
- (1 byte) track 3 UNENCRYPTED length
- (track 1 UNENCRYPTED length bytes) track 1 masked data
- (track 2 UNENCRYPTED length bytes) track 2 masked data
- (track 3 UNENCRYPTED length bytes) track 3 masked data

- (variable bytes) Track 1 + Track 2 encrypted data, the length of this block is calculated by subtracting from the end
- (20 bytes) track 1 sha1
- (20 bytes) track 2 sha1
- (10 bytes) DUKPT KSN

Encrypted block contents after decryption (3DES):

- (track 1 UNENCRYPTED length bytes) track 1 data
- (track 2 UNENCRYPTED length bytes) track 2 data

DUKPT data key derivation for magtek uses the newest X.24 DUKPT standard, i.e. after XORing the bytes to get the data key, the result key is encrypted with itself using 3DES ECB.

#### 2.2.2.7 ALG\_EH\_IDTECH\_AES128

```
#define ALG_EH_IDTECH_AES128 0x0b
```

Encrypted Head IDTECH encryption algorithm, please refer to IDTECH documentation for detailed format and examples.

Data, that is received via magneticCardEncryptedData has the following format:

- (1 byte) card encoding type, can ignore
- (1 byte) bits marking which track is present
- (1 byte) track 1 UNENCRYPTED length
- (1 byte) track 2 UNENCRYPTED length
- (1 byte) track 3 UNENCRYPTED length
- (track 1 UNENCRYPTED length bytes) track 1 masked data
- (track 2 UNENCRYPTED length bytes) track 2 masked data
- (track 3 UNENCRYPTED length bytes) track 3 masked data
- (variable bytes) Track 1 + Track 2 encrypted data, the length of this block is calculated by subtracting from the end
- (20 bytes) track 1 sha1
- (20 bytes) track 2 sha1
- (10 bytes) DUKPT KSN

Encrypted block contents after decryption (AS128):

- (track 1 UNENCRYPTED length bytes) track 1 data
- (track 2 UNENCRYPTED length bytes) track 2 data

With AES128 version, the normal 3DES DUKPT keys are used, but the encryption algorithm is AES128

### 2.2.2.8 ALG\_EH\_MAGTEK

```
#define ALG_EH_MAGTEK 4
```

Encrypted Head MAGTEK encryption algorithm, please refer to MAGTEK/MAGNASAFE documentation for detailed format and examples.

Data, that is received via magneticCardEncryptedData has the following format:

- (1 byte) card encoding type, can ignore
- (1 byte) bits marking which track is present
- (1 byte) track 1 UNENCRYPTED length
- (1 byte) track 2 UNENCRYPTED length
- (1 byte) track 3 UNENCRYPTED length
- (track 1 UNENCRYPTED length bytes) track 1 masked data
- (track 2 UNENCRYPTED length bytes) track 2 masked data
- (track 3 UNENCRYPTED length bytes) track 3 masked data
- (variable bytes) Track 1 encrypted data, the length of this block is calculated by the unencrypted len, padded to 8 bytes (i.e. if unencrypted was 12 bytes, encrypted will be 16)
- (variable bytes) Track 2 encrypted data, the length of this block is calculated by the unencrypted len, padded to 8 bytes (i.e. if unencrypted was 12 bytes, encrypted will be 16)
- (20 bytes) track 1 sha1
- (20 bytes) track 2 sha1
- (10 bytes) DUKPT KSN

Encrypted block contents after decryption (3DES):

- (track 1 UNENCRYPTED length bytes) track 1 data
- (track 2 UNENCRYPTED length bytes) track 2 data

DUKPT data key derivation for magtek uses the older X.24 DUKPT standard, there is no encryption of the data key by itself after XOR

### 2.2.2.9 ALG\_EH\_MAGTEK\_AES128

```
#define ALG_EH_MAGTEK_AES128 0x0c
```

Encrypted Head MAGTEK encryption algorithm, please refer to MAGTEK/MAGNASAFE documentation for detailed format and examples.

Data, that is received via magneticCardEncryptedData has the following format:

- (1 byte) card encoding type, can ignore
- (1 byte) bits marking which track is present

- (1 byte) track 1 UNENCRYPTED length
- (1 byte) track 2 UNENCRYPTED length
- (1 byte) track 3 UNENCRYPTED length
- (track 1 UNENCRYPTED length bytes) track 1 masked data
- (track 2 UNENCRYPTED length bytes) track 2 masked data
- (track 3 UNENCRYPTED length bytes) track 3 masked data
- (variable bytes) Track 1 encrypted data, the length of this block is calculated by the unencrypted len, padded to 16 bytes (i.e. if unencrypted was 24 bytes, encrypted will be 32)
- (variable bytes) Track 2 encrypted data, the length of this block is calculated by the unencrypted len, padded to 16 bytes (i.e. if unencrypted was 24 bytes, encrypted will be 32)
- (20 bytes) track 1 sha1
- (20 bytes) track 2 sha1
- (10 bytes) DUKPT KSN

Encrypted block contents after decryption (3DES):

- (track 1 UNENCRYPTED length bytes) track 1 data
- (track 2 UNENCRYPTED length bytes) track 2 data

DUKPT data key derivation for magtek uses the older X.24 DUKPT standard, there is no encryption of the data key by itself after XOR

With AES128 version, the normal 3DES DUKPT keys are used, but the encryption algorithm is AES128

#### 2.2.2.10 ALG\_EH\_RSA\_OAEP

```
#define ALG_EH_RSA_OAEP 6
```

Encrypted Head RSA encryption algorithm.

#### 2.2.2.11 ALG\_EH\_VOLTAGE

```
#define ALG_EH_VOLTAGE 8
```

Encrypted Head Voltage encryption algorithm.

The Voltage SecureData Payments consolidated message format is designed to be self-contained. The data packet provides all the information necessary to enable decryption at the Host SDK. It is also self-describing, meaning that the recipient can reliably interpret the contents independent of any other information, even though the specific data elements may vary between messages.

The message format is strictly text-based and can be transmitted to the Host even via a web form, because the

design deliberately avoids characters and character sequences that may otherwise need to be escaped in such environments.

The message structure borrows concepts from swipe card Track data specifications, specifically the use of start and end sentinels, together with an internal field separator that delimit the contents. These delimiters, particularly the field separator (|) and end sentinel (~), have been chosen to avoid any possible conflict with ciphertext values that may be generated using any version of the Voltage SecureData Payments encryption protocols.

The message structure allows for all currently supported card data element types (PAN, MID, and Tracks 1, 2 and 3), included in any combination. It is highly flexible, allowing for additional data elements to be incorporated, or for substantially new formats defined for future use.

The packet looks like: `_a[FLAGS][PAN][MID][TRACK1][TRACK2][TRACK3][EXP][APP][ETB]~`

Fields:

"_"	Start Sentinel (1 char)	Start of message is always indicated by an underscore.
"a"	Format Version (1 char)	Single letter is used to identify the format version.
"nn"	Header (2 chars hex)	The header indicates which optional data fields, of those defined in this format version, are included in the message. This comprises two hex digits interpreted as explained in the next section.
" "	Field Separator (1 char)	Vertical pipe is used as a field separator between message elements. A separator is required following the header to allow this to be of variable length.
"Data(1)"	First Encrypted Data Field (variable)	One or more encrypted data fields are optionally included in the sequence defined for the format version.
" "	Field Separator (1 char)	
"Data(2)"	Second Encrypted Data Field (variable)	
" "	Field Separator (1 char)	
...		
" "	Field Separator (1 char)	
"Base46"	Base64-Encoded ETB (variable)	The Encryption Transmission Block must be Base64-Encoded prior to inclusion in the message.
"~"	End Sentinel (1 char)	The end of the ETB is always indicated by a tilde character

Encrypted card data elements always appear in the message in a defined sequence, starting with PAN, MID, Track 1, and the rest. The relative position of these fields, delimited by field separators is always fixed although any combination of values is legal. Unused fields are omitted together with their terminating separator. The ciphertext format may vary depending on the encryption algorithm used. For example, Tracks 1 and 2 may use whole-track encryption (TEP1) or structure-preserving encryption (TEP2). Elements can miss from the packet, i.e. if Track 3 was not read, then it will not be in the packet and [FLAGS] will have TR3 bit cleared(0).

Data Fields and Headers:

"1"	PAN	Primary Account Number
"2"	MID	Merchant ID
"3"	TR1	Track 1 data (IATA)
"4"	TR2	Track 2 data (ABA)

"5"	TR3	Track 3 data (THRIFT-TTS)
"6"	EXP	Card expiration data in the form MMY
"7"	APP	Reserved for application-specific use (unsupported)

The header value comprises two hexadecimal digits that together form an 8 bit mask indicating the data fields present in the associated message

FLAGS Bit Mask Value:

"Bit 7 (most significant)"	APP (unsupported)
"Bit 6"	EXP
"Bit 5"	TR3
"Bit 4"	TR2
"Bit 3"	TR1
"Bit 2"	MID
"Bit 1"	PAN
"Bit 0 (least significant)"	ETB

#### 2.2.2.12 ALG\_MILES\_MORE

```
#define ALG_MILES_MORE 17
```

#### 2.2.2.13 ALG\_ONE\_WAY\_HASH

```
#define ALG_ONE_WAY_HASH 18
```

#### 2.2.2.14 ALG\_PPAD\_3DES\_CBC

```
#define ALG_PPAD_3DES_CBC 7
```

Pinpad 3DES format, containing:

- random data (4 bytes)
- unique ID (4 bytes) - same ID you have sent to the function
- payload length (2 bytes) - length of the TLV block in BIG ENDIAN
- card data (variable, ends with 0x00), in format 0xF1 [track1] 0xF2 [track2] 0xF3 [track3] (some tracks might be missing, in this case identifier is missing too)
- crc (2 bytes) - CRC16 CCIT on all the bytes before it
- padding (0-7 bytes) zeroes to pad the packet with



### 2.2.2.15 ALG\_PPAD\_AES128\_CBC

```
#define ALG_PPAD_AES128_CBC 20
```

Pinpad AES128 format, containing:

- random data (4 bytes)
- unique ID (4 bytes) - same ID you have sent to the function
- payload length (2 bytes) - length of the TLV block in BIG ENDIAN
- card data (variable, ends with 0x00), in format 0xF1 [track1] 0xF2 [track2] 0xF3 [track3] (some tracks might be missing, in this case identifier is missing too)
- crc (2 bytes) - CRC16 CCIT on all the bytes before it
- padding (1-16 bytes) zeroes to pad the packet with

### 2.2.2.16 ALG\_PPAD\_AES256\_CBC

```
#define ALG_PPAD_AES256_CBC 19
```

Pinpad AES256 format, containing:

- random data (4 bytes)
- unique ID (4 bytes) - same ID you have sent to the function
- payload length (2 bytes) - length of the TLV block in BIG ENDIAN
- card data (variable, ends with 0x00), in format 0xF1 [track1] 0xF2 [track2] 0xF3 [track3] (some tracks might be missing, in this case identifier is missing too)
- crc (2 bytes) - CRC16 CCIT on all the bytes before it
- padding (1-16 bytes) zeroes to pad the packet with

### 2.2.2.17 ALG\_PPAD\_DUKPT

```
#define ALG_PPAD_DUKPT 10
```

Pinpad DUKPT format, containing:

- random data (4 bytes)
- unique ID (4 bytes) - same ID you have sent to the function
- payload length (2 bytes) - length of the TLV block in BIG ENDIAN
- card data (variable, ends with 0x00), in format 0xF1 [track1] 0xF2 [track2] 0xF3 [track3] (some tracks might be missing, in this case identifier is missing too)
- crc (2 bytes) - CRC16 CCIT on all the bytes before it
- padding (0-7 bytes) zeroes to pad the packet with
- KSN (10 bytes)

### 2.2.2.18 ALG\_PPAD\_DUKPT\_SEPARATE\_TRACKS

```
#define ALG_PPAD_DUKPT_SEPARATE_TRACKS 14
```

Pinpad DUKPT format, consisting of one or more blocks of data.

Each block has a header of [ID] [LENHI] [LENLO]. Based on ID:

- 00: KSN (10 bytes)
- 01: Track 1 (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV
- 02: Track 2 (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV
- 03: Track 3 (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV
- 04: Extracted PAN only (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV
- 05: JIS Track (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV

### 2.2.2.19 ALG\_RSA\_OEAP\_SHA256

```
#define ALG_RSA_OEAP_SHA256 16
```

TransArmor packet format consisting of one or more data blocks, each separated with |.

Each block contains: Track Identifier(1char)+','+Track data (RSA2048 OEAEP SHA256 packet in base64) Track identifiers lower 3 bits contain the tracks present in the block, i.e.: 1 - track1 present 2 - track2 present 3 - both track1 and track2 present 4 - track3 present ... Each RSA block contains:

- merchant ID (8 bytes, padded with 0x00)
- track data (variable bytes)

### 2.2.2.20 ALG\_TRANSARMOR

```
#define ALG_TRANSARMOR 13
```

TransArmor packet format consisting of one or more data blocks, each separated with |.

Each block contains: Track Identifier(1char)+','+Track data (RSA2048 OEAEP packet in base64) Track identifiers lower 3 bits contain the tracks present in the block, i.e.: 1 - track1 present 2 - track2 present 3 - both track1 and track2 present 4 - track3 present ... Each RSA block contains:

- merchant ID (8 bytes, padded with 0x00)
- track data (variable bytes)

### 2.2.2.21 ALG\_TRANSARMOR\_DUKPT

```
#define ALG_TRANSARMOR_DUKPT 15
```

Pinpad DUKPT format, consisting of one or more blocks of data.

Each block has a header of [ID] [LENHI] [LENLO]. Based on ID:

- 00: KSN (10 bytes)
- 01: Track 1 (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV
- 02: Track 2 (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV
- 03: Track 3 (variable) encrypted with DUKPT key, padded with zeroes (0x00), CBC with zero for IV

## 2.3 Library Error Codes

Library error codes returned in the NSError objects.

### Macros

- #define [Library\\_Errors\\_h](#)
- #define [DT\\_ENONE](#) 0  
*Operation successful.*
- #define [DT\\_EGENERAL](#) -1  
*General error / Unknown error.*
- #define [DT\\_ECREATE](#) -2  
*Create error.*
- #define [DT\\_EOPEN](#) -3  
*Open error.*
- #define [DT\\_ECLOSE](#) -4  
*Close error.*
- #define [DT\\_EBUSY](#) -5  
*Device or resource busy.*
- #define [DT\\_ETIMEOUT](#) -6  
*Timeout expired.*
- #define [DT\\_ENOSUPPORTED](#) -7  
*Unsupported method or operation.*
- #define [DT\\_EMEMORY](#) -8  
*Memory allocation error.*
- #define [DT\\_EPARAM](#) -9  
*Invalid parameter.*
- #define [DT\\_EIO](#) -10  
*Input/Output error.*
- #define [DT\\_ECRC](#) -11  
*CRC error.*
- #define [DT\\_EFLASH](#) -12  
*Flash error.*
- #define [DT\\_EEEPROM](#) -13  
*EEPROM error.*
- #define [DT\\_EDEVICE](#) -14  
*Device error.*
- #define [DT\\_ENOIMPLEMENTED](#) -15  
*The operation is not implemented.*
- #define [DT\\_ENOEXIST](#) -16  
*The device or resource does not exists.*
- #define [DT\\_EINVALID\\_CMD](#) -17  
*Invalid command.*
- #define [DT\\_ENOT\\_EXIST\\_OBJECT](#) -18  
*Not exist object.*
- #define [DT\\_ENOMORE](#) -19  
*No more items.*
- #define [DT\\_EFAILED](#) -20  
*Command Failed.*
- #define [DT\\_EINVALID](#) -21

- Invalid command.*
- #define [DT\\_ENOT\\_REGISTERED](#) -22
- Not registered.*
- #define [DT\\_EPERMISSION\\_DENIED](#) -23
- Permission denied.*
- #define [DT\\_MIFARE\\_EBASE](#) -10000
- Mifare operation successful.*
- #define [DT\\_MIFARE\\_ETIMEOUT](#) [DT\\_MIFARE\\_EBASE](#)-1
- Mifare timeout error.*
- #define [DT\\_MIFARE\\_ECOLLISION](#) [DT\\_MIFARE\\_EBASE](#)-2
- Mifare collision error.*
- #define [DT\\_MIFARE\\_EPARITY](#) [DT\\_MIFARE\\_EBASE](#)-3
- Mifare parity error.*
- #define [DT\\_MIFARE\\_EFRAME](#) [DT\\_MIFARE\\_EBASE](#)-4
- Mifare frame error.*
- #define [DT\\_MIFARE\\_ECRC](#) [DT\\_MIFARE\\_EBASE](#)-5
- Mifare CRC error.*
- #define [DT\\_MIFARE\\_EFIFO](#) [DT\\_MIFARE\\_EBASE](#)-6
- Mifare FIFO overflow.*
- #define [DT\\_MIFARE\\_EEEPROM](#) [DT\\_MIFARE\\_EBASE](#)-7
- Mifare EEPROM error.*
- #define [DT\\_MIFARE\\_EKEY](#) [DT\\_MIFARE\\_EBASE](#)-8
- Mifare invalid key.*
- #define [DT\\_MIFARE\\_EGENERIC](#) [DT\\_MIFARE\\_EBASE](#)-9
- Mifare generic error.*
- #define [DT\\_MIFARE\\_EAUTHENTICATION](#) [DT\\_MIFARE\\_EBASE](#)-10
- Mifare authentication error.*
- #define [DT\\_MIFARE\\_ECODE](#) [DT\\_MIFARE\\_EBASE](#)-11
- Mifare code error.*
- #define [DT\\_MIFARE\\_EBIT](#) [DT\\_MIFARE\\_EBASE](#)-12
- Mifare bit count error.*
- #define [DT\\_MIFARE\\_EACCESS](#) [DT\\_MIFARE\\_EBASE](#)-13
- Mifare access error.*
- #define [DT\\_MIFARE\\_EVALUE](#) [DT\\_MIFARE\\_EBASE](#)-14
- Mifare value error.*
- #define [DT\\_EMSR\\_EBASE](#) -11000
- EMS base value.*
- #define [DT\\_EMSR\\_EINVALID\\_COMMAND](#) [DT\\_EMSR\\_EBASE](#)-0x01
- Encrypted magnetic head invalid command sent.*
- #define [DT\\_EMSR\\_ENO\\_PERMISSION](#) [DT\\_EMSR\\_EBASE](#)-0x02
- Encrypted magnetic head no permission error.*
- #define [DT\\_EMSR\\_ECARD](#) [DT\\_EMSR\\_EBASE](#)-0x03
- Encrypted magnetic head card error.*
- #define [DT\\_EMSR\\_ESYNTAX](#) [DT\\_EMSR\\_EBASE](#)-0x04
- Encrypted magnetic head command syntax error.*
- #define [DT\\_EMSR\\_ENO\\_RESPONSE](#) [DT\\_EMSR\\_EBASE](#)-0x05
- Encrypted magnetic head command no response from the magnetic chip.*
- #define [DT\\_EMSR\\_ENO\\_DATA](#) [DT\\_EMSR\\_EBASE](#)-0x06
- Encrypted magnetic head no data available.*
- #define [DT\\_EMSR\\_EINVALID\\_LENGTH](#) [DT\\_EMSR\\_EBASE](#)-0x14
- Encrypted magnetic head invalid data length.*

- `#define DT_EMSR_ETAMPERED DT_EMSR_EBASE-0x15`  
*Encrypted magnetic head is tampered.*
- `#define DT_EMSR_EINVALID_SIGNATURE DT_EMSR_EBASE-0x16`  
*Encrypted magnetic head invalid signature.*
- `#define DT_EMSR_EHARDWARE DT_EMSR_EBASE-0x17`  
*Encrypted magnetic head hardware failure.*
- `#define DT_PPAD_EBASE -16500`  
*Pinpad base value.*
- `#define DT_PPAD_EGENERAL DT_PPAD_EBASE-1`  
*Generic error.*
- `#define DT_PPAD_EINVALID_COMMAND DT_PPAD_EBASE-2`  
*Invalid command or subcommand code.*
- `#define DT_PPAD_EINVALID_PARAMETER DT_PPAD_EBASE-3`  
*Invalid parameter.*
- `#define DT_PPAD_EINVALID_ADDRESS DT_PPAD_EBASE-4`  
*Address is outside limits.*
- `#define DT_PPAD_EINVALID_VALUE DT_PPAD_EBASE-5`  
*Value is outside limits.*
- `#define DT_PPAD_EINVALID_LENGTH DT_PPAD_EBASE-6`  
*Length is outside limits.*
- `#define DT_PPAD_ENO_PERMISSION DT_PPAD_EBASE-7`  
*The action is not permitted in current state.*
- `#define DT_PPAD_ENO_DATA DT_PPAD_EBASE-8`  
*There is no data to be returned.*
- `#define DT_PPAD_ETIMEOUT DT_PPAD_EBASE-9`  
*Timeout occurred.*
- `#define DT_PPAD_EINVALID_KEY_NUMBER DT_PPAD_EBASE-10`  
*Invalid key number.*
- `#define DT_PPAD_EINVALID_KEY_ATTRIBUTES DT_PPAD_EBASE-11`  
*Invalid key attributes (usage)*
- `#define DT_PPAD_EINVALID_DEVICE DT_PPAD_EBASE-12`  
*Calling of non-existing device.*
- `#define DT_PPAD_ENOT_SUPPORTED DT_PPAD_EBASE-13`  
*(not used in this FW version)*
- `#define DT_PPAD_EPIN_LIMIT_EXCEEDED DT_PPAD_EBASE-14`  
*Pin entering limit exceed.*
- `#define DT_PPAD_EFLASH DT_PPAD_EBASE-15`  
*Error in flash commands.*
- `#define DT_PPAD_EHARDWARE DT_PPAD_EBASE-16`  
*Hardware error.*
- `#define DT_PPAD_EINVALID_CRC DT_PPAD_EBASE-17`  
*(not used in this FW version)*
- `#define DT_PPAD_ECANCELLED DT_PPAD_EBASE-18`  
*Operation cancelled.*
- `#define DT_PPAD_EINVALID_SIGNATURE DT_PPAD_EBASE-19`  
*Invalid signature.*
- `#define DT_PPAD_EINVALID_HEADER DT_PPAD_EBASE-20`  
*Invalid data in header.*
- `#define DT_PPAD_EINVALID_PASSWORD DT_PPAD_EBASE-21`  
*Incorrent password.*
- `#define DT_PPAD_EINVALID_KEY_FORMAT DT_PPAD_EBASE-22`

- Invalid key format.*

  - #define `DT_PPAD_ESCR DT_PPAD_EBASE-23`
- Error in smart card reader.*

  - #define `DT_PPAD_EHAL DT_PPAD_EBASE-24`
- Error code is returned from HAL functions.*

  - #define `DT_PPAD_EINVALID_KEY DT_PPAD_EBASE-25`
- Invalid key (or missing)*

  - #define `DT_PPAD_EINVALID_PIN DT_PPAD_EBASE-26`
- The PIN length is <4 or > 12.*

  - #define `DT_PPAD_EINVALID_REMAINDER DT_PPAD_EBASE-27`
- Issuer or ICC key invalid remainder length.*

  - #define `DT_PPAD_ENOT_INITIALIZED DT_PPAD_EBASE-28`
- (no used in this FW version)*

  - #define `DT_PPAD_ELIMIT_REACHED DT_PPAD_EBASE-29`
- (no used in this FW version)*

  - #define `DT_PPAD_EINVALID_SEQUENCE DT_PPAD_EBASE-30`
- (no used in this FW version)*

  - #define `DT_PPAD_ENOT_PERMITTED DT_PPAD_EBASE-31`
- The action is not permitted.*

  - #define `DT_PPAD_ENO_TMK DT_PPAD_EBASE-32`
- TMK is not loaded.*

  - #define `DT_PPAD_EWRONG_KEY DT_PPAD_EBASE-33`
- Wrong key format.*

  - #define `DT_PPAD_EDUPLICATE_KEY DT_PPAD_EBASE-34`
- Duplicated key.*

  - #define `DT_PPAD_EKEYBOARD_GENERAL DT_PPAD_EBASE-35`
- General keyboard error.*

  - #define `DT_PPAD_EKEYBOARD_NOT_CALIBRATED DT_PPAD_EBASE-36`
- Keyboard not calibrated.*

  - #define `DT_PPAD_EKEYBOARD_FAILURE DT_PPAD_EBASE-37`
- Keyboard failure.*

### 2.3.1 Detailed Description

Library error codes returned in the NSError objects.

### 2.3.2 Macro Definition Documentation

#### 2.3.2.1 DT\_EBUSY

```
#define DT_EBUSY -5
```

Device or resource busy.

### 2.3.2.2 DT\_ECLOSE

```
#define DT_ECLOSE -4
```

Close error.

### 2.3.2.3 DT\_ECRC

```
#define DT_ECRC -11
```

CRC error.

### 2.3.2.4 DT\_ECREATE

```
#define DT_ECREATE -2
```

Create error.

### 2.3.2.5 DT\_EDEVICE

```
#define DT_EDEVICE -14
```

Device error.

### 2.3.2.6 DT\_EEPROM

```
#define DT_EEPROM -13
```

EEPROM error.

### 2.3.2.7 DT\_EFAILED

```
#define DT_EFAILED -20
```

Command Failed.



### 2.3.2.8 DT\_EFLASH

```
#define DT_EFLASH -12
```

Flash error.

### 2.3.2.9 DT\_EGENERAL

```
#define DT_EGENERAL -1
```

General error / Unknown error.

### 2.3.2.10 DT\_EINVALID

```
#define DT_EINVALID -21
```

Invalid command.

### 2.3.2.11 DT\_EINVALID\_CMD

```
#define DT_EINVALID_CMD -17
```

Invalid command.

### 2.3.2.12 DT\_EIO

```
#define DT_EIO -10
```

Input/Output error.

### 2.3.2.13 DT\_EMEMORY

```
#define DT_EMEMORY -8
```

Memory allocation error.

#### 2.3.2.14 DT\_EMSR\_EBASE

```
#define DT_EMSR_EBASE -11000
```

EMS base value.

#### 2.3.2.15 DT\_EMSR\_ECARD

```
#define DT_EMSR_ECARD DT_EMSR_EBASE-0x03
```

Encrypted magnetic head card error.

#### 2.3.2.16 DT\_EMSR\_EHARDWARE

```
#define DT_EMSR_EHARDWARE DT_EMSR_EBASE-0x17
```

Encrypted magnetic head hardware failure.

#### 2.3.2.17 DT\_EMSR\_EINVALID\_COMMAND

```
#define DT_EMSR_EINVALID_COMMAND DT_EMSR_EBASE-0x01
```

Encrypted magnetic head invalid command sent.

#### 2.3.2.18 DT\_EMSR\_EINVALID\_LENGTH

```
#define DT_EMSR_EINVALID_LENGTH DT_EMSR_EBASE-0x14
```

Encrypted magnetic head invalid data length.

#### 2.3.2.19 DT\_EMSR\_EINVALID\_SIGNATURE

```
#define DT_EMSR_EINVALID_SIGNATURE DT_EMSR_EBASE-0x16
```

Encrypted magnetic head invalid signature.

### 2.3.2.20 DT\_EMSR\_ENO\_DATA

```
#define DT_EMSR_ENO_DATA DT_EMSR_EBASE-0x06
```

Encrypted magnetic head no data available.

### 2.3.2.21 DT\_EMSR\_ENO\_PERMISSION

```
#define DT_EMSR_ENO_PERMISSION DT_EMSR_EBASE-0x02
```

Encrypted magnetic head no permission error.

### 2.3.2.22 DT\_EMSR\_ENO\_RESPONSE

```
#define DT_EMSR_ENO_RESPONSE DT_EMSR_EBASE-0x05
```

Encrypted magnetic head command no response from the magnetic chip.

### 2.3.2.23 DT\_EMSR\_ESYNTAX

```
#define DT_EMSR_ESYNTAX DT_EMSR_EBASE-0x04
```

Encrypted magnetic head command syntax error.

### 2.3.2.24 DT\_EMSR\_ETAMPERED

```
#define DT_EMSR_ETAMPERED DT_EMSR_EBASE-0x15
```

Encrypted magnetic head is tampered.

### 2.3.2.25 DT\_ENOEXIST

```
#define DT_ENOEXIST -16
```

The device or resource does not exists.

#### 2.3.2.26 DT\_ENOIMPLEMENTED

```
#define DT_ENOIMPLEMENTED -15
```

The operation is not implemented.

#### 2.3.2.27 DT\_ENOMORE

```
#define DT_ENOMORE -19
```

No more items.

#### 2.3.2.28 DT\_ENONE

```
#define DT_ENONE 0
```

Operation successful.

#### 2.3.2.29 DT\_ENOSUPPORTED

```
#define DT_ENOSUPPORTED -7
```

Unsupported method or operation.

#### 2.3.2.30 DT\_ENOT\_EXIST\_OBJECT

```
#define DT_ENOT_EXIST_OBJECT -18
```

Not exist object.

#### 2.3.2.31 DT\_ENOT\_REGISTERED

```
#define DT_ENOT_REGISTERED -22
```

Not registered.

**2.3.2.32 DT\_EOPEN**

```
#define DT_EOPEN -3
```

Open error.

**2.3.2.33 DT\_EPARAM**

```
#define DT_EPARAM -9
```

Invalid parameter.

**2.3.2.34 DT\_EPERMISSION\_DENIED**

```
#define DT_EPERMISSION_DENIED -23
```

Permission denied.

**2.3.2.35 DT\_ETIMEOUT**

```
#define DT_ETIMEOUT -6
```

Timeout expired.

**2.3.2.36 DT\_MIFARE\_EACCESS**

```
#define DT_MIFARE_EACCESS DT_MIFARE_EBASE-13
```

Mifare access error.

**2.3.2.37 DT\_MIFARE\_EAUTHENTICATION**

```
#define DT_MIFARE_EAUTHENTICATION DT_MIFARE_EBASE-10
```

Mifare authentication error.

#### 2.3.2.38 DT\_MIFARE\_EBASE

```
#define DT_MIFARE_EBASE -10000
```

Mifare operation successful.

#### 2.3.2.39 DT\_MIFARE\_EBIT

```
#define DT_MIFARE_EBIT DT_MIFARE_EBASE-12
```

Mifare bit count error.

#### 2.3.2.40 DT\_MIFARE\_ECODE

```
#define DT_MIFARE_ECODE DT_MIFARE_EBASE-11
```

Mifare code error.

#### 2.3.2.41 DT\_MIFARE\_ECOLLISION

```
#define DT_MIFARE_ECOLLISION DT_MIFARE_EBASE-2
```

Mifare collision error.

#### 2.3.2.42 DT\_MIFARE\_ECRC

```
#define DT_MIFARE_ECRC DT_MIFARE_EBASE-5
```

Mifare CRC error.

#### 2.3.2.43 DT\_MIFARE\_EEPROM

```
#define DT_MIFARE_EEPROM DT_MIFARE_EBASE-7
```

Mifare EEPROM error.

#### 2.3.2.44 DT\_MIFARE\_EFIFO

```
#define DT_MIFARE_EFIFO DT_MIFARE_EBASE-6
```

Mifare FIFO overflow.

#### 2.3.2.45 DT\_MIFARE\_EFRAME

```
#define DT_MIFARE_EFRAME DT_MIFARE_EBASE-4
```

Mifare frame error.

#### 2.3.2.46 DT\_MIFARE\_EGENERIC

```
#define DT_MIFARE_EGENERIC DT_MIFARE_EBASE-9
```

Mifare generic error.

#### 2.3.2.47 DT\_MIFARE\_EKEY

```
#define DT_MIFARE_EKEY DT_MIFARE_EBASE-8
```

Mifare invalid key.

#### 2.3.2.48 DT\_MIFARE\_EPARITY

```
#define DT_MIFARE_EPARITY DT_MIFARE_EBASE-3
```

Mifare parity error.

#### 2.3.2.49 DT\_MIFARE\_ETIMEOUT

```
#define DT_MIFARE_ETIMEOUT DT_MIFARE_EBASE-1
```

Mifare timeout error.

### 2.3.2.50 DT\_MIFARE\_EVALUE

```
#define DT_MIFARE_EVALUE DT_MIFARE_EBASE-14
```

Mifare value error.

### 2.3.2.51 DT\_PPAD\_EBASE

```
#define DT_PPAD_EBASE -16500
```

Pinpad base value.

### 2.3.2.52 DT\_PPAD\_ECANCELLED

```
#define DT_PPAD_ECANCELLED DT_PPAD_EBASE-18
```

Operation cancelled.

### 2.3.2.53 DT\_PPAD\_EDUPLICATE\_KEY

```
#define DT_PPAD_EDUPLICATE_KEY DT_PPAD_EBASE-34
```

Duplicated key.

### 2.3.2.54 DT\_PPAD\_EFLASH

```
#define DT_PPAD_EFLASH DT_PPAD_EBASE-15
```

Error in flash commands.

### 2.3.2.55 DT\_PPAD\_EGENERAL

```
#define DT_PPAD_EGENERAL DT_PPAD_EBASE-1
```

Generic error.



**2.3.2.56 DT\_PPAD\_EHAL**

```
#define DT_PPAD_EHAL DT_PPAD_EBASE-24
```

Error code is returned from HAL functions.

**2.3.2.57 DT\_PPAD\_EHARDWARE**

```
#define DT_PPAD_EHARDWARE DT_PPAD_EBASE-16
```

Hardware error.

**2.3.2.58 DT\_PPAD\_EINVALID\_ADDRESS**

```
#define DT_PPAD_EINVALID_ADDRESS DT_PPAD_EBASE-4
```

Address is outside limits.

**2.3.2.59 DT\_PPAD\_EINVALID\_COMMAND**

```
#define DT_PPAD_EINVALID_COMMAND DT_PPAD_EBASE-2
```

Invalid command or subcommand code.

**2.3.2.60 DT\_PPAD\_EINVALID\_CRC**

```
#define DT_PPAD_EINVALID_CRC DT_PPAD_EBASE-17
```

(not used in this FW version)

**2.3.2.61 DT\_PPAD\_EINVALID\_DEVICE**

```
#define DT_PPAD_EINVALID_DEVICE DT_PPAD_EBASE-12
```

Calling of non-existing device.

### 2.3.2.62 DT\_PPAD\_EINVALID\_HEADER

```
#define DT_PPAD_EINVALID_HEADER DT_PPAD_EBASE-20
```

Invalid data in header.

### 2.3.2.63 DT\_PPAD\_EINVALID\_KEY

```
#define DT_PPAD_EINVALID_KEY DT_PPAD_EBASE-25
```

Invalid key (or missing)

### 2.3.2.64 DT\_PPAD\_EINVALID\_KEY\_ATTRIBUTES

```
#define DT_PPAD_EINVALID_KEY_ATTRIBUTES DT_PPAD_EBASE-11
```

Invalid key attributes (usage)

### 2.3.2.65 DT\_PPAD\_EINVALID\_KEY\_FORMAT

```
#define DT_PPAD_EINVALID_KEY_FORMAT DT_PPAD_EBASE-22
```

Invalid key format.

### 2.3.2.66 DT\_PPAD\_EINVALID\_KEY\_NUMBER

```
#define DT_PPAD_EINVALID_KEY_NUMBER DT_PPAD_EBASE-10
```

Invalid key number.

### 2.3.2.67 DT\_PPAD\_EINVALID\_LENGTH

```
#define DT_PPAD_EINVALID_LENGTH DT_PPAD_EBASE-6
```

Length is outside limits.

**2.3.2.68 DT\_PPAD\_EINVALID\_PARAMETER**

```
#define DT_PPAD_EINVALID_PARAMETER DT_PPAD_EBASE-3
```

Invalid parameter.

**2.3.2.69 DT\_PPAD\_EINVALID\_PASSWORD**

```
#define DT_PPAD_EINVALID_PASSWORD DT_PPAD_EBASE-21
```

Incorrent password.

**2.3.2.70 DT\_PPAD\_EINVALID\_PIN**

```
#define DT_PPAD_EINVALID_PIN DT_PPAD_EBASE-26
```

The PIN length is <4 or >12.

**2.3.2.71 DT\_PPAD\_EINVALID\_REMAINDER**

```
#define DT_PPAD_EINVALID_REMAINDER DT_PPAD_EBASE-27
```

Issuer or ICC key invalid remainder length.

**2.3.2.72 DT\_PPAD\_EINVALID\_SEQUENCE**

```
#define DT_PPAD_EINVALID_SEQUENCE DT_PPAD_EBASE-30
```

(no used in this FW version)

**2.3.2.73 DT\_PPAD\_EINVALID\_SIGNATURE**

```
#define DT_PPAD_EINVALID_SIGNATURE DT_PPAD_EBASE-19
```

Invalid signature.

#### 2.3.2.74 DT\_PPAD\_EINVALID\_VALUE

```
#define DT_PPAD_EINVALID_VALUE DT_PPAD_EBASE-5
```

Value is outside limits.

#### 2.3.2.75 DT\_PPAD\_EKEYBOARD\_FAILURE

```
#define DT_PPAD_EKEYBOARD_FAILURE DT_PPAD_EBASE-37
```

Keyboard failure.

#### 2.3.2.76 DT\_PPAD\_EKEYBOARD\_GENERAL

```
#define DT_PPAD_EKEYBOARD_GENERAL DT_PPAD_EBASE-35
```

General keyboard error.

#### 2.3.2.77 DT\_PPAD\_EKEYBOARD\_NOT\_CALIBRATED

```
#define DT_PPAD_EKEYBOARD_NOT_CALIBRATED DT_PPAD_EBASE-36
```

Keyboard not calibrated.

#### 2.3.2.78 DT\_PPAD\_ELIMIT\_REACHED

```
#define DT_PPAD_ELIMIT_REACHED DT_PPAD_EBASE-29
```

(no used in this FW version)

#### 2.3.2.79 DT\_PPAD\_ENO\_DATA

```
#define DT_PPAD_ENO_DATA DT_PPAD_EBASE-8
```

There is no data to be returned.

**2.3.2.80 DT\_PPAD\_ENO\_PERMISSION**

```
#define DT_PPAD_ENO_PERMISSION DT_PPAD_EBASE-7
```

The action is not permitted in current state.

**2.3.2.81 DT\_PPAD\_ENO\_TMK**

```
#define DT_PPAD_ENO_TMK DT_PPAD_EBASE-32
```

TMK is not loaded.

The action cannot be executed

**2.3.2.82 DT\_PPAD\_ENOT\_INITIALIZED**

```
#define DT_PPAD_ENOT_INITIALIZED DT_PPAD_EBASE-28
```

(no used in this FW version)

**2.3.2.83 DT\_PPAD\_ENOT\_PERMITTED**

```
#define DT_PPAD_ENOT_PERMITTED DT_PPAD_EBASE-31
```

The action is not permitted.

**2.3.2.84 DT\_PPAD\_ENOT\_SUPPORTED**

```
#define DT_PPAD_ENOT_SUPPORTED DT_PPAD_EBASE-13
```

(not used in this FW version)

**2.3.2.85 DT\_PPAD\_EPIN\_LIMIT\_EXCEEDED**

```
#define DT_PPAD_EPIN_LIMIT_EXCEEDED DT_PPAD_EBASE-14
```

Pin entering limit exceed.

#### 2.3.2.86 DT\_PPAD\_ESCR

```
#define DT_PPAD_ESCR DT_PPAD_EBASE-23
```

Error in smart card reader.

#### 2.3.2.87 DT\_PPAD\_ETIMEOUT

```
#define DT_PPAD_ETIMEOUT DT_PPAD_EBASE-9
```

Timeout occurred.

#### 2.3.2.88 DT\_PPAD\_EWRONG\_KEY

```
#define DT_PPAD_EWRONG_KEY DT_PPAD_EBASE-33
```

Wrong key format.

#### 2.3.2.89 Library\_Errors\_h

```
#define Library_Errors_h
```

## 2.4 General functions

Functions to connect/disconnect, set delegate, make sounds, update firmware, control various device settings.

### Functions

- (id) + [DTDevices::sharedDevice](#)  
*Creates and initializes new class instance or returns already initialized one.*
- (void) - [DTDevices::addDelegate:](#)  
*Allows unlimited delegates to be added to a single class instance.*
- (void) - [DTDevices::removeDelegate:](#)  
*Removes delegate, previously added with addDelegate.*
- (void) - [DTDevices::connect](#)  
*Tries to connect to supported devices in the background, connection status notifications will be passed through the delegate.*
- (void) - [DTDevices::disconnect](#)  
*Stops the sdk from trying to connect to supported devices and breaks existing connections.*
- (BOOL) - [DTDevices::isPresent:](#)
- (BOOL) - [DTDevices::setActiveDeviceType:error:](#)  
*The sdk can work with many devices at the same time, but some functions can be executed on a single device at a time (for example barcodeStartScan), this function sets the preferred device to execute the function by type.*
- (BOOL) - [DTDevices::setActiveDeviceIndexForType:deviceIndex:error:](#)  
*The sdk can work with many devices at the same time, including several of the same type (like 2 printers).*
- (BOOL) - [DTDevices::setAutoOffWhenIdle:whenDisconnected:error:](#)  
*Sets the time in seconds, after which Linea will shut down to conserve battery.*
- (BOOL) - [DTDevices::getAutoOffWhenIdle:whenDisconnected:error:](#)  
*Gets the time in seconds, after which Linea will shut down to conserve battery.*
- (BOOL) - [DTDevices::getBatteryCapacity:voltage:error:](#)  
*Returns active device's battery capacity.*
- (DTBatteryInfo \*) - [DTDevices::getBatteryInfo:](#)  
*Returns complete information about device's battery.*
- (DTBatteryInfo \*) - [DTDevices::getConnectedDeviceBatteryInfo:error:](#)  
*Returns complete information about a connected device's battery.*
- (BOOL) - [DTDevices::setBatteryMaxCapacity:error:](#)  
*On Infinea X, 2 battery capacities are supported, this function allows you to set the currently used battery capacity in order to receive correct battery info.*
- (BOOL) - [DTDevices::setInternalBatteryChargeCurrentMode:error:](#)  
*Switches between high and low current charging mode for internal battery.*
- (BOOL) - [DTDevices::getInternalBatteryChargeCurrentMode:error:](#)  
*Returns current charging mode for internal battery.*
- (NSArray< DTDeviceInfo \* > \*) - [DTDevices::getConnectedDevicesInfo:](#)  
*Returns an array of connected devices to the sdk.*
- (DTDeviceInfo \*) - [DTDevices::getConnectedDeviceInfo:error:](#)  
*Returns information about connected device, based on type.*
- (BOOL) - [DTDevices::playSound:beepData:length:error:](#)  
*Plays a sound using the built-in speaker on the active device.*
- (BOOL) - [DTDevices::setKioskMode:error:](#)  
*Enables or disables kiosk mode.*
- (BOOL) - [DTDevices::getKioskMode:error:](#)  
*Returns if the kiosk mode is enabled, refer to setKioskMode description for details.*

- (BOOL) - [DTDevices::getCharging:error:](#)  
*Returns if the connected device is charging the iOS device from it's own battery.*
- (BOOL) - [DTDevices::setCharging:error:](#)  
*Enables or disables Lines's capability to charge the handheld from it's own battery.*
- (BOOL) - [DTDevices::getPassThroughSync:error:](#)  
*Returns the current state of the pass-through synchronization.*
- (BOOL) - [DTDevices::setPassThroughSync:error:](#)  
*Enables or disables pass-through synchronization when you plug usb cable.*
- (BOOL) - [DTDevices::getUSBChargeCurrent:error:](#)  
*Gets the charge current that lightning connector based Lineas will allow the iPod/iPhone/iPad to be charged with when connected via USB port.*
- (BOOL) - [DTDevices::setUSBChargeCurrent:error:](#)  
*Sets the charge current that lightning connector based Lineas will allow the iPod/iPhone/iPad to be charged with when connected via USB port.*
- (NSDictionary \*) - [DTDevices::getFirmwareFileInformation:error:](#)  
*Returns information about the specified firmware data.*
- (BOOL) - [DTDevices::updateFirmwareData:error:](#)  
*Updates connected device's firmware with specified firmware data.*
- (BOOL) - [DTDevices::updateFirmwareData:validate:error:](#)  
*Updates connected device's firmware with specified firmware data.*
- (int) - [DTDevices::getSupportedFeature:error:](#)  
*Returns if a feature is supported on connected device(s) and what type it is.*
- (BOOL) - [DTDevices::getTimeRemainingToPowerOff:error:](#)
- (BOOL) - [DTDevices::sysSaveSettingsToFlash:](#)  
*In Lineas, all of the permanent settings are saved initially in RAM memory, then moved to flash upon program closing, device going to sleep, etc.*
- (BOOL) - [DTDevices::sysPowerOff:](#)  
*Powers the device off.*
- (BOOL) - [DTDevices::sysEnterPassThrough:](#)  
*Initiates pass-through sync if a usb cable is connected.*
- (BOOL) - [DTDevices::sysIsDevelopmentUnit](#)  
*Returns if the connected unit is development one.*
- (BOOL) - [DTDevices::sysSetBatteryWarningLevelPercent:error:](#)  
*Sets a specific battery level below which the device emits a charge needed warning.*
- (BOOL) - [DTDevices::sysEnableEvents:error:](#)  
*Use this to enable/disable specific events that are generated by the device.*
- (NSDate \*) - [DTDevices::rtcGetDeviceDate:](#)  
*Returns current device date/time.*
- (BOOL) - [DTDevices::rtcSetDeviceDate:error:](#)  
*Sets current device date/time.*

### 2.4.1 Detailed Description

Functions to connect/disconnect, set delegate, make sounds, update firmware, control various device settings.

### 2.4.2 Function Documentation



### 2.4.2.1 addDelegate():

```
- (void) addDelegate:
    (id) newDelegate
```

Allows unlimited delegates to be added to a single class instance.

This is useful in the case of global class and every view can use addDelegate when the view is shown and removeDelegate when no longer needs to monitor events

#### Parameters

<i>newDelegate</i>	the delegate that will be notified of events
--------------------	--

### 2.4.2.2 connect():

```
- (void) connect
```

Tries to connect to supported devices in the background, connection status notifications will be passed through the delegate.

Once connect is called, it will automatically try to reconnect until disconnect is called. Note that "connect" call works in background and will notify the caller of connection success via connectionState delegate. Do not assume the library has fully connected to the device after this call, but wait for the notification.

### 2.4.2.3 disconnect():

```
- (void) disconnect
```

Stops the sdk from trying to connect to supported devices and breaks existing connections.

### 2.4.2.4 getAutoOffWhenIdle:whenDisconnected:error:()

```
- (BOOL) getAutoOffWhenIdle:
    (NSTimeInterval *) timeIdle
    whenDisconnected: (NSTimeInterval *) timeDisconnected
    error: (NSError **) error
```

Gets the time in seconds, after which Linea will shut down to conserve battery.

This works with lightning connector Lineas only (LP5, LPTab4, LPTabMini)

#### Note

When Linea is being used by a program, only the idle time is taken in effect, but when Linea is disconnected BOTH parameters have effect - if idle time is 10 seconds and disconnected time is 30, then Linea will always disconnect in 10 seconds of inactivity! Thus idle time should always be bigger than disconnected time!

**Parameters**

<i>timeIdle</i>	this is the idle time, connected or not, after which Linea will turn off. The default value is 5400 seconds (90 minutes)
<i>timeDisconnected</i>	this is the time with no active program connection, after which Linea will turn off. The default value is 30 seconds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.5 getBatteryCapacity:voltage:error:()**

```
- (BOOL) getBatteryCapacity:
    (int *) capacity
    voltage:(float *) voltage
    error:(NSError **) error
```

Returns active device's battery capacity.

**Note**

Reading battery voltages during charging is unreliable!

**Parameters**

<i>capacity</i>	returns battery capacity in percents, ranging from 0 when battery is dead to 100 when fully charged. Pass nil if you don't want that information
<i>voltage</i>	returns battery voltage in Volts, pass nil if you don't want that information
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.6 getBatteryInfo:()**

```
- (DTBatteryInfo *) getBatteryInfo:
    (NSError **) error
```

Returns complete information about device's battery.

Currently this function is fully supported on Infineon-X and gives partial info when called for the rest of the devices

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

battery information if function succeeded, nil otherwise

2.4.2.7 `getCharging:error:()`

```
- (BOOL) getCharging:
    (BOOL *) charging
    error:(NSError **) error
```

Returns if the connected device is charging the iOS device from it's own battery.

Linea firmware versions prior to 2.13 will return true if external charge is attached, 2.13 and later will return only if Linea's own battery is used for charging.

## Parameters

<i>charging</i>	returns TRUE if charging is enabled (from internal battery, external charging is omitted)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

2.4.2.8 `getConnectedDeviceBatteryInfo:error:()`

```
- (DTBatteryInfo *) getConnectedDeviceBatteryInfo:
    (SUPPORTED_DEVICE_TYPES) device
    error:(NSError **) error
```

Returns complete information about a connected device's battery.

## Parameters

<i>device</i>	connected device type to query the info for
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

battery information if function succeeded, nil otherwise

**2.4.2.9 getConnectedDeviceInfo:error:()**

```
- (DTDeviceInfo *) getConnectedDeviceInfo:
    (SUPPORTED_DEVICE_TYPES) deviceType
    error:(NSError **) error
```

Returns information about connected device, based on type.

**Parameters**

<i>deviceType</i>	the type of device you want to query info for
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

[DTDeviceInfo](#) class, cotaining information about the specific device if function succeeded, nil otherwise

**2.4.2.10 getConnectedDevicesInfo:()**

```
- (NSArray<DTDeviceInfo *> *) getConnectedDevicesInfo:
    (NSError **) error
```

Returns an array of connected devices to the sdk.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

an array of [DTDeviceInfo](#) if function succeeded, nil otherwise

**2.4.2.11 getFirmwareFileInformation:error:()**

```
- (NSDictionary *) getFirmwareFileInformation:
    (NSData *) data
    error:(NSError **) error
```

Returns information about the specified firmware data.

Based on it, and the connected device's name, model and firmware version you can chose to update or not the firmware

#### Parameters

<i>data</i>	- firmware data		
	"deviceName"	Device name, for example "Linea"	
	"deviceModel"	Device model, for example "XBAMBL"	Firmware revision as number MAJOR*100+MINOR, i.e. 2.41 will be returned as 241
		<tr><td>"firmwareRevision"</td><td>Firmware revision as string, for example 2.41</td></tr>           <tr><td>"firmwareRevisionNumber"</td><td>	
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information		

#### Returns

firmware information if function succeeded, nil otherwise

#### 2.4.2.12 getInternalBatteryChargeCurrentMode:error:()

```

- (BOOL) getInternalBatteryChargeCurrentMode:
    (BOOL *) lowCurrent
    error:(NSError **) error

```

Returns current charging mode for internal battery.

Available in Linea7 only, it can be useful if you charge the linea off weak-powered usb ports

#### Parameters

<i>lowCurrent</i>	if true, low current mode is enabled
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

**2.4.2.13 getKioskMode:error:()**

```
- (BOOL) getKioskMode:
    (BOOL *) enabled
    error:(NSError **) error
```

Returns if the kiosk mode is enabled, refer to setKioskMode description for details.

**Parameters**

<i>enabled</i>	returns TRUE if kiosk mode is enabled
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.14 getPassThroughSync:error:()**

```
- (BOOL) getPassThroughSync:
    (BOOL *) enabled
    error:(NSError **) error
```

Returns the current state of the pass-through synchronization.

**Parameters**

<i>enabled</i>	returns if the sync is enabled or disabled
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.15 getSupportedFeature:error:()**

```
- (int) getSupportedFeature:
    (FEATURES) feature
    error:(NSError **) error
```

Returns if a feature is supported on connected device(s) and what type it is.

## Parameters

<i>feature</i>	one of the FEAT_* constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

FEAT\_UNSUPPORTED if feature is not supported, FEAT\_SUPPORTED or one or more feature specific types otherwise

## 2.4.2.16 getTimeRemainingToPowerOff:error:()

```
- (BOOL) getTimeRemainingToPowerOff:
    (NSTimeInterval *) timeRemaining
    error:(NSError **) error
```

## 2.4.2.17 getUSBChargeCurrent:error:()

```
- (BOOL) getUSBChargeCurrent:
    (int *) current
    error:(NSError **) error
```

Gets the charge current that lightning connector based Lineas will allow the iPod/iPhone/iPad to be charged with when connected via USB port.

Refer to setUSBChargeCurrent for more info.

## Parameters

<i>current</i>	stores the charge current in mA (normally it is 500) upon return.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.4.2.18 isPresent:()

```
- (BOOL) isPresent:
    (SUPPORTED_DEVICE_TYPES) type
```

**2.4.2.19 playSound:beepData:length:error:()**

```
- (BOOL) playSound:
    (int) volume
    beepData:(const int *) data
    length:(int) length
    error:(NSError **) error
```

Plays a sound using the built-in speaker on the active device.

**Note**

A sample beep containing of 2 tones, each with 400ms duration, first one 2000Hz and second - 5000Hz will look int beepData[]={2000,400,5000,400}

**Parameters**

<i>volume</i>	controls the volume (0-100). Currently have no effect
<i>data</i>	an array of integer values specifying pairs of tone(Hz) and duration(ms).
<i>length</i>	length in bytes of beepData array
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.20 removeDelegate:()**

```
- (void) removeDelegate:
    (id) newDelegate
```

Removes delegate, previously added with addDelegate.

**Parameters**

<i>newDelegate</i>	the delegate that will be no longer be notified of events
--------------------	---

**2.4.2.21 rtcGetDeviceDate:()**

```
- (NSDate *) rtcGetDeviceDate:
    (NSError **) error
```

Returns current device date/time.



## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

date/time or nil if error occurred

## 2.4.2.22 rtcSetDeviceDate:error:()

```
- (BOOL) rtcSetDeviceDate:
    (NSDate *) date
    error:(NSError **) error
```

Sets current device date/time.

## Parameters

<i>date</i>	date/time to set
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.4.2.23 setActiveDeviceIndexForType:deviceIndex:error:()

```
- (BOOL) setActiveDeviceIndexForType:
    (SUPPORTED_DEVICE_TYPES) type
    deviceIndex:(int) deviceIndex
    error:(NSError **) error
```

The sdk can work with many devices at the same time, including several of the same type (like 2 printers).

This function allows you to set the active device for specified type

## Parameters

<i>type</i>	device type to be made active, one of the DEVICE_TYPE_* constants
<i>deviceIndex</i>	the zero based index of the device
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.24 setActiveDeviceType:error:()**

```
- (BOOL) setActiveDeviceType:
    (SUPPORTED_DEVICE_TYPES) type
    error:(NSError **) error
```

The sdk can work with many devices at the same time, but some functions can be executed on a single device at a time (for example barcodeStartScan), this function sets the preferred device to execute the function by type.

**Parameters**

<i>type</i>	device type to be made active, one of the DEVICE_TYPE_* constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.25 setAutoOffWhenIdle:whenDisconnected:error:()**

```
- (BOOL) setAutoOffWhenIdle:
    (NSTimeInterval) timeIdle
    whenDisconnected:(NSTimeInterval) timeDisconnected
    error:(NSError **) error
```

Sets the time in seconds, after which Linea will shut down to conserve battery.

This works with lightning connector Lineas only (LP5, LPTab4, LPTabMini)

**Note**

When Linea is being used by a program, only the idle time is taken in effect, but when Linea is disconnected BOTH parameters have effect - if idle time is 10 seconds and disconnected time is 30, then Linea will always disconnect in 10 seconds of inactivity! Thus idle time should always be bigger than disconnected time! disconnected timeout only works on firmware <5.60, otherwise it is fixed at 30 seconds. On firmware 5.60+ disconnected one is ignored

**Parameters**

<i>timeIdle</i>	this is the idle time, connected or not, after which Linea will turn off. The default value is 5400 seconds (90 minutes)
<i>timeDisconnected</i>	this is the time with no active program connection, after which Linea will turn off. The default value is 30 seconds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.26 setBatteryMaxCapacity:error:()**

```
- (BOOL) setBatteryMaxCapacity:
    (int) capacity
    error:(NSError **) error
```

On Infinea X, 2 battery capacities are supported, this function allows you to set the currently used battery capacity in order to receive correct battery info.

**Note**

calling this function resets the battery info and it needs few cycles in order to return correct information, so this function should be called from service menu or similar

**Parameters**

<i>capacity</i>	battery capacity in mA/h
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

battery information if function succeeded, nil otherwise

**2.4.2.27 setCharging:error:()**

```
- (BOOL) setCharging:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables Linea's capability to charge the handheld from it's own battery.

Charging can stop if connected device's battery goes too low.

While Linea can act as external battery for the iPod/iPhone, there are certain limitations if you decide to implement it. The internal battery is not big enough, so if the iPod/iPhone consumes a lot of power from it, it will go down very fast and force the firmware to cut the charge to prevent going down to dangerous levels. The proper use of this charging function depends on how the program, running on the iPod/iPhone, is used and how the iPod/iPhone is discharged

There are two possible ways to use Linea's charge:

- Emergency mode - in the case iPod/iPhone usage is designed in a way it will last long enough between charging sessions and using Linea's charge is not generally needed, the charge can be used if the iPod/iPhone for some reason goes too low (like <50%), so it is given some power to continue working until next charging. An example will be store, where devices are being charged every night, but extreme usage on some iPod drains the battery before the end of the shift. This is the less efficient way to charge it, also, Linea will refuse to start the charge if it's own battery goes below 3.8v, so depending on the usage, barcode type it may not be possible to start the charge.
- Max life mode - it is the case where both devices are required to operate as long as possible. Usually, the iPod/iPhone's battery will be drained way faster than Linea's, especially with wifi enabled programs and to keep both devices operating as long as possible, the charging should be designed in a way so iPod/iPhone is able to use most of Linea's battery. This is possible, if you start charging when iPod/iPhone is almost full - at around 75-80% or higher. This way the iPod will consume small amount of energy, allowing our battery to slowly be used almost fully to charge it.

LibraryDemo application contains sample implementation of max life mode charging.

#### Note

Reading battery voltages during charging is unreliable!

Enabling charge can fail if connected device's battery is low. Disabling charge will fail if there is external charger or usb cable attached.

#### Parameters

<i>enabled</i>	TRUE to enable charging, FALSE to disable/stop it
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.4.2.28 setInternalBatteryChargeCurrentMode:error:()

```
- (BOOL) setInternalBatteryChargeCurrentMode:
    (BOOL) lowCurrent
    error:(NSError **) error
```

Switches between high and low current charging mode for internal battery.

Available in Linea7 only, it can be useful if you charge the linea off weak-powered usb ports

#### Parameters

<i>lowCurrent</i>	if true, low current mode is used
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.29 setKioskMode:error:()**

```
- (BOOL) setKioskMode:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables kiosk mode.

In this mode the device is unable to operate if not on external power. The mode is needed when the iOS needs to be charged with high current (2.1, 2.4A) and the internal battery cannot survive such. The setting is persistent.

**Parameters**

<i>enabled</i>	TRUE to enable kiosk mode, FALSE to disable it
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.30 setPassThroughSync:error:()**

```
- (BOOL) setPassThroughSync:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables pass-through synchronization when you plug usb cable.

In lightning connector devices this is important, as you can no longer have both sync and communication at the same time. Disable the sync for stationary, always on charge systems. Sync mode is persistent, but there is no downside of setting the desired one upon connection.

**Parameters**

<i>enabled</i>	TRUE to enable pass-through sync, FALSE to disable it
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

#### 2.4.2.31 `setUSBChargeCurrent:error:()`

```
- (BOOL) setUSBChargeCurrent:
    (int) current
    error:(NSError **) error
```

Sets the charge current that lightning connector based Lineas will allow the iPod/iPhone/iPad to be charged with when connected via USB port.

This setting persists.

##### Note

Note the combined consumption on both Linea (max 300mA) and the iPod/iPhone/iPad, some USB ports may not be strong enough and will turn off. Usually an usb port provides up to 1A, so setting the iOS charge to 500mA is always safe, but high powered usb ports can provide much more.

##### Warning

You can damage your adapter/port if you increase the charge current beyond its limits!!! Do not put 1A charge on 1A adapters, always use 2A adapter! Do not use 1A charge on PCs, unless it goes through high-power usb HUB!

##### Parameters

<i>current</i>	the charge current in mA (normally it is 500). Currently linea accepts 500, 1000, 2100 and 2400 as parameter.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.4.2.32 `sharedDevice()`

```
+ (id) sharedDevice
```

Creates and initializes new class instance or returns already initialized one.

Use this function, if you want to access the class from different places

##### Returns

shared class instance

### 2.4.2.33 sysEnableEvents:error:()

```
- (BOOL) sysEnableEvents:
    (SYS_EVENTS) events
    error:(NSError **) error
```

Use this to enable/disable specific events that are generated by the device.

Currently supported on pinpads only

#### Parameters

<i>events</i>	any combination of SYS_EVENTS enumeration
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.4.2.34 sysEnterPassThrough:()

```
- (BOOL) sysEnterPassThrough:
    (NSError **) error
```

Initiates pass-through sync if a usb cable is connected.

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.4.2.35 sysIsDevelopmentUnit()

```
- (BOOL) sysIsDevelopmentUnit
```

Returns if the connected unit is development one.

Test units are meant for development purposes and loaded with test keys, they should not be used in production environments. This function has only meaning for pinpads.

#### Returns

TRUE if the unit is development, FALSE if real production one

**2.4.2.36 sysPowerOff():**

```
- (BOOL) sysPowerOff:
    (NSError **) error
```

Powers the device off.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.37 sysSaveSettingsToFlash():**

```
- (BOOL) sysSaveSettingsToFlash:
    (NSError **) error
```

In Lineas, all of the permanent settings are saved initially in RAM memory, then moved to flash upon program closing, device going to sleep, etc.

This is okay in most cases, but this function is provided in case you want to force save them. Note that flash memory has limited erase cycles and is also quite slow, so don't use this command too often.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.4.2.38 sysSetBatteryWarningLevelPercent:error():**

```
- (BOOL) sysSetBatteryWarningLevelPercent:
    (int) percent
    error:(NSError **) error
```

Sets a specific battery level below which the device emits a charge needed warning.

This works only if there is no active connection to the device, when a program is connected, it can present the warning the best possible way. Currently supported by pinpads only.



## Parameters

<i>percent</i>	battery percentage treshold or 0 to disable functionality
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.4.2.39 updateFirmwareData:error:()

```
- (BOOL) updateFirmwareData:
    (NSData *) data
    error:(NSError **) error
```

Updates connected device's firmware with specified firmware data.

The firmware can only be upgraded or downgraded, if you send the same firmware version, then no update process will be started.

## Note

Make sure the user does not interrupt the process or the device will be rendered unusable and can only be recovered via the special firmware update cable

## Parameters

<i>data</i>	the firmware data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.4.2.40 updateFirmwareData:validate:error:()

```
- (BOOL) updateFirmwareData:
    (NSData *) data
    validate:(BOOL) validate
    error:(NSError **) error
```

Updates connected device's firmware with specified firmware data.

The firmware can only be upgraded or downgraded, if you send the same firmware version, then no update process will be started.

**Note**

Make sure the user does not interrupt the process or the device will be rendered unusable and can only be recovered via the special firmware update cable

**Parameters**

<i>data</i>	the firmware data
<i>validate</i>	true if the function should check for firmware compatibility, false otherwise. It is sometimes useful to disable validation if you want to go from one firmware model to another, when they differ by firmware features only and the hardware is the same (for example going for model with PM to model with AM)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

## 2.5 Magnetic Stripe Reader Functions (Unencrypted)

Functions to work with the unencrypted magnetic card reader.

### Functions

- (BOOL) - [DTDevices::msEnable:](#)  
*Enables reading of magnetic cards.*
- (BOOL) - [DTDevices::msDisable:](#)  
*Disables magnetic card reading.*
- (NSDictionary< NSString \*, NSObject \* > \*) - [DTDevices::msProcessFinancialCard:track2:](#)  
*Helper function to parse financial card and extract the data - name, number, expiration date.*
- (NSDictionary< NSString \*, NSObject \* > \*) - [DTDevices::msGetLastCardMaskedData:](#)  
*Retrieves masked card data (configurable by `emsrConfigMaskedDataShowExpiration` function), if the last swiped/scanned/tapped card was valid.*
- (DTFinancialCardInfo \*) - [DTDevices::msExtractFinancialCard:track2:](#)  
*Helper function to parse financial card and extract the data - name, number, expiration date.*
- (BOOL) - [DTDevices::msSetCardDataMode:error:](#)  
*Sets Linea's magnetic card data mode.*
- (BOOL) - [DTDevices::msSimulateCardDataTrack1:track2:track3:error:](#)  
*Send card data to be encrypted and returned via the currently selected encryption algorithm.*
- (NSString \*) - [DTDevices::msGetLoyaltyDataForID:error:](#)  
*Retrieves loyalty card data, if the last swiped magnetic card was a recognized loyalty one.*
- (NSData \*) - [DTDevices::msGetCardTracksEncryptedWithFormat:keyID:additionalData:error:](#)  
*After card is swiped or transaction is finished, you can get the card data in magnetic-stripe format by using one of the available Encrypted Head formats.*
- (BOOL) - [DTDevices::msSetBINRangesEx:error:](#)  
*Needed Structure: F0 C0 - pan min length C1 - pan max length F1 C0 - BIN.*

### 2.5.1 Detailed Description

Functions to work with the unencrypted magnetic card reader.

### 2.5.2 Function Documentation

#### 2.5.2.1 msDisable()

```
- (BOOL) msDisable:
    (NSError **) error
```

Disables magnetic card reading.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.5.2.2 msEnable():**

```
- (BOOL) msEnable:
    (NSError **) error
```

Enables reading of magnetic cards.

Current magnetic card heads used in Linea consume so little power, that there is no drawback in leaving it enabled all the time. By default magnetic card reading is enabled upon connect.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.5.2.3 msExtractFinancialCard:track2():**

```
- (DTFinancialCardInfo *) msExtractFinancialCard:
    (NSString *) track1
    track2:(NSString *) track2
```

Helper function to parse financial card and extract the data - name, number, expiration date.

The function will extract as much information as possible.

**Parameters**

<i>track1</i>	- track1 information or nil
<i>track2</i>	- track2 information or nil

**Returns**

[DTFinancialCardInfo](#) containing extracted data or nil if the data is invalid

**2.5.2.4 msGetCardTracksEncryptedWithFormat:keyID:additionalData:error:()**

```
- (NSData *) msGetCardTracksEncryptedWithFormat:
    (int) format
    keyID:(int) keyID
    additionalData:(NSDictionary *) additionalData
    error:(NSError **) error
```

After card is swiped or transaction is finished, you can get the card data in magnetic-stripe format by using one of the available Encrypted Head formats.

This function only works in pinad devices

**Parameters**

<i>format</i>	encryption algorithm used, one of the ALG_* constants
<i>keyID</i>	key ID, one of KEY_* constants. Passing 0 will use the default key for the specified algorithm
<i>additionalData</i>	a dictionary object containing algorithm specific values. Currently supported: <ul style="list-style-type: none"> <li>"uniqueID" an NSInteger containing random number, that is going to be sent back in the packet in case of ALG_PPAD_DUKPT encryption format. If not specified, the command will generate one. - @"randomSeed" an NSInteger containing 2 byte number to be used in ALG_MILES_MORE</li> </ul>
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

encrypted card data containing (encryption format<<3) and tracks read as first byte and encrypted data following if function succeeded, nil otherwise

**2.5.2.5 msGetLastCardMaskedData:()**

```
- (NSDictionary<NSString *, NSObject *> *) msGetLastCardMaskedData:
    (NSError **) error
```

Retrieves masked card data (configurable by `emsrConfigMaskedDataShowExpiration` function), if the last swiped/scanned/tapped card was valid.

This function can return masked card data out of regular magnetic swipes, payment transaction magnetic swipe, payment transaction smart card read and payment transaction contactless card read

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

dictionary containing parsed card details, see `msProcessFinancialCard` for details

**2.5.2.6 msGetLoyaltyDataForID:error:()**

```
- (NSString *) msGetLoyaltyDataForID:
    (int) loyaltyID
    error:(NSError **) error
```

Retrieves loyalty card data, if the last swiped magnetic card was a recognized loyalty one.

**Parameters**

<i>loyaltyID</i>	loyalty identifier, one of the LOYALTY_ID_* constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

loyalty data or nil if function failed

**2.5.2.7 msProcessFinancialCard:track2:()**

```
- (NSDictionary<NSString *, NSObject *> *) msProcessFinancialCard:
    (NSString *) track1
    track2:(NSString *) track2
```

Helper function to parse financial card and extract the data - name, number, expiration date.

The function will extract as much information as possible.

**Parameters**

<i>track1</i>	- track1 information or nil
<i>track2</i>	- track2 information or nil

**Returns**

dictionary containing extracted data or nil if the data is invalid. Keys contained are:

"accountNumber"	Account number
"cardholderName"	Cardholder name, as stored in the card
"expirationYear"	Expiration date - year
"expirationMonth"	Expiration date - month
"serviceCode"	Service code (if any)
"discretionaryData"	Discretionary data (if any)
"firstName"	Extracted cardholder's first name
"lastName"	Extracted cardholder's last name
"track1"	Full or assembled from data Track1 with masked PAN
"track2"	Full or assembled from data Track2 with masked PAN

**2.5.2.8 msSetBINRangesEx:error:()**

```
- (BOOL) msSetBINRangesEx:
    (NSData *) data
    error:(NSError **) error
```

Needed Structure: F0 C0 - pan min length C1 - pan max length F1 C0 - BIN.

If C0 is available, but C1 is missing, it means that it is BIN mask. C1 - BIN. If both C0 and C1 are available, it means that there is interval between BINs. C0 - minimum, C1 - maximum. C2 - plain? 0: plain 1: encrypted C3 - masked - start, end, after. It should be exactly 3 bytes length!

----- MANUAL ENTRY ----- C4 - exp. date prompt? 0: no 1: yes C5 - CVV prompt? 0: no 1: yes C6 - max length of the CVV. It is being used only if C5 has value 1. C7 - CVV Label. It is being used only if C5 has value 1.

**Parameters**

<i>data</i>	RSA2048 PKCS1.5 encrypted block containing SHA256 of the bin ranges + bin ranges data in ASCII or BCD
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.5.2.9 msSetCardDataMode:error:()**

```
- (BOOL) msSetCardDataMode:
    (int) mode
    error:(NSError **) error
```

Sets Linea's magnetic card data mode.

This setting is not persistent and is best to configure it upon connect.

## Parameters

<i>mode</i>	magnetic card data mode:	
	MS_PROCESSED_CARD_DATA	Card data will be processed and will be returned via call to <code>magneticCardData</code>
	MS_RAW_CARD_DATA	Card data will not be processed and will be returned via call to <code>magneticCardRawData</code>
	MS_PROCESSED_TRACK2_DATA	Card data will be returned as processed, but only track 2 will be read
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

## Returns

TRUE if function succeeded, FALSE otherwise

2.5.2.10 `msSimulateCardDataTrack1:track2:track3:error:()`

```
- (BOOL) msSimulateCardDataTrack1:
    (NSString *) track1
    track2:(NSString *) track2
    track3:(NSString *) track3
    error:(NSError **) error
```

Send card data to be encrypted and returned via the currently selected encryption algorithm.

## Parameters

<i>track1</i>	MS Track 1 data or nil if unavailable
<i>track2</i>	MS Track 2 data or nil if unavailable
<i>track3</i>	MS Track 3 data or nil if unavailable
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise



## 2.6 Barcode Reader Functions

Functions for scanning barcodes, various barcode settings and direct control of the barcode engine.

### Functions

- (NSString \*) - [DTDevices::barcodeType2Text:](#)  
*Helper function to return string name of barcode type.*
- (BOOL) - [DTDevices::barcodeStartScan:](#)  
*Starts barcode engine.*
- (BOOL) - [DTDevices::barcodeStopScan:](#)  
*Stops ongoing scan started with startScan.*
- (BOOL) - [DTDevices::barcodeGetScanButtonMode:error:](#)  
*Returns the current scan button mode.*
- (BOOL) - [DTDevices::barcodeSetScanButtonMode:error:](#)  
*Sets scan button mode.*
- (BOOL) - [DTDevices::barcodeSetUVLights:error:](#)  
*Enable or disable UV lights when scanning.*
- (BOOL) - [DTDevices::barcodeGetUVLights:error:](#)  
*Returns if the UV lights upon scanning are enabled This setting is not persistent and is best to configure it upon connect.*
- (BOOL) - [DTDevices::barcodeSetBeepOnReady:error:](#)  
*Enable or disable short double sound when barcode engine becomes operational and is ready to scan.*
- (BOOL) - [DTDevices::barcodeGetBeepOnReady:error:](#)  
*Returns if beeping upon barcode engine start is enabled This setting is persistent and can be set only once.*
- (BOOL) - [DTDevices::barcodeSetScanBeep:volume:beepData:length:error:](#)  
*Sets the sound, which is used upon successful barcode scan.*
- (BOOL) - [DTDevices::barcodeGetScanMode:error:](#)  
*Returns the current scan mode.*
- (BOOL) - [DTDevices::barcodeSetScanMode:error:](#)  
*Sets barcode engine scan mode.*
- (BOOL) - [DTDevices::barcodeGetTypeMode:error:](#)  
*Returns the current barcode type mode.*
- (BOOL) - [DTDevices::barcodeSetTypeMode:error:](#)  
*Sets barcode type mode.*
- (BOOL) - [DTDevices::barcodeSetUPCZeroStrip:error:](#)  
*Enables/disables UPC-A front 0 (USA country code) trimming.*
- (BOOL) - [DTDevices::barcodeEngineResetToDefaults:](#)  
*Performs factory reset of the barcode module.*
- (BOOL) - [DTDevices::barcodeEngineCheckReady:error:](#)  
*Performs a check if the barcode engine is ready to operate.*
- (BOOL) - [DTDevices::barcodeOpticonSetInitString:error:](#)  
*Allows for a custom initialization string to be sent to the Opticon barcode engine.*
- (BOOL) - [DTDevices::barcodeOpticonSetParams:saveToFlash:error:](#)  
*Sends configuration parameters directly to the opticon barcode engine.*
- (NSString \*) - [DTDevices::barcodeOpticonGetIdent:](#)  
*Reads barcode engine's identification.*
- (BOOL) - [DTDevices::barcodeOpticonUpdateFirmware:bootLoader:error:](#)  
*Performs firmware update on the optiocon 2D barcode engines.*
- (BOOL) - [DTDevices::barcodeHoneywellSetInitString:error:](#)

- Allows for a custom initialization data to be sent to the Honeywell barcode engine.*
- (BOOL) - [DTDevices::barcodeCodeSetParam:value:error:](#)  
*Sends configuration parameters directly to the code barcode engine.*
- (BOOL) - [DTDevices::barcodeCodeGetParam:value:error:](#)  
*Reads configuration parameters directly from the code barcode engine.*
- (BOOL) - [DTDevices::barcodeCodeUpdateFirmware:data:error:](#)  
*Performs firmware update on the Code 2D barcode engines.*
- (NSDictionary \*) - [DTDevices::barcodeCodeGetInformation:](#)
- (BOOL) - [DTDevices::barcodeZebraSetParam:value:permanent:error:](#)
- (NSString \*) - [DTDevices::barcodeZebraGetVersion:](#)
- (BOOL) - [DTDevices::barcodeZebraUpdateFirmware:error:](#)  
*Performs firmware update on zebra barcode engines.*
- (BOOL) - [DTDevices::barcodeIntermecSetInitData:error:](#)  
*Allows for a custom initialization string to be sent to the Intermec barcode engine.*
- (NSData \*) - [DTDevices::barcodeIntermecQuery:error:](#)  
*Sends a custom command to the barcode engine and receives a reply.*
- (BOOL) - [DTDevices::barcodeIntermecUpdateFirmware:error:](#)  
*Performs firmware update on Intermec barcode engines.*
- (BOOL) - [DTDevices::barcodeZebraSetInitData:error:](#)  
*Allows for a custom initialization data to be sent to the zebra barcode engine.*
- (NSData \*) - [DTDevices::barcodeNewlandQuery:error:](#)  
*Sends a custom command to the barcode engine and receives a reply.*
- (BOOL) - [DTDevices::barcodeNewlandSetInitString:error:](#)  
*Allows for a custom initialization string to be sent to the Newland barcode engine.*
- (BOOL) - [DTDevices::barcodeNewlandUpdateFirmware:error:](#)  
*Performs firmware update on the newland barcode engines.*

## 2.6.1 Detailed Description

Functions for scanning barcodes, various barcode settings and direct control of the barcode engine.

## 2.6.2 Function Documentation

### 2.6.2.1 `barcodeCodeGetInformation:()`

```
- (NSDictionary *) barcodeCodeGetInformation:
    (NSError **) error
```

### 2.6.2.2 `barcodeCodeGetParam:value:error:()`

```
- (BOOL) barcodeCodeGetParam:
    (int) setting
    value:(uint64_t *) value
    error:(NSError **) error
```

Reads configuration parameters directly from the code barcode engine.

Refer to the barcode engine documentation for supported parameters.

## Parameters

<i>setting</i>	the setting number
<i>value</i>	upon success, the parameter value will be stored here

## Returns

TRUE if operation was successful

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.6.2.3 barcodeCodeSetParam:value:error:()

```
- (BOOL) barcodeCodeSetParam:
    (int) setting
    value:(uint64_t) value
    error:(NSError **) error
```

Sends configuration parameters directly to the code barcode engine.

Use this function with EXTREME care, you can easily render your barcode engine useless. Refer to the barcode engine documentation for supported parameters.

## Parameters

<i>setting</i>	the setting number
<i>value</i>	the value to write to

## Returns

TRUE if operation was successful

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.4 barcodeCodeUpdateFirmware:data:error:()**

```
- (BOOL) barcodeCodeUpdateFirmware:
    (NSString *) name
    data:(NSData *) data
    error:(NSError **) error
```

Performs firmware update on the Code 2D barcode engines.

Barcode update can take very long time, it is best to call this function from a thread and update the user interface when firmwareUpdateProgress delegate is called

**Parameters**

<i>name</i>	the exact name of the firmware file
<i>data</i>	firmware file data to load
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.5 barcodeEngineCheckReady:error:()**

```
- (BOOL) barcodeEngineCheckReady:
    (BOOL *) ready
    error:(NSError **) error
```

Performs a check if the barcode engine is ready to operate.

**Parameters**

<i>ready</i>	TRUE if the engine is ready to operate, FALSE otherwise
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

### 2.6.2.6 barcodeEngineResetToDefaults:()

```
- (BOOL) barcodeEngineResetToDefaults:
    (NSError **) error
```

Performs factory reset of the barcode module.

This function is taxing, slow and should not be called often, emergency use only.

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.6.2.7 barcodeGetBeepOnReady:error:()

```
- (BOOL) barcodeGetBeepOnReady:
    (BOOL *) enabled
    error:(NSError **) error
```

Returns if beeping upon barcode engine start is enabled This setting is persistent and can be set only once.

#### Parameters

<i>enabled</i>	pointer to the current setting value that will be filled upon successful execution
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.6.2.8 barcodeGetScanButtonMode:error:()

```
- (BOOL) barcodeGetScanButtonMode:
    (int *) mode
    error:(NSError **) error
```

Returns the current scan button mode.

See setScanButtonMode for more detailed description. This setting is not persistent and is best to configure it upon connect.

**Parameters**

<i>mode</i>	returns scan button mode, one of the:	
	BUTTON_DISABLED	Scan button will become inactive
	BUTTON_ENABLED	Scan button will trigger barcode scan when pressed
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.9 barcodeGetScanMode:error:()**

```
- (BOOL) barcodeGetScanMode:
    (SCAN_MODES *) mode
    error:(NSError **) error
```

Returns the current scan mode.

This setting is not persistent and is best to configure it upon connect.

**Parameters**

<i>mode</i>	returns scanning mode, one of the MODE_* constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.10 barcodeGetTypeMode:error:()**

```
- (BOOL) barcodeGetTypeMode:
    (int *) mode
    error:(NSError **) error
```

Returns the current barcode type mode.

See setBarcodeTypeMode for more detailed description. This setting will not persist.

## Parameters

<i>mode</i>	returns barcode type mode, one of the:	
	BARCODE_TYPE_DEFAULT	default barcode types, listed in BARCODES enumeration
	BARCODE_TYPE_EXTENDED	extended barcode types, listed in BARCODES_EX enumeration
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.6.2.11 barcodeGetUVLights:error:()

```
- (BOOL) barcodeGetUVLights:
    (BOOL *) enabled
    error:(NSError **) error
```

Returns if the UV lights upon scanning are enabled This setting is not persistent and is best to configure it upon connect.

## Parameters

<i>enabled</i>	pointer to the current setting value that will be filled upon successful execution
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.6.2.12 barcodeHoneywellSetInitString:error:()

```
- (BOOL) barcodeHoneywellSetInitString:
    (NSString *) data
    error:(NSError **) error
```

Allows for a custom initialization data to be sent to the Honeywell barcode engine.

The data is sent directly, if the barcode is currently powered on, and every time it gets initialized. The setting does persists, but you can call it many times without wearing the flash

**Parameters**

<i>data</i>	barcode engine initialization string (consult barcode engine manual, serial commands)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.13 barcodeIntermecQuery:error:()**

```
- (NSData *) barcodeIntermecQuery:
    (NSData *) command
    error:(NSError **) error
```

Sends a custom command to the barcode engine and receives a reply.

**Parameters**

<i>command</i>	command data (consult barcode engine manual). You must only pass the data field, the header and checksum are automatically calculated
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

response data, if function succeeded, nil otherwise. Response is stripped of headers and checksum, only the real data is provided

**2.6.2.14 barcodeIntermecSetInitData:error:()**

```
- (BOOL) barcodeIntermecSetInitData:
    (NSData *) data
    error:(NSError **) error
```

Allows for a custom initialization string to be sent to the Intermec barcode engine.

The data is sent directly, if the barcode is currently powered on, and every time it gets initialized. The setting does not persists, so it is best this command is called upon new connection.

**Parameters**

<i>data</i>	barcode engine initialization data (consult barcode engine manual)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information



**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.15 barcodeIntermecUpdateFirmware:error:()**

```
- (BOOL) barcodeIntermecUpdateFirmware:
    (NSData *) firmwareData
    error:(NSError **) error
```

Performs firmware update on Intermec barcode engines.

Barcode update can take very long time, it is best to call this function from a thread and update the user interface when firmwareUpdateProgress delegate is called.

**Warning**

Interrupting Intermec update WILL brick the engine!

**Parameters**

<i>firmwareData</i>	firmware file data to load
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.16 barcodeNewlandQuery:error:()**

```
- (NSData *) barcodeNewlandQuery:
    (NSData *) command
    error:(NSError **) error
```

Sends a custom command to the barcode engine and receives a reply.

**Parameters**

<i>command</i>	command data (consult barcode engine manual). You must only pass the data field, the header and checksum are automatically calculated
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

response data, if function succeeded, nil otherwise. Response is stripped of headers and checksum, only the real data is provided

**2.6.2.17 barcodeNewlandSetInitString:error:()**

```
- (BOOL) barcodeNewlandSetInitString:
    (NSString *) data
    error:(NSError **) error
```

Allows for a custom initialization string to be sent to the Newland barcode engine.

The string is sent directly, if the barcode is currently powered on, and every time it gets initialized. The settings does persists and are stored in barcode module's flash, but the is written only upon change, so it is safe to repeatedly call this function on every connect.

**Parameters**

<i>data</i>	barcode engine initialization data (consult barcode engine manual)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.18 barcodeNewlandUpdateFirmware:error:()**

```
- (BOOL) barcodeNewlandUpdateFirmware:
    (NSData *) firmwareData
    error:(NSError **) error
```

Performs firmware update on the newland barcode engines.

Barcode update can take very long time, it is best to call this function from a thread and update the user interface when firmwareUpdateProgress delegate is called

**Parameters**

<i>firmwareData</i>	firmware file data to load
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.19 barcodeOpticonGetIdent:()**

```
- (NSString *) barcodeOpticonGetIdent:
    (NSError **) error
```

Reads barcode engine's identification.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

opticon engine ident string if function succeeded, nil otherwise

**2.6.2.20 barcodeOpticonSetInitString:error:()**

```
- (BOOL) barcodeOpticonSetInitString:
    (NSString *) data
    error:(NSError **) error
```

Allows for a custom initialization string to be sent to the Opticon barcode engine.

The string is sent directly, if the barcode is currently powered on, and every time it gets initialized. The setting does not persists, so it is best this command is called upon new connection.

**Parameters**

<i>data</i>	barcode engine initialization data (consult barcode engine manual)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.21 barcodeOpticonSetParams:saveToFlash:error:()**

```
- (BOOL) barcodeOpticonSetParams:
    (NSString *) data
```

```
saveToFlash:(BOOL) saveToFlash
error:(NSError **) error
```

Sends configuration parameters directly to the opticon barcode engine.

Use this function with EXTREME care, you can easily render your barcode engine useless. Refer to the barcode engine documentation on supported commands.

The function encapsulates the data with the ESC and CR so you don't have to send them. It optionally sends Z2 after the command to ensure settings are stored in the flash.

You can send multiple parameters with a single call if you format them as follows:

- commands that take 2 symbols can be sent without any delimiters, like: "C1C2C3"
- commands that take 3 symbols should be prefixed by [, like: "C1[C2AC3" (in this case commands are C1, C2A and C3)
- commands that take 4 symbols should be prefixed by ], like: "C1C2]C3AB" (in this case commands are C1, C2 and C3AB)

#### Parameters

<i>data</i>	command string
<i>saveToFlash</i>	if TRUE, command also saves the settings to flash. Saving setting is slower, so should be in ideal case executed only once and the program to remember it. The scanner's power usually gets cut when device goes to sleep - 5 seconds of idle time, so any non-stored to flash settings are lost, but if barcodeEnginePowerControl:TRUE is used on 2D engine, then even non-saved to flash settings will persist until device disconnects (iOS goes to sleep, physical disconnect)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.6.2.22 barcodeOpticonUpdateFirmware:bootLoader:error:()

```
- (BOOL) barcodeOpticonUpdateFirmware:
    (NSData *) firmwareData
    bootLoader:(BOOL) bootLoader
    error:(NSError **) error
```

Performs firmware update on the opticon 2D barcode engines.

Barcode update can take very long time, it is best to call this function from a thread and update the user interface when firmwareUpdateProgress delegate is called

## Parameters

<i>firmwareData</i>	firmware file data to load
<i>bootLoader</i>	TRUE if you are going to update bootloader, FALSE if normal firmware
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.6.2.23 barcodeSetBeepOnReady:error:()

```
- (BOOL) barcodeSetBeepOnReady:
    (BOOL) enabled
    error:(NSError **) error
```

Enable or disable short double sound when barcode engine becomes operational and is ready to scan.

This feature is only supported in Linea devices featuring zebra engine This setting is persistent and can be set only once

## Parameters

<i>enabled</i>	true or false
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.6.2.24 barcodeSetScanBeep:volume:beepData:length:error:()

```
- (BOOL) barcodeSetScanBeep:
    (BOOL) enabled
    volume:(int) volume
    beepData:(const int *) data
    length:(int) length
    error:(NSError **) error
```

Sets the sound, which is used upon successful barcode scan.

This setting is not persistent and is best to configure it upon connect.

## Note

A sample beep containing of 2 tones, each with 400ms duration, first one 2000Hz and second - 5000Hz will look int beepData[]={2000,400,5000,400}

**Parameters**

<i>enabled</i>	turns on or off beeping
<i>volume</i>	controls the volume (0-100). Currently have no effect
<i>data</i>	an array of integer values specifying pairs of tone(Hz) and duration(ms).
<i>length</i>	length in bytes of beepData array
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.25 barcodeSetScanButtonMode:error:()**

```
- (BOOL) barcodeSetScanButtonMode:
    (int) mode
    error:(NSError **) error
```

Sets scan button mode.

This setting is not persistent and is best to configure it upon connect.

**Parameters**

<i>mode</i>	button mode, one of the:	
	BUTTON_DISABLED	Scan button will become inactive
	BUTTON_ENABLED	Scan button will trigger barcode scan when pressed
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.26 barcodeSetScanMode:error:()**

```
- (BOOL) barcodeSetScanMode:
    (SCAN_MODES) mode
    error:(NSError **) error
```

Sets barcode engine scan mode.

This setting is not persistent and is best to configure it upon connect.

## Parameters

<i>mode</i>	scanning mode, one of the <code>MODE_*</code> constants
<i>error</i>	pointer to <code>NSError</code> object, where error information is stored in case function fails. You can pass <code>nil</code> if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

**2.6.2.27 barcodeSetTypeMode:error:()**

```
- (BOOL) barcodeSetTypeMode:
    (int) mode
    error:(NSError **) error
```

Sets barcode type mode.

Barcode type can be returned from the default list (listed in `BARCODES`), extended one (listed in `BARCODES_EX`) or ISO/AIM list. The extended one is superset to the default, so current programs will be mostly unaffected if they switch from default to extended (with the exception of barcodes like UPC-A and UPC-E, which will be returned as UPC in the default list, but proper types in the extended. This setting will not persists.

## Parameters

<i>mode</i>	barcode type mode, one of the:	
	BARCODE_TYPE_DEFAULT (default)	default barcode types, listed in <code>BARCODES</code> enumeration
	BARCODE_TYPE_EXTENDED	extended barcode types, listed in <code>BARCODES_EX</code> enumeration
<i>error</i>	pointer to <code>NSError</code> object, where error information is stored in case function fails. You can pass <code>nil</code> if you don't want that information	

## Returns

TRUE if function succeeded, FALSE otherwise

**2.6.2.28 barcodeSetUPCZeroStrip:error:()**

```
- (BOOL) barcodeSetUPCZeroStrip:
    (BOOL) enabled
    error:(NSError **) error
```

Enables/disables UPC-A front 0 (USA country code) trimming.

By default it is enabled

**Note**

While this function disables SDK code, the barcode engines by default (usually) also remove this 0, so you need to actually configure the engine too in order to receive the full barcode

**Parameters**

<i>enabled</i>	enable/disable 0 strip
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.29 barcodeSetUVLights:error:()**

```
- (BOOL) barcodeSetUVLights:
    (BOOL) enabled
    error:(NSError **) error
```

Enable or disable UV lights when scanning.

This feature is only supported in Linea devices This setting is not persistent and is best to configure it upon connect.

**Parameters**

<i>enabled</i>	true or false
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.30 barcodeStartScan:()**

```
- (BOOL) barcodeStartScan:
    (NSError **) error
```

Starts barcode engine.

In single scan mode the laser will be on until barcode is successfully read, the timeout elapses (set via call to setScanTimeout) or if stopScan is called. In multi scan mode the laser will stay on even if barcode is successfully read allowing series of barcodes to be scanned within a single read session. The scanning will stop if no barcode is scanned in the timeout interval (set via call to setScanTimeout) or if stopScan is called.



## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

TRUE if function succeeded, FALSE otherwise

**2.6.2.31 barcodeStopScan():**

```
- (BOOL) barcodeStopScan:
    (NSError **) error
```

Stops ongoing scan started with startScan.

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

TRUE if function succeeded, FALSE otherwise

**2.6.2.32 barcodeType2Text():**

```
- (NSString *) barcodeType2Text:
    (int) barcodeType
```

Helper function to return string name of barcode type.

## Parameters

<i>barcodeType</i>	barcode type returned from scanBarcode
--------------------	--

## Returns

barcode type name

**2.6.2.33 barcodeZebraGetVersion:()**

```
- (NSString *) barcodeZebraGetVersion:
    (NSError **) error
```

**2.6.2.34 barcodeZebraSetInitData:error:()**

```
- (BOOL) barcodeZebraSetInitData:
    (NSData *) data
    error:(NSError **) error
```

Allows for a custom initialization data to be sent to the zebra barcode engine.

The data is sent directly, if the barcode is currently powered on, and every time it gets initialized. The setting does not persists, so it is best this command is called upon new connection with Linea.

**Parameters**

<i>data</i>	barcode engine initialization data (consult barcode engine manual)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.6.2.35 barcodeZebraSetParam:value:permanent:error:()**

```
- (BOOL) barcodeZebraSetParam:
    (int) param
    value:(NSData *) value
    permanent:(BOOL) permanent
    error:(NSError **) error
```

**2.6.2.36 barcodeZebraUpdateFirmware:error:()**

```
- (BOOL) barcodeZebraUpdateFirmware:
    (NSData *) firmwareData
    error:(NSError **) error
```

Performs firmware update on zebra barcode engines.

Barcode update can take very long time, it is best to call this function from a thread and update the user interface when firmwareUpdateProgress delegate is called

**Parameters**

<i>firmwareData</i>	firmware file data to load
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

## 2.7 Bluetooth Functions

Functions to work with the built-in bluetooth module.

### Functions

- (BOOL) - [DTDevices::btDiscoverSupportedDevicesInBackground:maxTime:filter:error:](#)  
*Performs background discovery of nearby supported bluetooth devices.*
- (BOOL) - [DTDevices::btDiscoverDevicesInBackground:maxTime:codTypes:error:](#)  
*Performs background discovery of the nearby bluetooth devices.*
- (BOOL) - [DTDevices::btDiscoverPrintersInBackground:maxTime:error:](#)  
*Performs background discovery of supported printers.*
- (BOOL) - [DTDevices::btDiscoverPrintersInBackground:](#)  
*Performs background discovery of supported printers.*
- (BOOL) - [DTDevices::btDiscoverPinpadsInBackground:maxTime:error:](#)  
*Performs background discovery of supported printers.*
- (BOOL) - [DTDevices::btDiscoverPinpadsInBackground:](#)  
*Performs background discovery of supported printers.*
- (BOOL) - [DTDevices::btConnect:pin:error:](#)  
*Tries to connect to remote device.*
- (BOOL) - [DTDevices::btDisconnect:error:](#)  
*Disconnects from remote device.*
- (BOOL) - [DTDevices::btConnectSupportedDevice:pin:error:](#)  
*Tries to connect to supported bluetooth device.*
- (BOOL) - [DTDevices::btWrite:length:error:](#)  
*Sends data to the connected remote device.*
- (BOOL) - [DTDevices::btWrite:error:](#)  
*Sends data to the connected remote device.*
- (int) - [DTDevices::btRead:length:timeout:error:](#)  
*Tries to read data from the connected remote device for specified timeout.*
- (NSString \*) - [DTDevices::btReadLine:error:](#)  
*Tries to read string data, ending with CR/LF up to specifed timeout.*
- (BOOL) - [DTDevices::btEnableWriteCaching:error:](#)  
*Enables or disables write caching on the bluetooth stream.*
- (NSArray< NSString \* > \*) - [DTDevices::btDiscoverDevices:maxTime:codTypes:error:](#)  
*Performs synchronous discovery of the nearby bluetooth devices.*
- (NSString \*) - [DTDevices::btGetDeviceName:error:](#)  
*Queries device name given the address.*
- (BOOL) - [DTDevices::btSetDataNotificationMaxTime:maxLength:sequenceData:error:](#)  
*Sets the conditions to fire the NSStreamEventHasBytesAvailable event on bluetooth streams.*
- (BOOL) - [DTDevices::btSetInitData:error:](#)  
*Sets initialization data for the bluetooth module.*
- (BOOL) - [DTDevices::btListenForDevices:discoverable:localName:cod:error:](#)  
*Initiates/kills listen for incoming bluetooth connections.*
- (NSString \*) - [DTDevices::btGetLocalAddress:](#)  
*Retrieves local bluetooth address, this is the address that Linea will report to bluetooth discovery requests.*
- (BOOL) - [DTDevices::btConfirmPassKey:error:](#)  
*Confirms a passkey request sent upon connection.*
- (BOOL) - [DTDevices::btFirmwareUpdate:additionalData:error:](#)
- (NSString \*) - [DTDevices::btGetFirmwareVersion:](#)

- Returns bluetooth module firmware version as string.*
- (NSArray< CBPeripheral \* > \*) - [DTDevices::btleDiscoverSupportedDevices:stopOnFound:error:](#)  
*Performs synchronous bluetooth LE device discovery, filtering only devices that the SDK supports - printers, pinpads, lineas, etc.*
- (BOOL) - [DTDevices::btleDiscoverStop](#)  
*Cancel running bluetooth LE discovery process.*
- (BOOL) - [DTDevices::btleConnectToDevice:error:](#)  
*Connects to supported bluetooth LE device and lets the SDK handle it.*
- (BOOL) - [DTDevices::btleConnectToDeviceAndGetStreams:error:](#)  
*Connects to generic bluetooth LE device and gets communication streams to it so you can directly control it.*
- (BOOL) - [DTDevices::btleDisconnect:error:](#)  
*Disconnects from a connected bluetooth LE device.*
- (CBPeripheral \*) - [DTDevices::btleGetKnownDeviceWithUUID:error:](#)  
*Searches through paired bluetooth LE devices and return the one matching the UUID provided.*

## Properties

- NSString \* [DTDevices::btInputStream](#)  
*Bluetooth input stream, you can use it after connecting with btConnect.*
- NSString \* [DTDevices::btOutputStream](#)  
*Bluetooth output stream, you can use it after connecting with btConnect.*
- NSArray< NSString \* > \* [DTDevices::btConnectedDevices](#)  
*Contains bluetooth addresses of the currently connected bluetooth devices or empty array if no connected devices are found.*
- NSString \* [DTDevices::btleInputStream](#)  
*BluetoothLE input stream, you can use it after connecting with btleConnectToDeviceAndGetStreams.*
- NSString \* [DTDevices::btleOutputStream](#)  
*Bluetooth output stream, you can use it after connecting with btleConnectToDeviceAndGetStreams.*
- NSArray< CBPeripheral \* > \* [DTDevices::btleConnectedDevices](#)  
*Contains currently connected bluetooth LE devices or empty array if no connected devices are found.*

### 2.7.1 Detailed Description

Functions to work with the built-in bluetooth module.

### 2.7.2 Function Documentation

#### 2.7.2.1 btConfirmPassKey:error:()

```
- (BOOL) btConfirmPassKey:
    (BOOL) success
    error:(NSError **) error
```

Confirms a passkey request sent upon connection.

#### Note

Call this function only right after receiving passkey event

**Parameters**

<i>success</i>	the result of passkey comparison, sending true will result in connection being established, false will break it
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.2 btConnect:pin:error:()**

```
- (BOOL) btConnect:
    (NSString *) address
    pin:(NSString *) pin
    error:(NSError **) error
```

Tries to connect to remote device.

Once connection is established, use bluetooth streams to read/write to the remote device.

**Note**

active connection with remote device will be broken

**Parameters**

<i>address</i>	bluetooth address returned from btDiscoverDevices/btDiscoverPrinters
<i>pin</i>	PIN code if needed, or nil to try unencrypted connection
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.3 btConnectSupportedDevice:pin:error:()**

```
- (BOOL) btConnectSupportedDevice:
    (NSString *) address
    pin:(NSString *) pin
    error:(NSError **) error
```

Tries to connect to supported bluetooth device.

Supported devices are the ones the sdk has built-in support for - printers and pinpads. If successful, additional functions will become available and feature notifications will be sent

**Note**

active connection with remote device will be broken

**Parameters**

<i>address</i>	bluetooth address returned from <code>btDiscoverSupportedDevicesInBackground/btDiscoverPrintersInBackground</code>
<i>pin</i>	PIN code if needed, or nil to try unencrypted connection
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.4 btDisconnect:error:()**

```
- (BOOL) btDisconnect:
    (NSString *) address
    error:(NSError **) error
```

Disconnects from remote device.

**Parameters**

<i>address</i>	bluetooth address returned from <code>btDiscoverDevices/btDiscoverPrinters</code>
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.5 btDiscoverDevices:maxTime:codTypes:error:()**

```
- (NSArray<NSString *> *) btDiscoverDevices:
    (int) maxDevices
    maxTime:(double) maxTime
    codTypes:(int) codTypes
    error:(NSError **) DEPRECATED_ATTRIBUTE
```

Performs synchronous discovery of the nearby bluetooth devices.

Implemented for compatibility only!

**Deprecated** This function is not recommended to be called on the main thread, use `btDiscoverDevicesInBackground` instead

**Note**

this function cannot be called once connection to remote device was established

**Parameters**

<i>maxDevices</i>	the maximum results to return
<i>maxTime</i>	the max time to discover, in seconds. Actual time may vary.
<i>codTypes</i>	bluetooth Class Of Device to look for or 0 to search for all bluetooth devices
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

array of strings of bluetooth addresses if function succeeded, nil otherwise

**Parameters**

<i>DEPRECATED_ATTRIBUTE</i>	This function is deprecated
-----------------------------	-----------------------------

**2.7.2.6 btDiscoverDevicesInBackground:maxTime:codTypes:error:()**

```
- (BOOL) btDiscoverDevicesInBackground:
    (int) maxDevices
    maxTime:(double) maxTime
    codTypes:(int) codTypes
    error:(NSError **) error
```

Performs background discovery of the nearby bluetooth devices.

The discovery status and devices found will be sent via delegate notifications

**Note**

active connection with remote device will be broken

**Parameters**

<i>maxDevices</i>	the maximum results to return
<i>maxTime</i>	the max time to discover, in seconds. Actual time may vary.
<i>codTypes</i>	bluetooth Class Of Device to look for or 0 to search for all bluetooth devices
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise



### 2.7.2.7 `btDiscoverPinpadsInBackground:()`

```
- (BOOL) btDiscoverPinpadsInBackground:
    (NSError **) error
```

Performs background discovery of supported printers.

These include MPED-400 and PPAD1. The discovery status and devices found will be sent via delegate notifications

#### Note

active connection with remote device will be broken

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.7.2.8 `btDiscoverPinpadsInBackground:maxTime:error:()`

```
- (BOOL) btDiscoverPinpadsInBackground:
    (int) maxDevices
    maxTime:(double) maxTime
    error:(NSError **) error
```

Performs background discovery of supported printers.

These include MPED-400 and PPAD1. The discovery status and devices found will be sent via delegate notifications

#### Note

active connection with remote device will be broken

#### Parameters

<i>maxDevices</i>	the maximum results to return, default is 4
<i>maxTime</i>	the max time to discover, in seconds. Actual time may vary.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.7.2.9 `btDiscoverPrintersInBackground:()`

```
- (BOOL) btDiscoverPrintersInBackground:
    (NSError **) error
```

Performs background discovery of supported printers.

These include PP-60, DPP-250, DPP-350, SM-112, DPP-450. The discovery status and devices found will be sent via delegate notifications

#### Note

active connection with remote device will be broken

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.7.2.10 `btDiscoverPrintersInBackground:maxTime:error:()`

```
- (BOOL) btDiscoverPrintersInBackground:
    (int) maxDevices
    maxTime:(double) maxTime
    error:(NSError **) error
```

Performs background discovery of supported printers.

These include PP-60, DPP-250, DPP-350, SM-112, DPP-450. The discovery status and devices found will be sent via delegate notifications

#### Note

active connection with remote device will be broken

#### Parameters

<i>maxDevices</i>	the maximum results to return, default is 4
<i>maxTime</i>	the max time to discover, in seconds. Actual time may vary.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.11 btDiscoverSupportedDevicesInBackground:maxTime:filter:error:()**

```
- (BOOL) btDiscoverSupportedDevicesInBackground:
    (int) maxDevices
    maxTime:(double) maxTime
    filter:(BLUETOOTH_FILTER) filter
    error:(NSError **) error
```

Performs background discovery of nearby supported bluetooth devices.

Supported devices are the ones some of the sdk has built-in support for - printers and pinpads. The discovery status and devices found will be sent via delegate notifications

**Note**

this function cannot be called once connection to remote device was established

**Parameters**

<i>maxDevices</i>	the maximum results to return
<i>maxTime</i>	the max time to discover, in seconds. Actual time may vary.
<i>filter</i>	filter of which devices to discover, a combination of one or more of BLUETOOTH_FILTER_* constants or BLUETOOTH_FILTER_ALL to get all supported devices
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.12 btEnableWriteCaching:error:()**

```
- (BOOL) btEnableWriteCaching:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables write caching on the bluetooth stream.

When enabled the writes gets cached and send on bigger chunks, reducing substantially the time taken, if you are sending lot of data in small parts. Write caching has negative effect on the speed if your bluetooth communication is based on request/response format or packets, in this case every write operation will get delayed, resulting in very poor throughput.

## Parameters

<i>enabled</i>	enable or disable write caching, by default it is disabled
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

2.7.2.13 `btFirmwareUpdate:additionalData:error:()`

```
- (BOOL) btFirmwareUpdate:
    (NSData *) firmware
    additionalData:(NSData *) additionalData
    error:(NSError **) error
```

2.7.2.14 `btGetDeviceName:error:()`

```
- (NSString *) btGetDeviceName:
    (NSString *) address
    error:(NSError **) DEPRECATED_ATTRIBUTE
```

Queries device name given the address.

Implemented for compatibility only!

**Deprecated** This function complements the `btDiscoverDevices/btDiscoverPrinters` and as such is not recommended, use `btDiscoverDevicesInBackground` instead

## Note

this function cannot be called once connection to remote device was established

## Parameters

<i>address</i>	bluetooth address returned from <code>btDiscoverDevices/btDiscoverPrinters</code>
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

bluetooth device name if function succeeded, nil otherwise

## Parameters

<i>DEPRECATED_ATTRIBUTE</i>	This function is deprecated
-----------------------------	-----------------------------

**2.7.2.15 btGetFirmwareVersion:()**

```
- (NSString *) btGetFirmwareVersion:
    (NSError **) error
```

Returns bluetooth module firmware version as string.

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

firmware version or nil if the function failed

**2.7.2.16 btGetLocalAddress:()**

```
- (NSString *) btGetLocalAddress:
    (NSError **) error
```

Retrieves local bluetooth address, this is the address that Linea will report to bluetooth discovery requests.

## Note

this function cannot be called once connection to remote device was established

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

bluetooth address if function succeeded, nil otherwise

**2.7.2.17 btleConnectToDevice:error:()**

```
- (BOOL) btleConnectToDevice:
    (CBPeripheral *) aPeripheral
    error:(NSError **) error
```

Connects to supported bluetooth LE device and lets the SDK handle it.

**Parameters**

<i>aPeripheral</i>	the peripheral class taken either from bluetooth LE discovery process or already paired device via <code>btleGetKnownDeviceWithUUID</code> call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.18 btleConnectToDeviceAndGetStreams:error:()**

```
- (BOOL) btleConnectToDeviceAndGetStreams:
    (CBPeripheral *) aPeripheral
    error:(NSError **) error
```

Connects to generic bluetooth LE device and gets communication streams to it so you can directly control it.

If successful, you can use `btleInputStream` and `btleOutputStream` to communicate with the device. `bluetoothLEDeviceConnected` notification will also be sent

**Parameters**

<i>aPeripheral</i>	the peripheral class taken either from bluetooth LE discovery process or already paired device via <code>btleGetKnownDeviceWithUUID</code> call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.19 btleDisconnect:error:()**

```
- (BOOL) btleDisconnect:
    (CBPeripheral *) aPeripheral
    error:(NSError **) error
```

Disconnects from a connected bluetooth LE device.

Call this function when you are done with the device, connected either via `btleConnectToDevice` or `btleConnectToDeviceAndGetStreams`

#### Parameters

<i>aPeripheral</i>	the peripheral class taken either from bluetooth LE discovery process or already paired device via <code>btleGetKnownDeviceWithUUID</code> call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.7.2.20 `btleDiscoverStop()`

```
- (BOOL) btleDiscoverStop
```

Cancels running bluetooth LE discovery process.

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.7.2.21 `btleDiscoverSupportedDevices:stopOnFound:error:()`

```
- (NSArray<CBPeripheral *> *) btleDiscoverSupportedDevices:
    (int) filter
    stopOnFound:(BOOL) stopOnFound
    error:(NSError **) error
```

Performs synchronous bluetooth LE device discovery, filtering only devices that the SDK supports - printers, pinpads, lineas, etc.

#### Parameters

<i>filter</i>	one of the <code>BLUETOOT_FILTER_*</code> constants
<i>stopOnFound</i>	if TRUE, stops when the first compatible supported device is found
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

device list or nil if function failed

**2.7.2.22 btleGetKnownDeviceWithUUID:error:()**

```
- (CBPeripheral *) btleGetKnownDeviceWithUUID:
    (NSUUID *) uuid
    error:(NSError **) error
```

Searches through paired bluetooth LE devices and return the one matching the UUID provided.

This functions is instant and preferred way to do it instead doing a full discover process

**Parameters**

<i>uuid</i>	the UUID of the device you want to get
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

peripheral class to be used in btleConnectToDevice or btleConnectToDeviceAndGetStreams if function succeeded, or nil if it failed

**2.7.2.23 btListenForDevices:discoverable:localName:cod:error:()**

```
- (BOOL) btListenForDevices:
    (BOOL) enabled
    discoverable:(bool) discoverable
    localName:(NSString *) localName
    cod:(uint32_t) cod
    error:(NSError **) error
```

Initiates/kills listen for incoming bluetooth connections.

Incoming connecton requests will be sent as delegate notifications

**Note**

this function cannot be called once connection to remote device was established

**Parameters**

<i>enabled</i>	if YES the bluetooth module will listen for incoming connections, NO disables this functionality
<i>discoverable</i>	if YES the module will be discoverable while waiting. Making the module non-discoverable means only devices, that know it's bluetooth address will be able to connect
<i>localName</i>	if discoverable, then this will be the name seen by the others
<i>cod</i>	Class Of Device, as per bluetooth documentation. Pass 0 if you don't want to send class of device
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information



**Returns**

TRUE if function succeeded, FALSE otherwise

**2.7.2.24 btRead:length:timeout:error:()**

```
- (int) btRead:
    (void *) data
    length:(int) length
    timeout:(double) timeout
    error:(NSError **) error
```

Tries to read data from the connected remote device for specified timeout.

**Note**

You can use bluetooth streams instead

**Parameters**

<i>data</i>	data buffer, where the result will be stored
<i>length</i>	maximum amount of bytes to wait for
<i>timeout</i>	maximim timeout in seconds to wait for data

**Returns**

the

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

actual number of bytes stored in the data buffer if function succeeded, -1 otherwise

**2.7.2.25 btReadLine:error:()**

```
- (NSString *) btReadLine:
    (double) timeout
    error:(NSError **) error
```

Tries to read string data, ending with CR/LF up to specifed timeout.

**Note**

You can use bluetooth streams instead

## Parameters

<i>timeout</i>	maximim timeout in seconds to wait for data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

string with the line read (can be empty string too) if function succeeded, nil otherwise

2.7.2.26 `btSetDataNotificationMaxTime:maxLength:sequenceData:error:()`

```
- (BOOL) btSetDataNotificationMaxTime:
    (double) maxTime
    maxLength:(int) maxLength
    sequenceData:(NSData *) sequenceData
    error:(NSError **) error
```

Sets the conditions to fire the NSSStreamEventHasBytesAvailable event on bluetooth streams.

If all special conditions are disabled, then the notification will be fired the moment data arrives. You can have multiple notifications active at the same time, for example maxBytes and maxTime.

## Parameters

<i>maxTime</i>	notification will be fired 'maxTime' seconds after the last byte arrives, passing 0 disables it. For example 0.1 means that 100ms after the last byte is received the notification will fire.
<i>maxLength</i>	notification will be fired after 'maxLength' data arrives, passing 0 disables it.
<i>sequenceData</i>	notification will be fired if the received data contains 'sequenceData', passing nil disables it.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

2.7.2.27 `btSetInitData:error:()`

```
- (BOOL) btSetInitData:
    (NSData *) data
    error:(NSError **) error
```

Sets initialization data for the bluetooth module.

For BT301/401 (pinpads) These are AT commands separated by 0x00, for example "AT+WRNAME=MYNAME↵ME↵↵↵AT+WRNAME=MYOTHERNAME↵↵↵" This data is persistent, you can send it multiple times and only if it is changed will result in restarting and reinit of the bluetooth module. The init data will also be set after master reset so it will persist.

## Parameters

<i>data</i>	bluetooth module specific initialization data or empty array for deleting init data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

2.7.2.28 `btWrite:error:()`

```
- (BOOL) btWrite:
    (NSString *) data
    error:(NSError **) error
```

Sends data to the connected remote device.

## Note

You can use bluetthooth streams instead

## Parameters

<i>data</i>	data string to write
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

2.7.2.29 `btWrite:length:error:()`

```
- (BOOL) btWrite:
    (void *) data
    length:(int) length
    error:(NSError **) error
```

Sends data to the connected remote device.

## Note

You can use bluetthooth streams instead

**Parameters**

<i>data</i>	data bytes to write
<i>length</i>	the length of the data in the buffer
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

## 2.7.3 Properties

### 2.7.3.1 `btConnectedDevices`

```
- (NSArray<NSString *>*) btConnectedDevices [read], [atomic], [assign]
```

Contains bluetooth addresses of the currently connected bluetooth devices or empty array if no connected devices are found.

### 2.7.3.2 `btInputStream`

```
- (NSInputStream*) btInputStream [read], [atomic], [assign]
```

Bluetooth input stream, you can use it after connecting with `btConnect`.

See `NSInputStream` documentation.

### 2.7.3.3 `btleConnectedDevices`

```
- (NSArray<CBPeripheral *>*) btleConnectedDevices [read], [atomic], [assign]
```

Contains currently connected bluetooth LE devices or empty array if no connected devices are found.

### 2.7.3.4 `btleInputStream`

```
- (NSInputStream*) btleInputStream [read], [atomic], [assign]
```

BluetoothLE input stream, you can use it after connecting with `btleConnectToDeviceAndGetStreams`.

See `NSInputStream` documentation.

### 2.7.3.5 `btleOutputStream`

```
- (NSOutputStream*) btleOutputStream [read], [atomic], [assign]
```

Bluetooth output stream, you can use it after connecting with `btleConnectToDeviceAndGetStreams`.

See `NSOutputStream` documentation.

### 2.7.3.6 `btOutputStream`

```
- (NSOutputStream*) btOutputStream [read], [atomic], [assign]
```

Bluetooth output stream, you can use it after connecting with `btConnect`.

See `NSOutputStream` documentation.

## 2.8 External Serial Port Functions

`defined(NO_BT) || !defined(NO_BTLE)`

### Macros

- `#define PARITY_NONE 0`  
*No parity.*
- `#define PARITY_EVEN 1`  
*Even parity.*
- `#define PARITY_ODD 2`  
*Odd parity.*
- `#define DATABITS_7 1`  
*7 data bits*
- `#define DATABITS_8 0`  
*8 data bits*
- `#define STOPBITS_1 0`  
*1 stop bits*
- `#define STOPBITS_2 1`  
*2 stop bits*
- `#define FLOW_NONE 0`  
*No flow control.*
- `#define FLOW_RTS_CTS 1`  
*RTS/CTS hardware flow control.*
- `#define FLOW_DTR_DSR 2`  
*DSR/DTR hardware flow control.*
- `#define FLOW_XON_XOFF 3`  
*XON/XOFF software flow control.*

### Functions

- (BOOL) - `DTDevices::extOpenSerialPort:baudRate:parity:dataBits:stopBits:flowControl:error:`  
*Opens the external serial port with specified settings.*
- (BOOL) - `DTDevices::extCloseSerialPort:error:`  
*Closes the external serial port opened with `extOpenSerialPort`.*
- (BOOL) - `DTDevices::extWriteSerialPort:data:error:`  
*Sends data to the connected remote device via serial port.*
- (NSData \*) - `DTDevices::extReadSerialPort:length:timeout:error:`  
*Reads data from the connected remote device via serial port.*

#### 2.8.1 Detailed Description

`defined(NO_BT) || !defined(NO_BTLE)`

Functions to work with Linea Tab's external serial port

## 2.8.2 Macro Definition Documentation

### 2.8.2.1 DATABITS\_7

```
#define DATABITS_7 1
```

7 data bits

### 2.8.2.2 DATABITS\_8

```
#define DATABITS_8 0
```

8 data bits

### 2.8.2.3 FLOW\_DTR\_DSR

```
#define FLOW_DTR_DSR 2
```

DSR/DTR hardware flow control.

### 2.8.2.4 FLOW\_NONE

```
#define FLOW_NONE 0
```

No flow control.

### 2.8.2.5 FLOW\_RTS\_CTS

```
#define FLOW_RTS_CTS 1
```

RTS/CTS hardware flow control.

### 2.8.2.6 FLOW\_XON\_XOFF

```
#define FLOW_XON_XOFF 3
```

XON/XOFF software flow control.

### 2.8.2.7 PARITY\_EVEN

```
#define PARITY_EVEN 1
```

Even parity.

### 2.8.2.8 PARITY\_NONE

```
#define PARITY_NONE 0
```

No parity.

### 2.8.2.9 PARITY\_ODD

```
#define PARITY_ODD 2
```

Odd parity.

### 2.8.2.10 STOPBITS\_1

```
#define STOPBITS_1 0
```

1 stop bits

### 2.8.2.11 STOPBITS\_2

```
#define STOPBITS_2 1
```

2 stop bits

## 2.8.3 Function Documentation

### 2.8.3.1 extCloseSerialPort:error:()

```
- (BOOL) extCloseSerialPort:
    (int) port
    error:(NSError **) error
```

Closes the external serial port opened with extOpenSerialPort.



## Parameters

<i>port</i>	the port number, currently only 1 is used
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

**2.8.3.2 extOpenSerialPort:baudRate:parity:dataBits:stopBits:flowControl:error:()**

```
- (BOOL) extOpenSerialPort:
    (int) port
    baudRate:(int) baudRate
    parity:(int) parity
    dataBits:(int) dataBits
    stopBits:(int) stopBits
    flowControl:(int) flowControl
    error:(NSError **) error
```

Opens the external serial port with specified settings.

## Parameters

<i>port</i>	the port number, currently only 1 is used
<i>baudRate</i>	serial baud rate
<i>parity</i>	serial parity, one of the PARITY_* constants (currently only PARITY_NONE is supported)
<i>dataBits</i>	serial data bits, one of the DATABITS_* constants (currently only DATABITS_8 is supported)
<i>stopBits</i>	serial stop bits, one of the STOPBITS_* constants (currently only STOPBITS_1 is supported)
<i>flowControl</i>	serial flow control, one of the FLOW_* constants (currently only FLOW_NONE is supported)
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

**2.8.3.3 extReadSerialPort:length:timeout:error:()**

```
- (NSData *) extReadSerialPort:
    (int) port
    length:(int) length
    timeout:(double) timeout
    error:(NSError **) error
```

Reads data from the connected remote device via serial port.

**Parameters**

<i>port</i>	the port number, currently only 1 is used
<i>length</i>	the maximum amount of data to read
<i>timeout</i>	timeout in seconds, passing 0 reads and returns the bytes currently in the buffer
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

NSData with bytes received if function succeeded, nil otherwise

**2.8.3.4 extWriteSerialPort:data:error:()**

```
- (BOOL) extWriteSerialPort:
    (int) port
    data:(NSData *) data
    error:(NSError **) error
```

Sends data to the connected remote device via serial port.

**Parameters**

<i>port</i>	the port number, currently only 1 is used
<i>data</i>	data bytes to write
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

## 2.9 TCP/IP Functions

Functions to work with the supported devices over the network.

### Functions

- (BOOL) - [DTDevices::tcpConnectSupportedDevice:error:](#)  
*Tries to connect to supported device over the network.*
- (BOOL) - [DTDevices::tcpDisconnect:error:](#)  
*Disconnects from remote device.*

### Properties

- NSArray< NSString \* > \* [DTDevices::tcpConnectedDevices](#)  
*Contains tcp addresses of the currently connected network devices or empty array if no connected devices are found.*

### 2.9.1 Detailed Description

Functions to work with the supported devices over the network.

### 2.9.2 Function Documentation

#### 2.9.2.1 tcpConnectSupportedDevice:error:()

```
- (BOOL) tcpConnectSupportedDevice:
    (NSString *) address
    error:(NSError **) error
```

Tries to connect to supported device over the network.

Supported devices are the ones the sdk has built-in support for - printers and pinpads. If successful, additional functions will become available and feature notifications will be sent

#### Note

active connection with remote device will be broken

#### Parameters

<i>address</i>	network address, either dns or IP. Optionally provide a port number separated by : i.e. address:port. Default port is 9100.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.9.2.2 tcpDisconnect:error:()**

```
- (BOOL) tcpDisconnect:
    (NSString *) address
    error:(NSError **) error
```

Disconnects from remote device.

**Parameters**

<i>address</i>	the address to disconnect from, the same one that was used to connect to tcpConnectConnectSupportedDevice
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.9.3 Properties****2.9.3.1 tcpConnectedDevices**

```
- (NSArray<NSString *>*) tcpConnectedDevices [read], [atomic], [assign]
```

Contains tcp addresses of the currently connected network devices or empty array if no connected devices are found.

## 2.10 Cryptographic & Security Functions

Starting from firmware 2.13, Linea provides strong cryptographic support for magnetic card data.

### Functions

- (NSData \*) - [DTDevices::cryptoRawGenerateRandomData:](#)  
*Generates 16 byte block of random numbers, required for some of the other crypto functions.*
- (BOOL) - [DTDevices::cryptoRawSetKey:encryptedData:keyVersion:keyFlags:error:](#)
- (BOOL) - [DTDevices::cryptoSetKey:key:oldKey:keyVersion:keyFlags:error:](#)  
*Used to store AES256 keys into Linea internal memory.*
- (BOOL) - [DTDevices::cryptoGetKeyVersion:keyVersion:error:](#)  
*Returns key version.*
- (NSData \*) - [DTDevices::cryptoRawAuthenticateDevice:error:](#)
- (BOOL) - [DTDevices::cryptoAuthenticateDevice:error:](#)
- (BOOL) - [DTDevices::cryptoRawAuthenticateHost:error:](#)
- (BOOL) - [DTDevices::cryptoAuthenticateHost:error:](#)
- (NSArray< [DTCertificateInfo](#) \* > \*) - [DTDevices::cryptoGetCertificatesInfo:](#)  
*Returns information about currently loaded certificates.*
- (BOOL) - [DTDevices::cryptoLoadCertificate:version:position:rootPosition:error:](#)  
*Loads PEM X509 certificate at specified slot.*

### 2.10.1 Detailed Description

Starting from firmware 2.13, Linea provides strong cryptographic support for magnetic card data.

The encryption is supported on all Linea devices, from software point of view they are all the same, but provide different levels of hardware/firmware security.

An overview of the security, provided by Linea (see each of the crypto functions for further detail):

Hardware/Firmware:

For magnetic card encryption Linea is using AES256, which is the current industry standard encryption algorithm. The encryption key resides in volatile, battery powered ram inside Linea's cpu (for Linea 1.5 onward) and is being lost if anyone tries to break in the Linea device in order to prevent the key from being stolen. Magnetic card data, along with device serial number and some random bytes (to ensure every packet will be different) are being sent to the iOS program in an encrypted way.

Software:

Currently there are 2 types of keys, that can be loaded into Linea:

- AUTHENTICATION KEY - used for device authentication (for example the program can lock itself to work with very specific Linea device) and encryption of the firmware

- **ENCRYPTION KEY** - used for magnetic card data encryption. To use msr encryption, you don't need to set the **AUTHENTICATION KEY**.

Keys: The keys can be set/changed in two ways:

1. Using plain key data - this method is easy to use, but less secure, as it relies on program running on iPod/iPhone to have the key inside, an attacker could compromise the system and extract the key from device's memory. Call `cryptoSetKey` to set the keys this way. If there is an existing key of the same type inside Linea, you have to pass it too.

2. Using encrypted key data - this method is harder to implement, but provides better security - the key data, encrypted with old key data is sent from a server in secure environment to the program, running on the iOS, then the program forwards it to the Linea. The program itself have no means to decrypt the data, so an attacker can't possibly extract the key. Refer to `cryptoSetKey` documentation for more detailed description of the loading process.

The initial loading of the keys should always be done in a secure environment.

Magnetic card encryption:

Once **ENCRYPTION KEY** is set, all magnetic card data gets encrypted, and is now sent via `magneticCard←→EncryptedData` instead. The `LineaDemo` program contains sample code to decrypt the data block and extract the contents - the serial number and track data.

As with keys, card data can be extracted on the iOS device itself (less secure, the application needs to have the key inside) or be sent to a secure server to be processed. Note, that the encrypted data contains Linea's serial number too, this can be used for Data Origin Verification, to be sure someone is not trying to mimic data, coming from another device.

Demo program: the sample program now have "Crypto" tab, where key management can be tested:

- New AES 256 key - type in the key you want to set (or change to)
- Old AES 256 key - type in the previous key, or leave blank if you set the key for the first time

[SET AUTHENTICATION KEY] and [SET ENCRYPTION KEY] buttons allow you to use the key info in the text fields above to set the key.

- Decryption key - type in the key, which the demo program will use to try to decrypt card data. This field should contain the **ENCRYPTION KEY**, or something random, if you want to test failed card data decryption.

## 2.10.2 Function Documentation

### 2.10.2.1 cryptoAuthenticateDevice:error:()

```
- (BOOL) cryptoAuthenticateDevice:
    (NSData *) key
    error:(NSError **) error
```

#### Note

Check out the `cryptoRawAuthenticateDevice` function, if you want to not use the key inside the mobile device.

Generates random data, uses the key to encrypt it, then encrypts the same data with the stored authentication key inside Linea and returns true if both data matches.

The idea: if a program wants to work with specific Linea device, it sets AES256 authentication key once, then on every connect the program uses `cryptoAuthenticateDevice` with that key. If Linea contains no key, or the key is different, the function will return FALSE. This does not block Linea from operation, what action will be taken if devices mismatch depends on the program.

#### Parameters

<i>key</i>	32 bytes AES256 key
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if if Linea contains the same authentication key, FALSE otherwise

### 2.10.2.2 cryptoAuthenticateHost:error:()

```
- (BOOL) cryptoAuthenticateHost:
    (NSData *) key
    error:(NSError **) error
```

#### Note

Check out the `cryptoRawAuthenticateHost` function, if you want to not use the key inside the mobile device.

Generates random data, uses the key to encrypt it, then sends to Linea to verify against it's internal authentication key. If both keys match, return value is TRUE. This function is used so that Linea knows a "real" device is currently connected, before allowing some functionality. Currently firmware update is protected by this function, once authentication key is set, you have to use it or `cryptoRawAuthenticateHost` before you attempt firmware update, or it will error out.

#### Parameters

<i>key</i>	32 bytes AES256 key
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if Linea contains the same authentication key, FALSE otherwise

**2.10.2.3 cryptoGetCertificatesInfo:()**

```
- (NSArray<DTCertificateInfo *> *) cryptoGetCertificatesInfo:
    (NSError **) error
```

Returns information about currently loaded certificates.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

an array of [DTCertificateInfo](#) classes or nil if the function failed

**2.10.2.4 cryptoGetKeyVersion:keyVersion:error:()**

```
- (BOOL) cryptoGetKeyVersion:
    (int) keyID
    keyVersion:(uint32_t *) keyVersion
    error:(NSError **) error
```

Returns key version.

Valid key ID:

- KEY\_AUTHENTICATION - if set, you can use authentication functions - `cryptoRawAuthenticateDevice` or `cryptoAuthenticateDevice`. Firmware updates will require authentication too
- KEY\_ENCRYPTION - if set, magnetic card data will come encrypted via `magneticCardEncryptedData` or `magneticCardEncryptedRawData`

**Parameters**

<i>keyID</i>	the key type to get version - KEY_AUTHENTICATION or KEY_ENCRYPTION
<i>keyVersion</i>	returns key version or 0 if the key is not present (key versions are available in firmware 2.43 or later)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information



**Returns**

TRUE if function succeeded, FALSE otherwise

**2.10.2.5 cryptoLoadCertificate:version:position:rootPosition:error:()**

```
- (BOOL) cryptoLoadCertificate:
    (NSString *) certificate
    version:(int) version
    position:(int) position
    rootPosition:(int) rootPosition
    error:(NSError **) error
```

Loads PEM X509 certificate at specified slot.

**Parameters**

<i>certificate</i>	PEM based X509 certificate
<i>version</i>	certificate version (unused)
<i>position</i>	position to load the certificate to, 0 is the ROOT slot and not replaceable once loaded
<i>rootPosition</i>	the certificate to verify the certificate with. Root certificate is assumed self-signed
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if certificate is accepted, FALSE otherwise

**2.10.2.6 cryptoRawAuthenticateDevice:error:()**

```
- (NSData *) cryptoRawAuthenticateDevice:
    (NSData *) randomData
    error:(NSError **) error
```

**Note**

RAW crypto functions are harder to use and require more code, but are created to allow no secret keys to reside on the device, but all the operations can be executed with data, sent from a secure server. See `cryptoAuthenticateDevice` if you plan to use the key in the mobile device.

Encrypts a 16 bytes block of random data with the stored authentication key and returns the result.

The idea: if a program wants to work with specific Linea device, it sets AES256 authentication key once, then on every connect the program generates random 16 byte block of data, encrypts it internally with the said key, then encrypts it with linea too and compares the result. If that Linea contains no key, or the key is different, the resulting data will totally differ from the one generated. This does not block Linea from operation, what action will be taken if devices mismatch depends on the program.

**Parameters**

<i>randomData</i>	16 bytes block of data (presumably random bytes)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

random data, encrypted with the Linea authentication key if function succeeded, nil otherwise

**2.10.2.7 cryptoRawAuthenticateHost:error:()**

```
- (BOOL) cryptoRawAuthenticateHost:
    (NSData *) encryptedRandomData
    error:(NSError **) error
```

**Note**

RAW crypto functions are harder to use and require more code, but are created to allow no secret keys to reside on the device, but all the operations can be executed with data, sent from a secure server. See cryptoAuthenticateHost if you plan to use the key in the mobile device.

Tries to decrypt random data, generated from cryptoRawGenerateRandomData with the stored internal authentication key and returns the result. This function is used so that Linea knows a "real" device is currently connected, before allowing some functionality. Currently firmware update is protected by this function, once authentication key is set, you have to use it or cryptoAuthenticateHost before you attempt firmware update, or it will error out.

The idea (considering the iOS device does not have the keys inside, but depends on server):

- (iOS program) generates random data using cryptoRawGenerateRandomData and sends to the server
- (Server) encrypts the random data with the same AES256 key that is in the Linea and sends back to the iOS program
- (iOS program) uses cryptoRawAuthenticateHost to authenticate with the data, function will error out if authentication fails.

**Parameters**

<i>encryptedRandomData</i>	16 bytes block of encrypted data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.10.2.8 cryptoRawGenerateRandomData:()**

```
- (NSData *) cryptoRawGenerateRandomData:
    (NSError **) error
```

Generates 16 byte block of random numbers, required for some of the other crypto functions.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

16 bytes of random numbers if function succeeded, nil otherwise

**2.10.2.9 cryptoRawSetKey:encryptedData:keyVersion:keyFlags:error:()**

```
- (BOOL) cryptoRawSetKey:
    (int) keyID
    encryptedData: (NSData *) encryptedData
    keyVersion: (uint32_t) keyVersion
    keyFlags: (uint32_t) keyFlags
    error: (NSError **) error
```

**Note**

RAW crypto functions are harder to use and require more code, but are created to allow no secret keys to reside on the device, but all the operations can be executed with data, sent from a secure server. See cryptoSetKey if you plan to use the key in the mobile device.

Used to store AES256 keys into Linea internal memory. Valid keys that can be set:

- KEY\_AUTHENTICATION - if set, you can use authentication functions - cryptoRawAuthenticateDevice or cryptoAuthenticateDevice. Firmware updates will require authentication too
- KEY\_ENCRYPTION - if set, magnetic card data will come encrypted via magneticCardEncryptedData or magneticCardEncryptedRawData

Generally the key loading process, using "Raw" commands, a program on the iOS device and a server which holds the keys will look similar to:

- (iOS program) calls cryptoRawGenerateRandomData to get 16 bytes block of random data and send these to the server
- (Server) creates byte array of 48 bytes consisting of: [RANDOM DATA: 16 bytes][KEY DATA: 32 bytes]
- (Server) if there is current encryption key set on the Linea (if you want to change existing key) the server encrypts the 48 bytes block with the OLD key
- (Server) sends the result data back to the program
- (iOS program) calls cryptoRawSetKey with KEY\_ENCRYPTION and the data it received from the server
- (Linea) tries to decrypt the key data if there was already key present, then extracts the key, verifies the random data and if everything is okay, sets the key

## Parameters

<i>keyID</i>	the key type to set - KEY_AUTHENTICATION or KEY_ENCRYPTION
<i>encryptedData</i>	- 48 bytes that consists of 16 bytes random numbers received via call to cryptoRawGenerateRandomData and 32 byte AES256 key. If there has been previous key of the same type, then all 48 bytes should be encrypted with it.
<i>keyVersion</i>	- the version of the key. On firmware versions less than 2.43 this parameter is ignored and key version is considered to be 0x00000000. Key version is useful for the program to determine what key is inside the head.
<i>keyFlags</i>	- optional key flags, supported on ver 2.58 and onward

- KEY\_AUTHENTICATION:

BIT 1	If set to 1, scanning barcodes, reading magnetic card and using the bluetooth module are locked and have to be unlocked with cryptoAuthenticateHost/cryptoRawAuthenticateHost upon every reinsert of the device
-------	---

- KEY\_ENCRYPTION: No flags are supported

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.10.2.10 cryptoSetKey:key:oldKey:keyVersion:keyFlags:error:()

```
- (BOOL) cryptoSetKey:
    (int) keyID
    key:(NSData *) key
    oldKey:(NSData *) oldKey
    keyVersion:(uint32_t) keyVersion
    keyFlags:(uint32_t) keyFlags
    error:(NSError **) error
```

Used to store AES256 keys into Linea internal memory.

Valid keys that can be set:

- KEY\_AUTHENTICATION - if set, you can use authentication functions - cryptoRawAuthenticateDevice or cryptoAuthenticateDevice. Firmware updates will require authentication too
- KEY\_ENCRYPTION - if set, magnetic card data will come encrypted via magneticCardEncryptedData or magneticCardEncryptedRawData

## Parameters

<i>keyID</i>	the key type to set - KEY_AUTHENTICATION or KEY_ENCRYPTION
--------------	--

## Parameters

<i>key</i>	32 bytes AES256 key to set
<i>oldKey</i>	32 bytes AES256 key that was previously used, or null if there was no previous key. The old key should match the new key, i.e. if you are setting KEY_ENCRYPTION, then you should pass the old KEY_ENCRYPTION.
<i>keyVersion</i>	- the version of the key. On firmware versions less than 2.43 this parameter is ignored and key version is considered to be 0x00000000. Key version is useful for the program to determine what key is inside the head.
<i>keyFlags</i>	- optional key flags, supported on ver 2.58 and onward

- KEY\_AUTHENTICATION:

BIT 1	If set to 1, scanning barcodes, reading magnetic card and using the bluetooth module are locked and have to be unlocked with <code>cryptoAuthenticateHost/cryptoRawAuthenticateHost</code> upon every reinsert of the device
-------	--

- KEY\_ENCRYPTION: No flags are supported

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.11 Trans Armor Functions

Functions to work with First Data Trans Armor implementation.

### Functions

- (BOOL) - [DTDevices::taSetMerchantID:error:](#)  
*Sets TransArmor Merchant ID to be used in card data encryption.*
- (NSString \*) - [DTDevices::taEncryptData:error:](#)  
*Encrypts data string in TransArmor RSA packet.*
- (BOOL) - [DTDevices::taSetBINRanges:error:](#)  
*Sets what cards to be encrypted, rejected or sent in plain.*
- (BOOL) - [DTDevices::taSetBINRangesEx:error:](#)
- (BOOL) - [DTDevices::taSetEncryptionModeForCard:forManual:includeSentinels:error:](#)  
*Defines how and what tracks will be encrypted.*

### 2.11.1 Detailed Description

Functions to work with First Data Trans Armor implementation.

### 2.11.2 Function Documentation

#### 2.11.2.1 taEncryptData:error:()

```
- (NSString *) taEncryptData:
    (NSString *) data
    error:(NSError **) error
```

Encrypts data string in TransArmor RSA packet.

#### Parameters

<i>data</i>	either track1, track2 or pan data to encrypt
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

encrypted data in Base64 format upon success, nil otherwise

### 2.11.2.2 taSetBINRanges:error:()

```
- (BOOL) taSetBINRanges:
    (NSData *) data
    error:(NSError **) error
```

Sets what cards to be encrypted, rejected or sent in plain.

This data is in format:

- B - starts new range of cards to be sent plain
  - E - ends range
  - C - starts new range of cards to be rejected
  - 1-6 numbers - range BIN, it is auto completed with 0 to 6
  - A - define ending range
- An examples:
- B000000A1111111E - BIN ranges 000000-1111111 will be sent in plain
  - B100001E - cards starting with 1000001 will be sent in plain
  - C999999E - cards starting with 999999 will be rejected
  - C000000A1111111E - BIN ranges 000000-1111111 will be rejected B0A1E - BIN ranges 000000-100000 will be sent in plain
- BIN ranges can be sent both in ASCII and BCD, BCD takes twice less space allowing for more data.

#### Parameters

<i>data</i>	RSA2048 PKCS1.5 encrypted block containing SHA256 of the bin ranges + bin ranges data in ASCII or BCD
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.11.2.3 taSetBINRangesEx:error:()

```
- (BOOL) taSetBINRangesEx:
    (NSData *) data
    error:(NSError **) error
```

#### 2.11.2.4 `taSetEncryptionModeForCard:forManual:includeSentinels:error:()`

```
- (BOOL) taSetEncryptionModeForCard:
    (TA_MODES) modeCard
    forManual:(TA_MODES) modeManual
    includeSentinels:(BOOL) includeSentinels
    error:(NSError **) error
```

Defines how and what tracks will be encrypted.

TA wants a single track, so by default this is set to encrypt track2 only. This setting is not persistent, so it is best to set it upon connect

##### Parameters

<i>modeCard</i>	encryption mode used for magnetic, contact or contactless transactions, one of the TA_MODES constants
<i>modeManual</i>	encryption mode used for manual entry transactions, one of the TA_MODES constants
<i>includeSentinels</i>	when track data is sent, you can enable or disable track sentinels
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.11.2.5 `taSetMerchantID:error:()`

```
- (BOOL) taSetMerchantID:
    (NSData *) merchantID
    error:(NSError **) error
```

Sets TransArmor Merchant ID to be used in card data encryption.

##### Parameters

<i>merchantID</i>	up to 8 bytes of merchant id, if more are sent, they will be truncated
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

##### Returns

TRUE upon success, FALSE otherwise



## 2.12 Encrypted Magnetic Head Functions

Functions to work with encrypted magnetic head.

### Macros

- `#define LN_EMSR_EBASE -11000`
- `#define LN_EMSR_EINVALID_COMMAND LN_EMSR_EBASE-0x01`  
*Encrypted magnetic head invalid command sent.*
- `#define LN_EMSR_ENO_PERMISSION LN_EMSR_EBASE-0x02`  
*Encrypted magnetic head no permission error.*
- `#define LN_EMSR_ECARD LN_EMSR_EBASE-0x03`  
*Encrypted magnetic head card error.*
- `#define LN_EMSR_ESYNTAX LN_EMSR_EBASE-0x04`  
*Encrypted magnetic head command syntax error.*
- `#define LN_EMSR_ENO_RESPONSE LN_EMSR_EBASE-0x05`  
*Encrypted magnetic head command no response from the magnetic chip.*
- `#define LN_EMSR_ENO_DATA LN_EMSR_EBASE-0x06`  
*Encrypted magnetic head no data available.*
- `#define LN_EMSR_EINVALID_LENGTH LN_EMSR_EBASE-0x14`  
*Encrypted magnetic head invalid data length.*
- `#define LN_EMSR_ETAMPERED LN_EMSR_EBASE-0x15`  
*Encrypted magnetic head is tampered.*
- `#define LN_EMSR_EINVALID_SIGNATURE LN_EMSR_EBASE-0x16`  
*Encrypted magnetic head invalid signature.*
- `#define LN_EMSR_EHARDWARE LN_EMSR_EBASE-0x17`  
*Encrypted magnetic head hardware failure.*

### Functions

- (BOOL) - `DTDevices::emsrSetActiveHead:error:`  
*In case there are multiple encrypted heads on the device, sets the active one.*
- (NSDictionary \*) - `DTDevices::emsrGetFirmwareInformation:error:`  
*Returns information about the specified head firmware data.*
- (BOOL) - `DTDevices::emsrIsTampered:error:`  
*Checks if the head was tampered or not.*
- (BOOL) - `DTDevices::emsrGetKeyVersion:keyVersion:error:`  
*Retrieves the key version (if any) of a loaded key.*
- (BOOL) - `DTDevices::emsrLoadInitialKey:error:`  
*Loads Terminal Master Key (TMK) or reenables after tampering.*
- (BOOL) - `DTDevices::emsrLoadKey:error:`  
*Loads new key, in plain or encrypted with already loaded AES256 Key Encryption Key (KEK).*
- (NSData \*) - `DTDevices::emsrGetDUKPTSerial:`  
*Returns DUKPT serial number, if DUKPT key is set.*
- (NSData \*) - `DTDevices::emsrGetDUKPTSerialForKeyID:error:`  
*Returns DUKPT serial number (KSN), if DUKPT key is set.*
- (NSString \*) - `DTDevices::emsrGetDeviceModel:`  
*Returns head's model.*
- (BOOL) - `DTDevices::emsrGetFirmwareVersion:error:`

- Returns head's firmware version as number MAJOR\*100+MINOR, i.e.*

    - (BOOL) - [DTDevices::emsrGetSecurityVersion:error:](#)

*Returns head's security version as number MAJOR\*100+MINOR, i.e.*

  - (NSData \*) - [DTDevices::emsrGetSerialNumber:](#)
- Return head's unique serial number as byte array.*
- (BOOL) - [DTDevices::emsrUpdateFirmware:error:](#)
- Performs firmware update on the encrypted head.*
- (NSArray< NSNumber \* > \*) - [DTDevices::emsrGetSupportedEncryptions:](#)
- Returns supported encryption algorithms by the encrypted head.*
- (BOOL) - [DTDevices::emsrSetEncryption:params:error:](#)
- Selects the preferred encryption algorithm.*
- (BOOL) - [DTDevices::emsrSetEncryption:keyID:params:error:](#)
- Selects the preferred encryption algorithm.*
- (BOOL) - [DTDevices::emsrConfigMaskedDataShowExpiration:showServiceCode:showTrack3:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:unmaskedDigitsAfter:error:](#)
- Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [DTDevices::emsrConfigMaskedDataShowExpiration:showServiceCode:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:unmaskedDigitsAfter:error:](#)
- Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [DTDevices::emsrConfigMaskedDataShowExpiration:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:error:](#)
- Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [DTDevices::emsrConfigMaskedDataShowExpiration:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:unmaskedDigitsAfter:error:](#)
- Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [DTDevices::emsrLoadRSAKeyPEM:version:error:](#)
- (EMSRDeviceInfo \*) - [DTDevices::emsrGetDeviceInfo:](#)
- Returns general information about the encrypted head - firmware version, ident, serial number.*
- (EMSRKeysInfo \*) - [DTDevices::emsrGetKeysInfo:](#)
- Returns information about the loaded keys in the encrypted head and tampered status.*
- (BOOL) - [DTDevices::emsrSetCardDataMode:tracks:trackIdentifiers:error:](#)
- Sets encrypted magnetic head card data mode.*

### 2.12.1 Detailed Description

Functions to work with encrypted magnetic head.

### 2.12.2 Macro Definition Documentation

#### 2.12.2.1 LN\_EMSR\_EBASE

```
#define LN_EMSR_EBASE -11000
```

### 2.12.2.2 LN\_EMSR\_ECARD

```
#define LN_EMSR_ECARD LN_EMSR_EBASE-0x03
```

Encrypted magnetic head card error.

### 2.12.2.3 LN\_EMSR\_EHARDWARE

```
#define LN_EMSR_EHARDWARE LN_EMSR_EBASE-0x17
```

Encrypted magnetic head hardware failure.

### 2.12.2.4 LN\_EMSR\_EINVALID\_COMMAND

```
#define LN_EMSR_EINVALID_COMMAND LN_EMSR_EBASE-0x01
```

Encrypted magnetic head invalid command sent.

### 2.12.2.5 LN\_EMSR\_EINVALID\_LENGTH

```
#define LN_EMSR_EINVALID_LENGTH LN_EMSR_EBASE-0x14
```

Encrypted magnetic head invalid data length.

### 2.12.2.6 LN\_EMSR\_EINVALID\_SIGNATURE

```
#define LN_EMSR_EINVALID_SIGNATURE LN_EMSR_EBASE-0x16
```

Encrypted magnetic head invalid signature.

### 2.12.2.7 LN\_EMSR\_ENO\_DATA

```
#define LN_EMSR_ENO_DATA LN_EMSR_EBASE-0x06
```

Encrypted magnetic head no data available.

#### 2.12.2.8 LN\_EMSR\_ENO\_PERMISSION

```
#define LN_EMSR_ENO_PERMISSION LN_EMSR_EBASE-0x02
```

Encrypted magnetic head no permission error.

#### 2.12.2.9 LN\_EMSR\_ENO\_RESPONSE

```
#define LN_EMSR_ENO_RESPONSE LN_EMSR_EBASE-0x05
```

Encrypted magnetic head command no response from the magnetic chip.

#### 2.12.2.10 LN\_EMSR\_ESYNTAX

```
#define LN_EMSR_ESYNTAX LN_EMSR_EBASE-0x04
```

Encrypted magnetic head command syntax error.

#### 2.12.2.11 LN\_EMSR\_ETAMPERED

```
#define LN_EMSR_ETAMPERED LN_EMSR_EBASE-0x15
```

Encrypted magnetic head is tampered.

### 2.12.3 Function Documentation

#### 2.12.3.1 emsrConfigMaskedDataShowExpiration:showServiceCode:showTrack3:unmaskedDigitsAtStart:unmaskedDigitsAt↵ End:unmaskedDigitsAfter:error:()

```
- (BOOL) emsrConfigMaskedDataShowExpiration:
    (BOOL) showExpiration
    showServiceCode:(BOOL) showServiceCode
    showTrack3:(BOOL) showTrack3
    unmaskedDigitsAtStart:(int) unmaskedDigitsAtStart
    unmaskedDigitsAtEnd:(int) unmaskedDigitsAtEnd
    unmaskedDigitsAfter:(int) unmaskedDigitsAfter
    error:(NSError **) error
```

Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.

## Parameters

<i>showExpiration</i>	if set to TRUE, expiration date will be shown in clear text, otherwise will be masked
<i>showServiceCode</i>	if set to TRUE, service code will be shown in clear text, otherwise will be masked
<i>showTrack3</i>	if set to TRUE, service code will be shown in clear text, otherwise will be masked
<i>unmaskedDigitsAtStart</i>	the number of digits to show in clear text at the start of the PAN, range from 0 to 6 (default is 4)
<i>unmaskedDigitsAtEnd</i>	the number of digits to show in clear text at the end of the PAN, range from 0, to 4 (default is 4)
<i>unmaskedDigitsAfter</i>	the number of digits to unmask after the PAN, i.e. 4 will give you the expiration, 7 will give expiration and service code (default is 0)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

### 2.12.3.2 emsrConfigMaskedDataShowExpiration:showServiceCode:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:unmaskedDigitsAfter:error:()

```
- (BOOL) emsrConfigMaskedDataShowExpiration:
    (BOOL) showExpiration
    showServiceCode:(BOOL) showServiceCode
    unmaskedDigitsAtStart:(int) unmaskedDigitsAtStart
    unmaskedDigitsAtEnd:(int) unmaskedDigitsAtEnd
    unmaskedDigitsAfter:(int) unmaskedDigitsAfter
    error:(NSError **) error
```

Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.

## Parameters

<i>showExpiration</i>	if set to TRUE, expiration date will be shown in clear text, otherwise will be masked
<i>showServiceCode</i>	if set to TRUE, service code will be shown in clear text, otherwise will be masked
<i>unmaskedDigitsAtStart</i>	the number of digits to show in clear text at the start of the PAN, range from 0 to 6 (default is 4)
<i>unmaskedDigitsAtEnd</i>	the number of digits to show in clear text at the end of the PAN, range from 0, to 4 (default is 4)
<i>unmaskedDigitsAfter</i>	the number of digits to unmask after the PAN, i.e. 4 will give you the expiration, 7 will give expiration and service code (default is 0)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

### 2.12.3.3 emsrConfigMaskedDataShowExpiration:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:error:()

```
- (BOOL) emsrConfigMaskedDataShowExpiration:
    (BOOL) showExpiration
    unmaskedDigitsAtStart:(int) unmaskedDigitsAtStart
    unmaskedDigitsAtEnd:(int) unmaskedDigitsAtEnd
    error:(NSError **) error
```

Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.

#### Parameters

<i>showExpiration</i>	if set to TRUE, expiration date will be shown in clear text, otherwise will be masked
<i>unmaskedDigitsAtStart</i>	the number of digits to show in clear text at the start of the PAN, range from 0 to 6 (default is 4)
<i>unmaskedDigitsAtEnd</i>	the number of digits to show in clear text at the end of the PAN, range from 0, to 4 (default is 4)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.12.3.4 emsrConfigMaskedDataShowExpiration:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:unmaskedDigitsAfter:error:()

```
- (BOOL) emsrConfigMaskedDataShowExpiration:
    (BOOL) showExpiration
    unmaskedDigitsAtStart:(int) unmaskedDigitsAtStart
    unmaskedDigitsAtEnd:(int) unmaskedDigitsAtEnd
    unmaskedDigitsAfter:(int) unmaskedDigitsAfter
    error:(NSError **) error
```

Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.

#### Parameters

<i>showExpiration</i>	if set to TRUE, expiration date will be shown in clear text, otherwise will be masked
<i>unmaskedDigitsAtStart</i>	the number of digits to show in clear text at the start of the PAN, range from 0 to 6 (default is 4)
<i>unmaskedDigitsAtEnd</i>	the number of digits to show in clear text at the end of the PAN, range from 0, to 4 (default is 4)
<i>unmaskedDigitsAfter</i>	the number of digits to show in clear after the PAN (starting with expiration date), range from 0 to 6 (default is 0). The first 4 digits are the expiration date, if the showExpiration parameter is enabled, then at least 4 digits will be unmasked. Supported only on pinpads.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.12.3.5 emsrGetDeviceInfo:()**

```
- (EMSRDeviceInfo *) emsrGetDeviceInfo:
    (NSError **) error
```

Returns general information about the encrypted head - firmware version, ident, serial number.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

[EMSRDeviceInfo](#) object if function succeeded, nil otherwise

**2.12.3.6 emsrGetDeviceModel:()**

```
- (NSString *) emsrGetDeviceModel:
    (NSError **) error
```

Returns head's model.

**Returns**

head's model as string

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.12.3.7 emsrGetDUKPTSerial:()**

```
- (NSData *) emsrGetDUKPTSerial:
    (NSError **) error
```

Returns DUKPT serial number, if DUKPT key is set.

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

serial number or nil if an error occurred

#### 2.12.3.8 emsrGetDUKPTSerialForKeyID:error:()

```
- (NSData *) emsrGetDUKPTSerialForKeyID:
    (int) keyID
    error:(NSError **) error
```

Returns DUKPT serial number (KSN), if DUKPT key is set.

#### Parameters

<i>keyID</i>	DUKPT key id, one of the KEY_EH_DUKPT_MASTERx constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

serial number or nil if an error occurred

#### 2.12.3.9 emsrGetFirmwareInformation:error:()

```
- (NSDictionary *) emsrGetFirmwareInformation:
    (NSData *) data
    error:(NSError **) error
```

Returns information about the specified head firmware data.

Based on it, and the current head's name and firmware version you can chose to update or not the head's firmware

#### Parameters

<i>data</i>	- firmware data
-------------	-----------------



**Returns**

dictionary containing extracted data or nil if the data is invalid. Keys contained are:

"deviceModel"	Head's model, for example "EMSR-DEA"
"firmwareRevision"	Firmware revision as string, for example 1.07
"firmwareRevisionNumber"	Firmware revision as number MAJOR*100+MINOR, i.e. 1.07 will be returned as 107

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.12.3.10 emsrGetFirmwareVersion:error:()**

```
- (BOOL) emsrGetFirmwareVersion:
    (int *) version
    error:(NSError **) error
```

Returns head's firmware version as number MAJOR\*100+MINOR, i.e.

version 1.05 will be sent as 105

**Parameters**

<i>version</i>	integer, where firmware version is stored upon success
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.12.3.11 emsrGetKeysInfo:()**

```
- (EMSRKeysInfo *) emsrGetKeysInfo:
    (NSError **) error
```

Returns information about the loaded keys in the encrypted head and tampered status.

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

[EMSRKeysInfo](#) object if function succeeded, nil otherwise

## 2.12.3.12 emsrGetKeyVersion:keyVersion:error:()

```
- (BOOL) emsrGetKeyVersion:
    (int) keyID
    keyVersion:(int *) keyVersion
    error:(NSError **) error
```

Retrieves the key version (if any) of a loaded key.

## Parameters

<i>keyID</i>	the ID of the key to get the version, one of the KEY_* constants
<i>keyVersion</i>	- pointer to integer, where key version will be returned upon success. Key version can be 0.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.12.3.13 emsrGetSecurityVersion:error:()

```
- (BOOL) emsrGetSecurityVersion:
    (int *) version
    error:(NSError **) error
```

Returns head's security version as number MAJOR\*100+MINOR, i.e.

version 1.05 will be sent as 105. Security version is the version of the certificated security kernel.

## Parameters

<i>version</i>	integer, where firmware version is stored upon success
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.12.3.14 emsrGetSerialNumber:()**

```
- (NSData *) emsrGetSerialNumber:
    (NSError **) error
```

Return head's unique serial number as byte array.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

serial number or nil if an error occurred

**2.12.3.15 emsrGetSupportedEncryptions:()**

```
- (NSArray<NSNumber *> *) emsrGetSupportedEncryptions:
    (NSError **) error
```

Returns supported encryption algorithms by the encrypted head.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

an array of supported algorithms or nil if an error occurred

**2.12.3.16 emsIsTampered:error:()**

```
- (BOOL) emsIsTampered:
    (BOOL *) tampered
    error: (NSError **) error
```

Checks if the head was tampered or not.

If the head's tamper protection have activated, the device should be sent to service for checks

**Returns**

true if the head was tampered and not operational

**2.12.3.17 emsrLoadInitialKey:error:()**

```
- (BOOL) emsrLoadInitialKey:
    (NSData *) keyData
    error:(NSError **) error
```

Loads Terminal Master Key (TMK) or reenables after tampering.

This command is enabled only if the device is in tamper mode or there is no TMK key yet. If the command is executed in normal mode an error will be returned. To reenables the device after tampering the old TMK key must be passed as an argument. If the keys do not match error will be returned.

**Parameters**

<i>keyData</i>	<p>an array, that consists of:</p> <ul style="list-style-type: none"><li>• BLOCK IDENT - 1 byte, set to 0x29</li><li>• KEY ID - the ID of the key to set, put KEY_TMK_AES (0x10)</li><li>• KEY VERSION - the version of the key in high to low order, 4 bytes, cannot be 0</li><li>• KEY - the key data, 16 bytes</li><li>• HASH - SHA256 of the previous bytes (BLOCK IDENT, KEY ID, KEY VERSION and KEY)</li></ul>
<i>error</i>	<p>pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information</p>

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.12.3.18 emsrLoadKey:error:()**

```
- (BOOL) emsrLoadKey:
    (NSData *) keyData
    error:(NSError **) error
```

Loads new key, in plain or encrypted with already loaded AES256 Key Encryption Key (KEK).

Plain text loading works only the first time the specified key is loaded and is recommended only in secure environment. For normal usage the new key should be encrypted with the Key Encryption Key (KEK). The command is unavailable if the device is tampered.

## Parameters

<i>keyData</i>	<p>an array, that consists of:</p> <ul style="list-style-type: none"> <li>• MAGIC NUMBER - (1 byte) 0x2b</li> <li>• ENCRYPTION KEY ID - (1 byte) the ID of the already existing key, used to encrypt the new key data. Set it to KEY_EH_AES256_LOADING (0x02) if you want to set the key in encrypted state or 0xFF for plain state.</li> <li>• KEY ID - (1 byte) the ID of the key to set, one of the KEY_ constants. The TMK cannot be changed with this command.</li> <li>• KEY VERSION - (4 bytes) the version of the key in high to low order, 4 bytes, cannot be 0</li> <li>• KEY - (variable) the key data, length depends on the key in question, AES256 keys are 32 bytes, DUKPT key is 16 bytes key, 10 bytes serial, 6 bytes for padding (zeroes)</li> <li>• HASH - SHA256 of the previous bytes (MAGIC NUMBER, ENCRYPTION KEY ID, KEY ID, KEY VERSION, KEY)</li> </ul>
----------------	--

If using KEY\_EH\_AES256\_LOADING, then KEY + HASH have to be put inside the packet encrypted with AES256 using key KEY\_EH\_AES256\_LOADING. SHA256 is calculated on the unencrypted data. The head decrypts the data and then calculates and compares the hash. If the calculated SHA does not match the SHA sent with the command, the key exchange is rejected and error is returned.

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.12.3.19 emsrLoadRSAKeyPEM:version:error:()

```
- (BOOL) emsrLoadRSAKeyPEM:
    (NSString *) pem
    version:(int) version
    error:(NSError **) error
```

## 2.12.3.20 emsrSetActiveHead:error:()

```
- (BOOL) emsrSetActiveHead:
    (int) active
    error:(NSError **) error
```

In case there are multiple encrypted heads on the device, sets the active one.

Currently second head, emulated, is present in EMV NFC Lineas only.

## Parameters

<i>active</i>	the encrypted head to use with all other emsr functions - either EMSR_REAL or EMSR_EMUL
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.12.3.21 emsrSetCardDataMode:tracks:trackIdentifiers:error:()

```
- (BOOL) emsrSetCardDataMode:
    (int) mode
    tracks:(int) tracks
    trackIdentifiers:(BOOL) trackIdentifiers
    error:(NSError **) error
```

Sets encrypted magnetic head card data mode.

This setting is not persistent and is best to configure it upon connect. The default mode is to return all tracks read, including JIS and add track identifiers.

## Parameters

<i>mode</i>	magnetic card data mode:	
	MS_PROCESSED_CARD_DATA	Card data will be processed and will be returned via magneticCardEncryptedData delegate
	MS_RAW_CARD_DATA	Card data will not be processed and will be returned via magneticCardRawData delegate
<i>tracks</i>	which card tracks to be read, any combination of the following	
	MS_TRACK_1	Track 1 data will be returned
	MS_TRACK_2	Track 2 data will be returned
	MS_TRACK_3	Track 3 data will be returned
	MS_TRACK_JIS	JIS track data will be returned
	MS_TRACK_ALL (default)	All track data, including JIS data will be returned
<i>trackIdentifiers</i>	if true (default), the track data will be prefixed by 0xF1 for track1, 0xF2 for track2, 0xF3 for track3 and 0xF5 for JIS track	
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

## Returns

TRUE if function succeeded, FALSE otherwise

**2.12.3.22 emsrSetEncryption:keyID:params:error:()**

```

- (BOOL) emsrSetEncryption:
    (int) encryption
    keyID:(int) keyID
    params:(NSDictionary *) params
    error:(NSError **) error

```

Selects the preferred encryption algorithm.

When card is swiped, it will be encrypted by it and sent via magneticCardEncryptedData delegate

**Parameters**

<i>encryption</i>	encryption algorithm used, one of the ALG_* constants
<i>keyID</i>	the ID of the key to use, one of the KEY_* constants. The key needs to be suitable for the provided algorithm.
<i>params</i>	optional algorithm parameters. ALL: <ul style="list-style-type: none"> <li>includeTracks: (int) Bit mask for which card tracks to include, 1 for track1, 2 for track2, 4 for track3</li> </ul>

IDTECH/MAGTEK:

- includeSentinels: (bool) Allows to enable/disable sentinels in the track data

ALG\_PPAD\_3DES\_CBC/ALG\_PPAD\_DUKPT:

- uniqueID: (UInt32) An ID that will be stored inside the packet and returned back encrypted. Never use same ID, either autoincrement or random value. If not set, random value will be used

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.12.3.23 emsrSetEncryption:params:error:()**

```

- (BOOL) emsrSetEncryption:
    (int) encryption

```

```
params:(NSDictionary *) params
error:(NSError **) error
```

Selects the preferred encryption algorithm.

When card is swiped, it will be encrypted by it and sent via magneticCardEncryptedData delegate

#### Parameters

<i>encryption</i>	encryption algorithm used, one of the ALG_* constants
<i>params</i>	optional algorithm parameters. IDTECH/MAGTEK/ALG_PPAD_DUKPT_SEPARATE_TRACKS: <ul style="list-style-type: none"> <li>includeSentinels: (bool) Allows to enable/disable sentinels in the track data</li> </ul>

ALG\_PPAD\_3DES\_CBC/ALG\_PPAD\_DUKPT:

- uniqueID: (UInt32) An ID that will be stored inside the packet and returned back encrypted. Never use same ID, either autoincrement or random value. If not set, random value will be used

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.12.3.24 emsrUpdateFirmware:error:()

```
- (BOOL) emsrUpdateFirmware:
    (NSData *) data
    error:(NSError **) error
```

Performs firmware update on the encrypted head.

DO NOT INTERRUPT THE COMMUNICATION DURING THE FIRMWARE UPDATE!

#### Parameters

<i>data</i>	firmware file data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information



**Returns**

TRUE if function succeeded, FALSE otherwise

## 2.13 SAM Module Functions

Functions to work with the Linea's built-in SAM module.

### Functions

- (NSData \*) - [DTDevices::samPowerOn:](#)  
*Powers on the SAM module and returns Answer To Reset (ATR)*
- (BOOL) - [DTDevices::samPowerOff:](#)  
*Powers off the SAM module.*
- (BOOL) - [DTDevices::samAPDU:ins:p1:p2:inData:apduStatus:error:](#)  
*Sends smartcard APDU command in the smartcard put in the SAM slot.*
- (NSData \*) - [DTDevices::samCAPDU:ins:p1:p2:inData:outLength:apduStatus:error:](#)  
*Executes combined read/write smartcard APDU command in the smartcard put in the SAM slot.*
- (NSData \*) - [DTDevices::samRawAPDU:apduStatus:error:](#)  
*Executes combined read/write smartcard APDU command in the smartcard put in the SAM slot.*

### 2.13.1 Detailed Description

Functions to work with the Linea's built-in SAM module.

### 2.13.2 Function Documentation

#### 2.13.2.1 `samAPDU:ins:p1:p2:inData:apduStatus:error:()`

```
- (BOOL) samAPDU:
    (uint8_t) cla
    ins:(uint8_t) ins
    p1:(uint8_t) p1
    p2:(uint8_t) p2
    inData:(NSData *) inData
    apduStatus:(uint16_t *) apduStatus
    error:(NSError **) error
```

Sends smartcard APDU command in the smartcard put in the SAM slot.

Use this function for commands without return data

#### Parameters

<i>cla</i>	CLA parameter, refer to smartcard documentation for more
<i>ins</i>	INS parameter, refer to smartcard documentation for more
<i>p1</i>	P1 parameter, refer to smartcard documentation for more
<i>p2</i>	P2 parameter, refer to smartcard documentation for more
<i>inData</i>	command specific data or nil, refer to smartcard documentation for more
<i>apduStatus</i>	upon successful result, the 2 byte APDU status is returned here
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.13.2.2 samCAPDU:ins:p1:p2:inData:outLength:apduStatus:error:()**

```
- (NSData *) samCAPDU:
    (uint8_t) cla
    ins:(uint8_t) ins
    p1:(uint8_t) p1
    p2:(uint8_t) p2
    inData:(NSData *) inData
    outLength:(int) outLength
    apduStatus:(uint16_t *) apduStatus
    error:(NSError **) error
```

Executes combined read/write smartcard APDU command in the smartcard put in the SAM slot.

**Parameters**

<i>cla</i>	CLA parameter, refer to smartcard documentation for more
<i>ins</i>	INS parameter, refer to smartcard documentation for more
<i>p1</i>	P1 parameter, refer to smartcard documentation for more
<i>p2</i>	P2 parameter, refer to smartcard documentation for more
<i>inData</i>	command specific data or nil, refer to smartcard documentation for more
<i>outLength</i>	expected return data, send 0 for 256 byte block, -1 if you don't want to receive anything from the card. This is essentially the Le parameter
<i>apduStatus</i>	upon successful result, the 2 byte APDU status is returned here
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

result data or empty object if function succeeded, nil otherwise

**2.13.2.3 samPowerOff:()**

```
- (BOOL) samPowerOff:
    (NSError **) error
```

Powers off the SAM module.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.13.2.4 samPowerOn:()**

```
- (NSData *) samPowerOn:
    (NSError **) error
```

Powers on the SAM module and returns Answer To Reset (ATR)

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

card ATR if function succeeded, nil otherwise

**2.13.2.5 samRawAPDU:apduStatus:error:()**

```
- (NSData *) samRawAPDU:
    (NSData *) apdu
    apduStatus:(uint16_t *) apduStatus
    error:(NSError **) error
```

Executes combined read/write smartcard APDU command in the smartcard put in the SAM slot.

**Parameters**

<i>apdu</i>	pre-created apu data with CLA/INS/P1/P2/[LC]/[LE]
<i>apduStatus</i>	upon successful result, the 2 byte APDU status is returned here
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

result data or empty object if function succeeded, nil otherwise

## 2.14 Voltage Functions

Functions to work with voltage card endencryption.

### Macros

- `#define VOLTAGE_ENCRYPTION_FULL 0`  
*Full track encryption, refer to Voltage documentation for more details.*
- `#define VOLTAGE_ENCRYPTION_SPE 1`  
*Structure preserving encryption (SPE), refer to Voltage documentation for more details.*

### Functions

- `(DTVoltageInfo *) - DTDevices::voltageGetInfo:`  
*Returns various information about Voltage state.*
- `(BOOL) - DTDevices::voltageLoadConfiguration:error:`  
*Loads new configuration.*
- `(BOOL) - DTDevices::voltageGenerateNewKey:`  
*Forces generation of a new key.*
- `(BOOL) - DTDevices::voltageSetMerchantID:error:`  
*Sets merchant ID.*
- `(BOOL) - DTDevices::voltageSetPublicParameters:error:`  
*Sets public parameters to be used with ETB generation.*
- `(BOOL) - DTDevices::voltageSetIdentityString:error:`  
*Sets identity string to be used with ETB generation.*
- `(BOOL) - DTDevices::voltageSetEncryptionType:error:`  
*Sets encryption type.*
- `(BOOL) - DTDevices::voltageSetSettingsVersion:error:`  
*Sets settings version.*
- `(BOOL) - DTDevices::voltageSetKeyRolloverDays:numberOfTransactions:error:`  
*Sets how often a new key will be generated.*

### 2.14.1 Detailed Description

Functions to work with voltage card endencryption.

### 2.14.2 Macro Definition Documentation

#### 2.14.2.1 VOLTAGE\_ENCRYPTION\_FULL

```
#define VOLTAGE_ENCRYPTION_FULL 0
```

Full track encryption, refer to Voltage documentation for more details.

### 2.14.2.2 VOLTAGE\_ENCRYPTION\_SPE

```
#define VOLTAGE_ENCRYPTION_SPE 1
```

Structure preserving encryption (SPE), refer to Voltage documentation for more details.

## 2.14.3 Function Documentation

### 2.14.3.1 voltageGenerateNewKey:()

```
- (BOOL) voltageGenerateNewKey:
    (NSError **) error
```

Forces generation of a new key.

This is asynchronous process, you can query the current state of key generation via `voltageGetInfo`

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.14.3.2 voltageGetInfo:()

```
- (DTVoltageInfo *) voltageGetInfo:
    (NSError **) error
```

Returns various information about Voltage state.

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

`DTVoltageInfo` class if function succeeded, nil otherwise

## 2.14.3.3 voltageLoadConfiguration:error:()

```
- (BOOL) voltageLoadConfiguration:
    (NSData *) configuration
    error:(NSError **) error
```

Loads new configuration.

The configuration is signed with RSA2048 to prevent unauthorized modification and contains all parameters, needed for the algorithm to work.

The format of the data is series of blocks, following the structure:

- length of the field (2 bytes, big endian)
- content of the field (variable, can be missing if the length is 0)

If any field is missing, its length is 0 and content - empty. The final block looks something like:  
[RSA CHECKSUM][LenHi,LenLo][Field0][LenHi,LenLo][Field1][LenHi,LenLo][Field2]...

Based on the position, the fields are as follows:

0	Required	Configuration version, 4 bytes in big endian format, can be read with voltageGetInfo
1	Required	Identity string, variable length, it is used during ETB generation
2	Required	Public parameters, variable length binary data block, used during ETB generation
3	Required	Encryption type, 1 byte, either 0 for full track encryption or 1 for structure preserving encryption (see below)
4	Optional	Merchant ID string, variable length, zero sized means no MID will be present in the packet (see below)
5	Optional	Key rollover days, 4 bytes in big endian format, 0 or zero-sized length disables the feature (see below)
6	Optional	Key rollover number of transactions, 4 bytes in big endian format, 0 or zero-sized length disables the feature (see below)

Encryption type, it can be either 0 (FULL, whole track) or 1 (SPE, structure preserving). They both differ on the way track 1 & 2 data and PAN is encrypted, there is no difference in track 3 and merchant ID.

An example of PAN data encryption using both methods:

- PAN : 5105105105105100
- FULL: 5105102433775100
- SPE : ++++++X0oDMHFSj

An example of track 1 data encryption using both methods:

- Track1: B5105105105100^840PUBLIC/JOHN Q^120422212345?

- FULL : B5105103065100^840PUBLIC/JOHN Q^1204222kzKsspG8?
- SPE : 9o6OY2VmftqV69ZoYqxZ0cusnnDr1oQtiTIVGDalQrnbSrHql

An example of track 2 data encryption using both methods:

- Track2: 5105105105105100=120422212345
- FULL : 5105103065100=1204222kzKsspG8
- SPE : 3Ep5uEIE1Ov7JEEM1IBRGjgQKGT

For PAN data, VOLTAGE\_ENCRYPTION\_SPE guarantees the following:

- The leading 6 digits of the original PAN are maintained in the clear.
- The trailing 4 digits of the original PAN are maintained in the clear.
- The middle digits are used for the ciphertext value, which is guaranteed to consist solely of digits.
- The Luhn check value is preserved so that a PAN with a valid (0) result, creates ciphertext that also checks as valid. For non-PAN data, such as MIDs, VOLTAGE\_ENCRYPTION\_SPE behaves the same way as VOLTAGE\_ENCRYPTION\_FULL.

Merchant ID value data length can be from 4 to 23 digits long. The input and output character sets are identical and length is always preserved. The following is an example of a MID encryption:

- Plaintext: 8888881000000000
- Ciphertext: 1234433247352418

Key rollover conditions will force a new key generation when any of them triggers. When that happens, all conditions are reset to their start values, i.e. if you have set key rollover to 10 days or 100 transactions, if the 100 transactions happen first, then the day count is reset to 0.

Generating key is a long process (about 2 minutes), so if a card is swiped during the process, the device will use current key to encrypt and restart generation process. You can query the current state of key generation via `voltageGetInfo`.

Key rollover days - after the specified number of days elapsed, the key will be regenerated. Using value of 0, or not setting this field at all (length of 0) disables it. Key rollover will happen automatically after an year in any case. The actual time of key generation will differ each time by a random amount, i.e. if you set days to 1 and generated on 7am today, the next generation can happen at 6pm on next day. This is by design in order to disperse key generation requests to lower server load.

Key rollover number of transactions - after specified number of cards read, the key will be regenerated. Using value of 0, or not setting this field at all (length of 0) disables it.

#### Note

After changing configuration, be sure to call `voltageGenerateNewKey` in order for the new settings to take effect!

The preferred way of handling the configuration is to send us the configuration values wanted (encryption type, public parameters, identity string, key rollover conditions - days/number of transactions) and we will return the required block. Then the program just checks the current parameters version and if different - reloads them.



## Parameters

<i>configuration</i>	voltage configuration data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.14.3.4 voltageSetEncryptionType:error:()

```
- (BOOL) voltageSetEncryptionType:
    (int) type
    error:(NSError **) DEPRECATED_ATTRIBUTE
```

Sets encryption type.

**Deprecated**

## Parameters

<i>type</i>	encryption type - VOLTAGE_ENCRYPTION_FULL or VOLTAGE_ENCRYPTION_SPE
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## Parameters

<i>DEPRECATED_ATTRIBUTE</i>	This function is deprecated
-----------------------------	-----------------------------

## 2.14.3.5 voltageSetIdentityString:error:()

```
- (BOOL) voltageSetIdentityString:
    (NSString *) identityString
    error:(NSError **) DEPRECATED_ATTRIBUTE
```

Sets identity string to be used with ETB generation.

After changing identity string, be sure to call voltageGenerateNewKey function

**Deprecated**

## Parameters

<i>identityString</i>	identity string to be used, pass nil if you want to use the test one
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## Parameters

<i>DEPRECATED_ATTRIBUTE</i>	This function is deprecated
-----------------------------	-----------------------------

## 2.14.3.6 voltageSetKeyRolloverDays:numberOfTransactions:error:()

```
- (BOOL) voltageSetKeyRolloverDays:
    (int) days
    numberOfTransactions:(int) numberOfTransactions
    error:(NSError **) DEPRECATED_ATTRIBUTE
```

Sets how often a new key will be generated.

Generating key is a long process. Currently this function has no effect!

## Deprecated

## Parameters

<i>days</i>	keys will be regenerated after that number of days, pass 0 to disable that
<i>numberOfTransactions</i>	keys will be regenerated after the specified number of transactions, pass 0 to disable that
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## Parameters

<i>DEPRECATED_ATTRIBUTE</i>	This function is deprecated
-----------------------------	-----------------------------

### 2.14.3.7 voltageSetMerchantID:error:()

```
- (BOOL) voltageSetMerchantID:
    (NSString *) merchantID
    error:(NSError **) error
```

Sets merchant ID.

Merchant ID can be present in the configuration, but it is possible to change it on the fly too

#### Parameters

<i>merchantID</i>	merchant ID number
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.14.3.8 voltageSetPublicParameters:error:()

```
- (BOOL) voltageSetPublicParameters:
    (NSData *) publicParameters
    error:(NSError **) DEPRECATED_ATTRIBUTE
```

Sets public parameters to be used with ETB generation.

After changing public parameters, be sure to call voltageGenerateNewKey function

#### Deprecated

#### Parameters

<i>publicParameters</i>	public parameters block or nil to use the built-in test ones
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

#### Parameters

<i>DEPRECATED_ATTRIBUTE</i>	This function is deprecated
-----------------------------	-----------------------------

### 2.14.3.9 voltageSetSettingsVersion:error:()

```
- (BOOL) voltageSetSettingsVersion:
    (int) version
    error:(NSError **) DEPRECATED_ATTRIBUTE
```

Sets settings version.

#### Deprecated

##### Parameters

<i>version</i>	settings version
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

##### Returns

TRUE if function succeeded, FALSE otherwise

##### Parameters

<i>DEPRECATED_ATTRIBUTE</i>	This function is deprecated
-----------------------------	-----------------------------

## 2.15 UHF Reader Functions

Functions to work with the UHF tags reader.

### Enumerations

- enum `DTDevices::UHF_COUNTRY` {  
`DTDevices::UHF_COUNTRY_KOREA = 0, DTDevices::UHF_COUNTRY_NORTH_AMERICA, DTDevices::UHF_COUNTRY_US, DTDevices::UHF_COUNTRY_EUROPE, DTDevices::UHF_COUNTRY_JAPAN, DTDevices::UHF_COUNTRY_CHINA1, DTDevices::UHF_COUNTRY_CHINA2, DTDevices::UHF_COUNTRY_BRAZIL }`  
*UHF Country.*

### Functions

- (NSData \*) - `DTDevices::uhfCommand:length:error:`
- (BOOL) - `DTDevices::uhfInit:error:`
- (BOOL) - `DTDevices::uhfClose:`
- (BOOL) - `DTDevices::uhfStartAutoReadForTagType:maximumNumberOfTags:maximumTimeForTagging:repeatCycleCount:error:`
- (BOOL) - `DTDevices::uhfStopAutoRead:`

### 2.15.1 Detailed Description

Functions to work with the UHF tags reader.

### 2.15.2 Enumeration Type Documentation

#### 2.15.2.1 UHF\_COUNTRY

– (enum) `UHF_COUNTRY`

UHF Country.

#### Enumerator

<code>UHF_COUNTRY_KOREA</code>	Korea.
<code>UHF_COUNTRY_NORTH_AMERICA</code>	North America.
<code>UHF_COUNTRY_US</code>	United States.
<code>UHF_COUNTRY_EUROPE</code>	Europe.
<code>UHF_COUNTRY_JAPAN</code>	Japan.
<code>UHF_COUNTRY_CHINA1</code>	China 1.
<code>UHF_COUNTRY_CHINA2</code>	China 2.
<code>UHF_COUNTRY_BRAZIL</code>	Brazil.

## 2.15.3 Function Documentation

### 2.15.3.1 uhfClose:()

```
- (BOOL) uhfClose:
    (NSError **) error
```

### 2.15.3.2 uhfCommand:length:error:()

```
- (NSData *) uhfCommand:
    (const uint8_t *) packet
    length:(int) length
    error:(NSError **) error
```

### 2.15.3.3 uhfInit:error:()

```
- (BOOL) uhfInit:
    (UHF_COUNTRY) country
    error:(NSError **) error
```

### 2.15.3.4 uhfStartAutoReadForTagType:maxNumberOfTags:maxTimeForTagging:repeatCycleCount:error:()

```
- (BOOL) uhfStartAutoReadForTagType:
    (int) type
    maxNumberOfTags:(int) maxNumberOfTags
    maxTimeForTagging:(int) maxTimeForTagging
    repeatCycleCount:(int) repeatCycleCount
    error:(NSError **) error
```

### 2.15.3.5 uhfStopAutoRead:()

```
- (BOOL) uhfStopAutoRead:
    (NSError **) error
```

## 2.16 RF Reader Functions

Functions to work with the RF cards reader.

### Macros

- `#define RF_CHANNEL_ISO1443A 0x01`  
*ISO14443 Type A (Mifare) cards will be detected.*
- `#define RF_CHANNEL_ISO1443B 0x02`  
*ISO14443 Type B cards will be detected.*
- `#define RF_CHANNEL_ISO15693 0x03`  
*ISO15693 cards will be detected.*
- `#define RF_CHANNEL_FELICA 0x04`  
*Felica cards will be detected.*
- `#define RF_CHANNEL_STSR1 0x05`  
*ST SRI cards will be detected.*
- `#define RF_CHANNEL_PICOPASS_ISO15 0x06`  
*PicoPass ISO15693 cards will be detected.*
- `#define CARD_SUPPORT_TYPE_A 0x0001`  
*ISO14443 Type A (Mifare) cards will be detected.*
- `#define CARD_SUPPORT_TYPE_B 0x0002`  
*ISO14443 Type B cards will be detected.*
- `#define CARD_SUPPORT_FELICA 0x0004`  
*Felica cards will be detected.*
- `#define CARD_SUPPORT_NFC 0x0008`  
*NFC cards will be detected.*
- `#define CARD_SUPPORT_JEWEL 0x0010`  
*Jewel cards will be detected.*
- `#define CARD_SUPPORT_ISO15 0x0020`  
*ISO15693 cards will be detected.*
- `#define CARD_SUPPORT_STSR1 0x0040`  
*ST SRI cards will be detected.*
- `#define CARD_SUPPORT_PICOPASS_ISO14 0x0080`  
*PicoPass ISO14443-A cards will be detected.*
- `#define CARD_SUPPORT_PICOPASS_ISO15 0x0100`  
*PicoPass ISO15693 cards will be detected.*

### Functions

- (BOOL) - `DTDevices::rfInit:error:`  
*Initializes and powers on the RF card reader module.*
- (BOOL) - `DTDevices::rfInit:fieldGain:error:`  
*Initializes and powers on the RF card reader module.*
- (BOOL) - `DTDevices::rfInitWithPreferredReader:supportedCards:fieldGain:sleepTimeout:error:`  
*Initializes and powers on the RF card reader module.*
- (BOOL) - `DTDevices::rfClose:`  
*Powers down RF card reader module.*
- (BOOL) - `DTDevices::rfFieldControlOnChannel:enabled:error:`  
*Allows enabling/disabling the field with specific card type settings.*

- (BOOL) - [DTDevices::rfRemoveCard:error:](#)  
*Call this function once you are done with the card, a delegate call `rfCardRemoved` will be called when the card leaves the RF field and new card is ready to be detected.*
- (DTRFCardInfo \*) - [DTDevices::rfDetectCardOnChannel:additionalData:error:](#)  
*Call this function to manually detect a card on specific channel.*
- (DTRFCardInfo \*) - [DTDevices::rfDetectCardOnChannel:additionalData:timeout:error:](#)  
*Call this function to manually detect a card on specific channel.*
- (BOOL) - [DTDevices::rfSetCustomSettings:settings:error:](#)  
*Call this function to alter specific settings of the supported chips.*
- (NSData \*) - [DTDevices::rfReadPaymentCardTracks:tagList:error:](#)  
*Call this function to read a payment card via the RF channel.*
- (BOOL) - [DTDevices::mfAuthByKey:type:address:key:error:](#)  
*Authenticate mifare card block with direct key data.*
- (BOOL) - [DTDevices::mfStoreKeyIndex:type:key:error:](#)  
*Store key in the internal module memory for later use.*
- (BOOL) - [DTDevices::mfAuthByStoredKey:type:address:keyIndex:error:](#)  
*Authenticate mifare card block with previously stored key.*
- (NSData \*) - [DTDevices::mfRead:address:length:error:](#)  
*Reads one more more blocks of data from Mifare Classic/Ultralight cards.*
- (int) - [DTDevices::mfWrite:address:data:error:](#)  
*Writes one more more blocks of data to Mifare Classic/Ultralight cards.*
- (BOOL) - [DTDevices::mfWrite:address:data:bytesWritten:error:](#)  
*Swift version: Writes one more more blocks of data to Mifare Classic/Ultralight cards.*
- (BOOL) - [DTDevices::mfUlcSetKey:key:error:](#)  
*Sets the 3DES key of Mifare Ultralight C cards.*
- (BOOL) - [DTDevices::mfUlcAuthByKey:key:error:](#)  
*Performs 3DES authentication of Mifare Ultralight C card using the given key.*
- (NSData \*) - [DTDevices::iso15693Read:startBlock:length:error:](#)  
*Reads one more more blocks of data from ISO 15693 card.*
- (int) - [DTDevices::iso15693Write:startBlock:data:error:](#)  
*Writes one more more blocks of data to ISO 15693 card.*
- (BOOL) - [DTDevices::iso15693Write:startBlock:data:bytesWritten:error:](#)  
*Swift version: Writes one more more blocks of data to ISO 15693 card.*
- (NSData \*) - [DTDevices::iso15693GetBlocksSecurityStatus:startBlock:nBlocks:error:](#)  
*Reads the security status of one more more blocks from ISO 15693 card.*
- (BOOL) - [DTDevices::iso15693LockBlock:block:error:](#)  
*Locks a single ISO 15693 card block.*
- (BOOL) - [DTDevices::iso15693WriteAFI:afi:error:](#)  
*Changes ISO 15693 card AFI.*
- (BOOL) - [DTDevices::iso15693LockAFI:error:](#)  
*Locks ISO 15693 AFI preventing further changes.*
- (BOOL) - [DTDevices::iso15693WriteDSFID:dsfid:error:](#)  
*Changes ISO 15693 card DSFID.*
- (BOOL) - [DTDevices::iso15693LockDSFID:error:](#)  
*Locks ISO 15693 card DSFID preventing further changes.*
- (NSData \*) - [DTDevices::iso14GetATS:error:](#)  
*Initializes ISO1443B card and returns Answer To Select.*
- (NSData \*) - [DTDevices::iso14APDU:cla:ins:p1:p2:data:apduResult:error:](#)  
*Executes APDU command on ISO1443B compatible card.*
- (NSData \*) - [DTDevices::iso14APDU:cla:ins:p1:p2:data:apduResult:maxOutLength:error:](#)  
*Executes APDU command on ISO1443B compatible card.*



- (NSData \*) - `DTDevices::iso14Transceive:data:error:`  
*Executes APDU command on ISO1443 compatible card.*
- (NSData \*) - `DTDevices::iso14Transceive:data:status:error:`  
*Executes APDU command on ISO1443 compatible card.*
- (BOOL) - `DTDevices::iso14Halt:error:`  
*Halts connected ISO1443 card.*
- (BOOL) - `DTDevices::felicaSetPollingParamsRequestCode:systemCode:timeSlot:detectionTimeMS↵:intervalTimeMS:error:`  
*Sets polling parameters of FeliCa card.*
- (NSData \*) - `DTDevices::felicaSendCommand:command:data:error:`  
*Executes a raw command on FeliCa card.*
- (NSData \*) - `DTDevices::felicaTransieve:data:error:`  
*Sends raw data to FeliCa card and returns the response.*
- (NSData \*) - `DTDevices::felicaRead:serviceCode:startBlock:length:error:`  
*Reads one more more blocks of data from FeliCa card.*
- (int) - `DTDevices::felicaWrite:serviceCode:startBlock:data:error:`  
*Writes one more more blocks of data to FeliCa card.*
- (BOOL) - `DTDevices::felicaWrite:serviceCode:startBlock:data:bytesWritten:error:`  
*Swift version: Writes one more more blocks of data to FeliCa card.*
- (BOOL) - `DTDevices::felicaSmartTagGetBatteryStatus:status:error:`  
*Returns FeliCa SmartTag battery status.*
- (BOOL) - `DTDevices::felicaSmartTagClearScreen:error:`  
*Clears the screen of FeliCa SmartTag.*
- (BOOL) - `DTDevices::felicaSmartTagDrawImage:image:topLeftX:topLeftY:drawMode:layout:error:`  
*Draws image on FeliCa SmartTag's screen.*
- (BOOL) - `DTDevices::felicaSmartTagSaveLayout:layout:error:`  
*Saves the current display as layout number.*
- (BOOL) - `DTDevices::felicaSmartTagDisplayLayout:layout:error:`  
*Displays previously stored layout.*
- (int) - `DTDevices::felicaSmartTagWrite:address:data:error:`  
*Writes data in FeliCa SmartTag.*
- (BOOL) - `DTDevices::felicaSmartTagWrite:address:data:bytesWritten:error:`  
*Swift version: Writes data in FeliCa SmartTag.*
- (NSData \*) - `DTDevices::felicaSmartTagRead:address:length:error:`  
*Writes data in FeliCa SmartTag.*
- (BOOL) - `DTDevices::felicaSmartTagWaitCompletion:error:`  
*Waits for FeliCa SmartTag to complete current operation.*
- (NSData \*) - `DTDevices::stSRIRead:address:length:error:`  
*Reads one more more blocks of data from ST SRI card.*
- (int) - `DTDevices::stSRIWrite:address:data:error:`  
*Writes one more more blocks of data to ST SRI card.*
- (BOOL) - `DTDevices::stSRIWrite:address:data:bytesWritten:error:`  
*Writes one more more blocks of data to ST SRI card.*
- (NSData \*) - `DTDevices::dfAESAuthByFixedKey:key:keyIndex:error:`  
*Performs desfire three step AES128 authentication with a key and returns session key as a result.*
- (BOOL) - `DTDevices::df3DESAAuthByFixedKey:key:keyIndex:error:`  
*Performs desfire three step 3DES authentication with a direct key.*
- (BOOL) - `DTDevices::dfCreateFile:fileID:type:permissions:size:isoID:error:`  
*Creates file in desfire card, refer to desfire documentation for te parameters.*
- (BOOL) - `DTDevices::dfWriteFile:fileID:data:error:`  
*Writes data to a desfire file, an application needs to be selected.*

- (NSData \*) - [DTDevices::dfReadFile:fileID:length:error:](#)  
*Reads data from a desfire file, an application needs to be selected.*
- (BOOL) - [DTDevices::dfSelectApplication:app:error:](#)  
*Selects desfire application.*
- (NSString \*) - [DTDevices::hidReadPACSKeyboardWedge:error:](#)  
*HID RF Module: Extracts PACS bits from the card in the field using the loaded keyboard wedge configuration.*
- (NSData \*) - [DTDevices::hidExecuteAPDU:apdu:error:](#)  
*HID RF Module: Executes custom APDU command.*
- (BOOL) - [DTDevices::hidUpdateConfig:error:](#)  
*HID RF Module: Loads configuration file into the module.*
- (BOOL) - [DTDevices::hidUpdateMainFirmware:error:](#)  
*HID RF Module: Updates main firmware, can take up to 10 minutes, do NOT interrupt the procedure!*
- (BOOL) - [DTDevices::hidUpdateSAMFirmware:apdu:error:](#)
- (NSData \*) - [DTDevices::hidGetVersionInfo:](#)
- (NSData \*) - [DTDevices::hidGetSerialNumber:](#)
- (NSData \*) - [DTDevices::hidGetContentElement:pin:rootSoOID:error:](#)

## 2.16.1 Detailed Description

Functions to work with the RF cards reader.

## 2.16.2 Macro Definition Documentation

### 2.16.2.1 CARD\_SUPPORT\_FELICA

```
#define CARD_SUPPORT_FELICA 0x0004
```

Felica cards will be detected.

### 2.16.2.2 CARD\_SUPPORT\_ISO15

```
#define CARD_SUPPORT_ISO15 0x0020
```

ISO15693 cards will be detected.

### 2.16.2.3 CARD\_SUPPORT\_JEWEL

```
#define CARD_SUPPORT_JEWEL 0x0010
```

Jewel cards will be detected.

Currently unsupported.

#### 2.16.2.4 CARD\_SUPPORT\_NFC

```
#define CARD_SUPPORT_NFC 0x0008
```

NFC cards will be detected.

Currently unsupported.

#### 2.16.2.5 CARD\_SUPPORT\_PICOPASS\_ISO14

```
#define CARD_SUPPORT_PICOPASS_ISO14 0x0080
```

PicoPass ISO14443-A cards will be detected.

#### 2.16.2.6 CARD\_SUPPORT\_PICOPASS\_ISO15

```
#define CARD_SUPPORT_PICOPASS_ISO15 0x0100
```

PicoPass ISO15693 cards will be detected.

#### 2.16.2.7 CARD\_SUPPORT\_STMRI

```
#define CARD_SUPPORT_STMRI 0x0040
```

ST MRI cards will be detected.

#### 2.16.2.8 CARD\_SUPPORT\_TYPE\_A

```
#define CARD_SUPPORT_TYPE_A 0x0001
```

ISO14443 Type A (Mifare) cards will be detected.

#### 2.16.2.9 CARD\_SUPPORT\_TYPE\_B

```
#define CARD_SUPPORT_TYPE_B 0x0002
```

ISO14443 Type B cards will be detected.

#### 2.16.2.10 RF\_CHANNEL\_FELICA

```
#define RF_CHANNEL_FELICA 0x04
```

Felica cards will be detected.

#### 2.16.2.11 RF\_CHANNEL\_ISO1443A

```
#define RF_CHANNEL_ISO1443A 0x01
```

ISO14443 Type A (Mifare) cards will be detected.

#### 2.16.2.12 RF\_CHANNEL\_ISO1443B

```
#define RF_CHANNEL_ISO1443B 0x02
```

ISO14443 Type B cards will be detected.

#### 2.16.2.13 RF\_CHANNEL\_ISO15693

```
#define RF_CHANNEL_ISO15693 0x03
```

ISO15693 cards will be detected.

#### 2.16.2.14 RF\_CHANNEL\_PICOPASS\_ISO15

```
#define RF_CHANNEL_PICOPASS_ISO15 0x06
```

PicoPass ISO15693 cards will be detected.

#### 2.16.2.15 RF\_CHANNEL\_STMRI

```
#define RF_CHANNEL_STMRI 0x05
```

ST MRI cards will be detected.

### 2.16.3 Function Documentation

#### 2.16.3.1 df3DESAuthByFixedKey:key:keyIndex:error:()

```
- (BOOL) df3DESAuthByFixedKey:
    (int) cardIndex
    key:(NSData *) key
    keyIndex:(int) keyIndex
    error:(NSError **) error
```

Performs desfire three step 3DES authentication with a direct key.

## Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>key</i>	2-len 3DES key to use for the authentication
<i>keyIndex</i>	the index of the key to use for the authentication
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.16.3.2 dfAESAuthByFixedKey:key:keyIndex:error:()

```
- (NSData *) dfAESAuthByFixedKey:
    (int) cardIndex
    key:(NSData *) key
    keyIndex:(int) keyIndex
    error:(NSError **) error
```

Performs desfire three step AES128 authentication with a key and returns session key as a result.

## Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>key</i>	AES128 key to use for the authentication
<i>keyIndex</i>	the index of the key to use for the authentication
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

session key to use for subsequent operations or nil if function failed

## 2.16.3.3 dfCreateFile:fileID:type:permissions:size:isoID:error:()

```
- (BOOL) dfCreateFile:
    (int) cardIndex
    fileID:(int) fileID
    type:(uint8_t) type
    permissions:(uint16_t) permissions
    size:(uint32_t) size
    isoID:(int16_t) isoID
    error:(NSError **) error
```

Creates file in desfire card, refer to desfire documentation for te parameters.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>fileID</i>	the index of the file (0 based) to create
<i>type</i>	file type, refer to desfire documentation
<i>permissions</i>	permissions, refer to desfire documentation
<i>size</i>	file size, refer to desfire documentation
<i>isoID</i>	optional iso file ID, refer to desfire documentation
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.4 dfReadFile:fileID:length:error:()**

```
- (NSData *) dfReadFile:
    (int) cardIndex
    fileID:(int) fileID
    length:(int) length
    error:(NSError **) error
```

Reads data from a desfire file, an application needs to be selected.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>fileID</i>	the index of the file (0 based) to create
<i>length</i>	the number of bytes to read from the file
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

file data if function succeeded, nil otherwise

**2.16.3.5 dfSelectApplication:app:error:()**

```
- (BOOL) dfSelectApplication:
    (int) cardIndex
    app:(uint32_t) app
    error:(NSError **) error
```

Selects desfire application.

## Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>app</i>	the id of desfire application (3 bytes)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.16.3.6 dfWriteFile:fileID:data:error:()

```
- (BOOL) dfWriteFile:
    (int) cardIndex
    fileID:(int) fileID
    data:(NSData *) data
    error:(NSError **) error
```

Writes data to a desfire file, an application needs to be selected.

## Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>fileID</i>	the index of the file (0 based) to create
<i>data</i>	the data to write
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.16.3.7 felicaRead:serviceCode:startBlock:length:error:()

```
- (NSData *) felicaRead:
    (int) cardIndex
    serviceCode:(int) serviceCode
    startBlock:(int) startBlock
    length:(int) length
    error:(NSError **) error
```

Reads one more more blocks of data from FeliCa card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>serviceCode</i>	the service code, default is 0x0900
<i>startBlock</i>	the starting block to read from
<i>length</i>	the number of bytes to read, this must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

NSData object containing the data received or nil if an error occurred

**2.16.3.8 felicaSendCommand:command:data:error:()**

```
- (NSData *) felicaSendCommand:
    (int) cardIndex
    command:(int) command
    data:(NSData *) data
    error:(NSError **) error
```

Executes a raw command on FeliCa card.

The IDm(UUID) parameter is automatically added and needs to be skipped.

**Note**

To read block 0 with service code 0x0900, then you need to send command 06 with data 01 09 00 01 80 00

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>command</i>	command code, refer to FeliCa documentation
<i>data</i>	optional data to the command
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

NSData object containing the data received or nil if an error occurred. Received data contains command code (1 byte) and command data, IDm(UUID) is skipped



**2.16.3.9 felicaSetPollingParamsRequestCode:systemCode:timeSlot:detectionTimeMS:intervalTimeMS:error:()**

```

- (BOOL) felicaSetPollingParamsRequestCode:
    (int) requestCode
    systemCode:(int) systemCode
    timeSlot:(int) timeSlot
    detectionTimeMS:(int) detectionTimeMS
    intervalTimeMS:(int) intervalTimeMS
    error:(NSError **) error

```

Sets polling parameters of FeliCa card.

Call this function before `rfInit!`

Felica detection works as the card is polled for `detectionTimeMS`(or more), then no tries are done in some time and again the process is retried after `intervalTimeMS`

**Parameters**

<i>requestCode</i>	request code, refer to FeliCa documentation, default is 1
<i>systemCode</i>	system code, refer to FeliCa documentation, default is 0xFFFF
<i>timeSlot</i>	felica time slot, 0-3
<i>detectionTimeMS</i>	detection time in milliseconds, this cannot be less than 44ms, as 24ms are used to power on the card and a min of 20ms for detection
<i>intervalTimeMS</i>	the whole time interval in milliseconds, after wich the detection process will be retried
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.10 felicaSmartTagClearScreen:error:()**

```

- (BOOL) felicaSmartTagClearScreen:
    (int) cardIndex
    error:(NSError **) error

```

Clears the screen of FeliCa SmartTag.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

### 2.16.3.11 felicaSmartTagDisplayLayout:layout:error:()

```
- (BOOL) felicaSmartTagDisplayLayout:
    (int) cardIndex
    layout:(int) layout
    error:(NSError **) error
```

Displays previously stored layout.

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>layout</i>	layout index (1-12) of the previously stored image
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.16.3.12 felicaSmartTagDrawImage:image:topLeftX:topLeftY:drawMode:layout:error:()

```
- (BOOL) felicaSmartTagDrawImage:
    (int) cardIndex
    image:(UIImage *) image
    topLeftX:(int) topLeftX
    topLeftY:(int) topLeftY
    drawMode:(int) drawMode
    layout:(int) layout
    error:(NSError **) error
```

Draws image on FeliCa SmartTag's screen.

The screen is 200x96 pixels.

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>image</i>	image to draw
<i>topLeftX</i>	- topleft X coordinate in pixels
<i>topLeftY</i>	- topleft Y coordinate in pixels
<i>drawMode</i>	draw mode, one of the FELICA_SMARTTAG_DRAW_* constants
<i>layout</i>	only used when drawMode is FELICA_SMARTTAG_DRAW_USE_LAYOUT, it specifies the index of the layout (1-12) of the previously stored image
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.13 felicaSmartTagGetBatteryStatus:status:error:()**

```
- (BOOL) felicaSmartTagGetBatteryStatus:
    (int) cardIndex
    status:(int *) status
    error:(NSError **) error
```

Returns FeliCa SmartTag battery status.

**Note**

Call this function before any other SmartTag

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>status</i>	upon successful execution, battery status will be returned here, one of FELICA_SMARTTAG_BATTERY_* constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.14 felicaSmartTagRead:address:length:error:()**

```
- (NSData *) felicaSmartTagRead:
    (int) cardIndex
    address:(int) address
    length:(int) length
    error:(NSError **) error
```

Writes data in FeliCa SmartTag.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the address of the card to read from, refer to SmartTag documentation
<i>length</i>	of the data to read, note that the data does not need to be aligned to block size
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

NSData object containing the data received or nil if an error occurred

**2.16.3.15 felicaSmartTagSaveLayout:layout:error:()**

```
- (BOOL) felicaSmartTagSaveLayout:
    (int) cardIndex
    layout:(int) layout
    error:(NSError **) error
```

Saves the current display as layout number.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>layout</i>	layout index (1-12) to which the currently displayed image will be saved
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.16 felicaSmartTagWaitCompletion:error:()**

```
- (BOOL) felicaSmartTagWaitCompletion:
    (int) cardIndex
    error:(NSError **) error
```

Waits for FeliCa SmartTag to complete current operation.

Waiting is generally not needed, but needed in case for example drawing an image and then saving the layout, you need to wait for the image to be drawn. Write operation forces waiting internally.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.17 felicaSmartTagWrite:address:data:bytesWritten:error:()**

```
- (BOOL) felicaSmartTagWrite:
    (int) cardIndex
    address:(int) address
    data:(NSData *) data
    bytesWritten:(int *) bytesWritten
    error:(NSError **) error
```

Swift version: Writes data in FeliCa SmartTag.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the address of the card to write to, refer to SmartTag documentation
<i>data</i>	data to write, note that the data does not need to be aligned to block size
<i>bytesWritten</i>	optional parameter, filled with bytes written if the function partially succeeds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.18 felicaSmartTagWrite:address:data:error:()**

```
- (int) felicaSmartTagWrite:
    (int) cardIndex
    address:(int) address
    data:(NSData *) data
    error:(NSError **) error
```

Writes data in FeliCa SmartTag.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the address of the card to write to, refer to SmartTag documentation
<i>data</i>	data to write, note that the data does not need to be aligned to block size
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

number of bytes actually written or 0 if an error occurred

### 2.16.3.19 felicaTransieve:data:error:()

```
- (NSData *) felicaTransieve:
    (int) cardIndex
    data:(NSData *) data
    error:(NSError **) error
```

Sends raw data to FeliCa card and returns the response.

This command does no additional processing and no combining of the packet with the UID as does felicaSendCommand

#### Note

To read block 0 with service code 0x0900, then you need to send 06 [UID] 01 09 00 01 80 00

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>data</i>	raw data block, usually consists of COMMAND UID DATA, refer to FeliCa documentation
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

NSData object containing the data received or nil if an error occurred. Received data usually RESPONSE COMMAND UID DATA

### 2.16.3.20 felicaWrite:serviceCode:startBlock:data:bytesWritten:error:()

```
- (BOOL) felicaWrite:
    (int) cardIndex
    serviceCode:(int) serviceCode
    startBlock:(int) startBlock
    data:(NSData *) data
    bytesWritten:(int *) bytesWritten
    error:(NSError **) error
```

Swift version: Writes one more more blocks of data to FeliCa card.

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>serviceCode</i>	the service code, default is 0x0900
<i>startBlock</i>	the starting block to write to
<i>data</i>	the data to write, it must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>bytesWritten</i>	optional parameter, filled with bytes written if the function partially succeeds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.21 felicaWrite:serviceCode:startBlock:data:error:()**

```
- (int) felicaWrite:
    (int) cardIndex
    serviceCode:(int) serviceCode
    startBlock:(int) startBlock
    data:(NSData *) data
    error:(NSError **) error
```

Writes one more more blocks of data to FeliCa card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>serviceCode</i>	the service code, default is 0x0900
<i>startBlock</i>	the starting block to write to
<i>data</i>	the data to write, it must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

number of bytes actually written or 0 if an error occurred

**2.16.3.22 hidExecuteAPDU:apdu:error:()**

```
- (NSData *) hidExecuteAPDU:
    (int) cardIndex
    apdu:(NSData *) apdu
    error:(NSError **) error
```

HID RF Module: Executes custom APDU command.

It can be used to execute custom commands to change settings or pass-through to the currently active card. Refer to HID documentation for available commands

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call or -1 if you want to send generic command to the reader
<i>apdu</i>	APDU data containing CLA INS P1 P2 LC LE and data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

APDU response followed by 2 status bytes ST1 and ST2

**2.16.3.23 hidGetContentElement:pin:rootSoOID:error:()**

```
- (NSData *) hidGetContentElement:
    (int) contentTag
    pin:(NSData *) pin
    rootSoOID:(NSData *) rootSoOID
    error:(NSError **) error
```

**2.16.3.24 hidGetSerialNumber:()**

```
- (NSData *) hidGetSerialNumber:
    (NSError **) error
```

**2.16.3.25 hidGetVersionInfo:()**

```
- (NSData *) hidGetVersionInfo:
    (NSError **) error
```

**2.16.3.26 hidReadPACSKeyboardWedge:error:()**

```
- (NSString *) hidReadPACSKeyboardWedge:
    (int) cardIndex
    error:(NSError **) error
```

HID RF Module: Extracts PACS bits from the card in the field using the loaded keyboard wedge configuration.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

PACS bits if function succeeded, nil otherwise



**2.16.3.27 hidUpdateConfig:error:()**

```
- (BOOL) hidUpdateConfig:
    (NSData *) config
    error:(NSError **) error
```

HID RF Module: Loads configuration file into the module.

Do not use this function on every connect, as it can damage the flash memory of the module

**Parameters**

<i>config</i>	configuration file, usually created by the module web interface
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.28 hidUpdateMainFirmware:error:()**

```
- (BOOL) hidUpdateMainFirmware:
    (NSData *) data
    error:(NSError **) error
```

HID RF Module: Updates main firmware, can take up to 10 minutes, do NOT interrupt the procedure!

**Parameters**

<i>data</i>	firmware encrypted binary data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.29 hidUpdateSAMFirmware:apdu:error:()**

```
- (BOOL) hidUpdateSAMFirmware:
    (NSData *) snmp
    apdu:(NSData *) apdu
    error:(NSError **) error
```

### 2.16.3.30 iso14APDU:cla:ins:p1:p2:data:apduResult:error:()

```
- (NSData *) iso14APDU:
    (int) cardIndex
    cla:(uint8_t) cla
    ins:(uint8_t) ins
    p1:(uint8_t) p1
    p2:(uint8_t) p2
    data:(NSData *) data
    apduResult:(uint16_t *) apduResult
    error:(NSError **) error
```

Executes APDU command on ISO1443B compatible card.

The card must be initialized with iso14GetATS first

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>cla</i>	CLA parameter, refer to card documentation
<i>ins</i>	INS parameter, refer to card documentation
<i>p1</i>	P1 parameter, refer to card documentation
<i>p2</i>	P2 parameter, refer to card documentation
<i>data</i>	optional data with the command
<i>apduResult</i>	every APDU command sends 2 bytes result code, refer to card documentation
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

APDU response data or empty object, or nil if command failed

### 2.16.3.31 iso14APDU:cla:ins:p1:p2:data:apduResult:maxOutLength:error:()

```
- (NSData *) iso14APDU:
    (int) cardIndex
    cla:(uint8_t) cla
    ins:(uint8_t) ins
    p1:(uint8_t) p1
    p2:(uint8_t) p2
    data:(NSData *) data
    apduResult:(uint16_t *) apduResult
    maxOutLength:(int) maxOutLength
    error:(NSError **) error
```

Executes APDU command on ISO1443B compatible card.

The card must be initialized with iso14GetATS first

## Parameters

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>cla</i>	CLA parameter, refer to card documentation
<i>ins</i>	INS parameter, refer to card documentation
<i>p1</i>	P1 parameter, refer to card documentation
<i>p2</i>	P2 parameter, refer to card documentation
<i>data</i>	optional data with the command
<i>apduResult</i>	every APDU command sends 2 bytes result code, refer to card documentation
<i>maxOutLength</i>	optionally specify the maximum data you want to receive from the function, set to 0x00 to receive as much as possible
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

APDU response data or empty object, or nil if command failed

2.16.3.32 `iso14GetATS:error:()`

```
- (NSData *) iso14GetATS:
    (int) cardIndex
    error:(NSError **) error
```

Initializes ISO1443B card and returns Answer To Select.

Call this function before further communication with the card.

## Parameters

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

Answer To Select data, or nil if command failed

2.16.3.33 `iso14Halt:error:()`

```
- (BOOL) iso14Halt:
    (int) cardIndex
    error:(NSError **) error
```

Halts connected ISO1443 card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>error</i>	pointer to <code>NSError</code> object, where error information is stored in case function fails. You can pass <code>nil</code> if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.34 iso14Transceive:data:error:()**

```
- (NSData *) iso14Transceive:
    (int) cardIndex
    data:(NSData *) data
    error:(NSError **) error
```

Executes APDU command on ISO1443 compatible card.

The command supports both ISO14443-4 protocol and non-protocol cards. For the protocol activation you need to call `iso14GetATS` first

**Parameters**

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>data</i>	command data
<i>error</i>	pointer to <code>NSError</code> object, where error information is stored in case function fails. You can pass <code>nil</code> if you don't want that information

**Returns**

command response data or `nil` if command failed

**2.16.3.35 iso14Transceive:data:status:error:()**

```
- (NSData *) iso14Transceive:
    (int) cardIndex
    data:(NSData *) data
    status:(uint8_t *) status
    error:(NSError **) error
```

Executes APDU command on ISO1443 compatible card.

The command supports both ISO14443-4 protocol and non-protocol cards. For the protocol activation you need to call `iso14GetATS` first

## Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>data</i>	command data
<i>status</i>	upon successful execution, the status of the command, returned by the card will be stored here. The status is meant as the first byte of the data, if you don't want it stripped out of the data, or the command you are sending does not send status byte, pass nil and the status byte will be ignored
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

command response data or nil if command failed

**2.16.3.36 iso15693GetBlocksSecurityStatus:startBlock:nBlocks:error:()**

```
- (NSData *) iso15693GetBlocksSecurityStatus:
    (int) cardIndex
    startBlock:(int) startBlock
    nBlocks:(int) nBlocks
    error:(NSError **) error
```

Reads the security status of one more more blocks from ISO 15693 card.

## Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>startBlock</i>	the starting block to read from
<i>nBlocks</i>	the number of blocks to get the security status
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

NSData object containing the data received or nil if an error occurred

**2.16.3.37 iso15693LockAFI:error:()**

```
- (BOOL) iso15693LockAFI:
    (int) cardIndex
    error:(NSError **) error
```

Locks ISO 15693 AFI preventing further changes.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.38 iso15693LockBlock:block:error:()**

```
- (BOOL) iso15693LockBlock:
    (int) cardIndex
    block:(int) block
    error:(NSError **) error
```

Locks a single ISO 15693 card block.

Locked blocks cannot be written upon anymore.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>block</i>	the block index to lock
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.39 iso15693LockDSFID:error:()**

```
- (BOOL) iso15693LockDSFID:
    (int) cardIndex
    error:(NSError **) error
```

Locks ISO 15693 card DSFID preventing further changes.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.40 iso15693Read:startBlock:length:error:()**

```
- (NSData *) iso15693Read:
    (int) cardIndex
  startBlock:(int) startBlock
  length:(int) length
  error:(NSError **) error
```

Reads one more more blocks of data from ISO 15693 card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>startBlock</i>	the starting block to read from
<i>length</i>	the number of bytes to read, this must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

NSData object containing the data received or nil if an error occurred

**2.16.3.41 iso15693Write:startBlock:data:bytesWritten:error:()**

```
- (BOOL) iso15693Write:
    (int) cardIndex
  startBlock:(int) startBlock
  data:(NSData *) data
  bytesWritten:(int *) bytesWritten
  error:(NSError **) error
```

Swift version: Writes one more more blocks of data to ISO 15693 card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>startBlock</i>	the starting block to write to
<i>data</i>	the data to write, it must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>bytesWritten</i>	optional parameter, filled with bytes written if the function partially succeeds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.42 iso15693Write:startBlock:data:error:()**

```
- (int) iso15693Write:
    (int) cardIndex
  startBlock:(int) startBlock
    data:(NSData *) data
    error:(NSError **) error
```

Writes one more more blocks of data to ISO 15693 card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>startBlock</i>	the starting block to write to
<i>data</i>	the data to write, it must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

number of bytes actually written or 0 if an error occurred

**2.16.3.43 iso15693WriteAFI:afi:error:()**

```
- (BOOL) iso15693WriteAFI:
    (int) cardIndex
    afi:(uint8_t) afi
    error:(NSError **) error
```

Changes ISO 15693 card AFI.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>afi</i>	new AFI value
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise



**2.16.3.44 iso15693WriteDSFID:dsfid:error:()**

```
- (BOOL) iso15693WriteDSFID:
    (int) cardIndex
    dsfid:(uint8_t) dsfid
    error:(NSError **) error
```

Changes ISO 15693 card DSFID.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>dsfid</i>	new DSFID value
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.45 mfAuthByKey:type:address:key:error:()**

```
- (BOOL) mfAuthByKey:
    (int) cardIndex
    type:(char) type
    address:(int) address
    key:(NSData *) key
    error:(NSError **) error
```

Authenticate mifare card block with direct key data.

This is less secure method, as it requires the key to be present in the program, the preferred way is to store a key once in a secure environment and then authenticate using the stored key.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>type</i>	key type, either 'A' or 'B'
<i>address</i>	the address of the block to authenticate
<i>key</i>	6 bytes key
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

### 2.16.3.46 mfAuthByStoredKey:type:address:keyIndex:error:()

```
- (BOOL) mfAuthByStoredKey:
    (int) cardIndex
    type:(char) type
    address:(int) address
    keyIndex:(int) keyIndex
    error:(NSError **) error
```

Authenticate mifare card block with previously stored key.

This the preferred method, as no key needs to reside in application.

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>type</i>	key type, either 'A' or 'B'
<i>address</i>	the address of the block to authenticate
<i>keyIndex</i>	the index of the stored key, you can have up to 8 keys stored (0-7)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.16.3.47 mfRead:address:length:error:()

```
- (NSData *) mfRead:
    (int) cardIndex
    address:(int) address
    length:(int) length
    error:(NSError **) error
```

Reads one more more blocks of data from Mifare Classic/Ultralight cards.

A single read operation gets 16 bytes of data, so you can pass 32 on length to read 2 blocks, etc

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the address of the block to read
<i>length</i>	the number of bytes to read, this must be multiple of block size (16 bytes)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

NSData object containing the data received or nil if an error occurred

**2.16.3.48 mfStoreKeyIndex:type:key:error:()**

```
- (BOOL) mfStoreKeyIndex:
    (int) keyIndex
    type:(char) type
    key:(NSData *) key
    error:(NSError **) error
```

Store key in the internal module memory for later use.

**Parameters**

<i>keyIndex</i>	the index of the key, you can have up to 8 keys stored (0-7)
<i>type</i>	key type, either 'A' or 'B'
<i>key</i>	6 bytes key
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.49 mfUlcAuthByKey:key:error:()**

```
- (BOOL) mfUlcAuthByKey:
    (int) cardIndex
    key:(NSData *) key
    error:(NSError **) error
```

Performs 3DES authentication of Mifare Ultralight C card using the given key.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>key</i>	16 bytes 3DES key to authenticate with
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

### 2.16.3.50 mfUlcSetKey:key:error:()

```
- (BOOL) mfUlcSetKey:
    (int) cardIndex
    key:(NSData *) key
    error:(NSError **) error
```

Sets the 3DES key of Mifare Ultralight C cards.

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>key</i>	16 bytes 3DES key to set
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.16.3.51 mfWrite:address:data:bytesWritten:error:()

```
- (BOOL) mfWrite:
    (int) cardIndex
    address:(int) address
    data:(NSData *) data
    bytesWritten:(int *) bytesWritten
    error:(NSError **) error
```

Swift version: Writes one more more blocks of data to Mifare Classic/Ultralight cards.

A single write operation stores 16 bytes of data, so you can pass 32 on length to write 2 blocks, etc

#### Parameters

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the address of the block to write
<i>data</i>	the data to write, must be multiple of the block size (16 bytes)
<i>bytesWritten</i>	optional parameter, filled with bytes written if the function partially succeeds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

**2.16.3.52 mfWrite:address:data:error:()**

```
- (int) mfWrite:
    (int) cardIndex
    address:(int) address
    data:(NSData *) data
    error:(NSError **) error
```

Writes one more more blocks of data to Mifare Classic/Ultralight cards.

A single write operation stores 16 bytes of data, so you can pass 32 on length to write 2 blocks, etc

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the address of the block to write
<i>data</i>	the data to write, must be multiple of the block size (16 bytes)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

number of bytes actually written or 0 if an error occurred

**2.16.3.53 rfClose:()**

```
- (BOOL) rfClose:
    (NSError **) error
```

Powers down RF card reader module.

Call this function after you are done with the reader.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.54 rfDetectCardOnChannel:additionalData:error:()**

```
- (DTRFCardInfo *) rfDetectCardOnChannel:
    (int) channel
```

```
additionalData:(NSData *) additionalData
error:(NSError **) error
```

Call this function to manually detect a card on specific channel.

This function stops the automatic card polling, if it is enabled by calling `rfInit` with `supportedCards` parameter different from 0

#### Parameters

<i>channel</i>	the card channel to detect card on, one of <code>RF_CARD_CHANNEL_*</code> constants
<i>additionalData</i>	optional card specific detection data
<i>error</i>	pointer to <code>NSError</code> object, where error information is stored in case function fails. You can pass <code>nil</code> if you don't want that information

#### Returns

detected card info if function succeeded, `nil` otherwise

#### 2.16.3.55 `rfDetectCardOnChannel:additionalData:timeout:error:()`

```
- (DTRFCardInfo *) rfDetectCardOnChannel:
    (int) channel
    additionalData:(NSData *) additionalData
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

Call this function to manually detect a card on specific channel.

This function stops the automatic card polling, if it is enabled by calling `rfInit` with `supportedCards` parameter different from 0

#### Parameters

<i>channel</i>	the card channel to detect card on, one of <code>RF_CARD_CHANNEL_*</code> constants
<i>additionalData</i>	optional card specific detection data
<i>timeout</i>	the maximum timeout to wait for the detection process to respond
<i>error</i>	pointer to <code>NSError</code> object, where error information is stored in case function fails. You can pass <code>nil</code> if you don't want that information

#### Returns

detected card info if function succeeded, `nil` otherwise

#### 2.16.3.56 `rfFieldControlOnChannel:enabled:error:()`

```
- (BOOL) rfFieldControlOnChannel:
    (int) channel
```

```
enabled:(bool) enabled
error:(NSError **) error
```

Allows enabling/disabling the field with specific card type settings.

#### Warning

Enabling the field and leaving it on will drain the battery very fast!

#### Parameters

<i>channel</i>	the card channel to detect card on, one of RF_CARD_CHANNEL_* constants
<i>enabled</i>	enable or disable the field
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.16.3.57 rflnit:error:()

```
- (BOOL) rflnit:
    (int) supportedCards
    error:(NSError **) error
```

Initializes and powers on the RF card reader module.

Call this function before any other RF card functions. The module power consumption is highly optimized, so it can be left on for extended periods of time.

#### Parameters

<i>supportedCards</i>	any combination of CARD_SUPPORT_* flags to mark which card types to be active. Enable only cards you actually plan to work with, this has high implication on power usage and detection speed. If you pass 0 as this parameter, the module will be enabled without scanning for cards, you can manually scan for card later with rfDetectCardOnChannel
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.16.3.58 `rfInit:fieldGain:error:()`

```
- (BOOL) rfInit:
    (int) supportedCards
    fieldGain:(int) fieldGain
    error:(NSError **) error
```

Initializes and powers on the RF card reader module.

Call this function before any other RF card functions. The module power consumption is highly optimized, so it can be left on for extended periods of time.

#### Parameters

<i>supportedCards</i>	any combination of CARD_SUPPORT_* flags to mark which card types to be active. Enable only cards you actually plan to work with, this has high implication on power usage and detection speed.
<i>fieldGain</i>	changes the gain of the field in mV. Currently supported values are 0 (unchanged), -100, -250, -500, -1000. Works on RC663 only devices with firmware that supports them
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.16.3.59 `rfInitWithPreferredReader:supportedCards:fieldGain:sleepTimeout:error:()`

```
- (BOOL) rfInitWithPreferredReader:
    (FEAT_RF_READERS) reader
    supportedCards:(int) supportedCards
    fieldGain:(int) fieldGain
    sleepTimeout:(NSTimeInterval) sleepTimeout
    error:(NSError **) error
```

Initializes and powers on the RF card reader module.

Call this function before any other RF card functions. The module power consumption is highly optimized, so it can be left on for extended periods of time.

#### Parameters

<i>reader</i>	which reader to use, one of the RF_READER constants, or RF_READER_NONE to not specify one, but rather use system default
<i>supportedCards</i>	any combination of CARD_SUPPORT_* flags to mark which card types to be active. Enable only cards you actually plan to work with, this has high implication on power usage and detection speed.
<i>fieldGain</i>	changes the gain of the field in mV. Currently supported values are 0 (unchanged), -100, -250, -500, -1000. Works on RC663 only devices with firmware that supports them
<i>sleepTimeout</i>	the time to sleep between consecutive RF scans. Lowering this value results in speedy card detections, but at the cost of battery, default is 0.3
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information



**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.60 rfReadPaymentCardTracks:tagList:error:()**

```
- (NSData *) rfReadPaymentCardTracks:
    (int) cardIndex
    tagList:(NSData *) tagList
    error:(NSError **) error
```

Call this function to read a payment card via the RF channel.

This is useful for fast getting of magnetic-type card tracks and doing an online transaction or some basic card check. The data is extracted from the card, magnetic type-like tracks are composed from the data and is stored inside the device. You can then get the encrypted card data via `msGetCardTracksEncryptedWithFormat`

**Parameters**

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>tagList</i>	a tag list of additional tags you can get from the card in plain. Sensitive tags are omitted
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

requested tag data or empty array if function succeeds, or nil if it failed

**2.16.3.61 rfRemoveCard:error:()**

```
- (BOOL) rfRemoveCard:
    (int) cardIndex
    error:(NSError **) error
```

Call this function once you are done with the card, a delegate call `rfCardRemoved` will be called when the card leaves the RF field and new card is ready to be detected.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

### 2.16.3.62 rfSetCustomSettings:settings:error:()

```
- (BOOL) rfSetCustomSettings:
    (int) channel
    settings:(NSData *) settings
    error:(NSError **) error
```

Call this function to alter specific settings of the supported chips.

Currently only devices with RC663 RF cpu are supported. The settings do not persist and can be used after `rfInit` was called

#### Parameters

<i>channel</i>	the card channel to detect card on, one of RF_CARD_CHANNEL_* constants
<i>settings</i>	chip specific settings, in case of RC663 it is [1Byte] - Register, [1Byte] mask (0xFF if you want to set the full value, or any bit mask), [1Byte] value
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.16.3.63 stSRIRead:address:length:error:()

```
- (NSData *) stSRIRead:
    (int) cardIndex
    address:(int) address
    length:(int) length
    error:(NSError **) error
```

Reads one more more blocks of data from ST SRI card.

#### Parameters

<i>cardIndex</i>	the index of the card as sent by <code>rfCardDetected</code> delegate call
<i>address</i>	the starting block to read from
<i>length</i>	the number of bytes to read, this must be multiple of block size (can be taken from the card info that is coming with <code>rfCardDetected</code> call)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

NSData object containing the data received or nil if an error occurred

**2.16.3.64 stSRIWrite:address:data:bytesWritten:error:()**

```

- (BOOL) stSRIWrite:
    (int) cardIndex
    address:(int) address
    data:(NSData *) data
    bytesWritten:(int *) bytesWritten
    error:(NSError **) error

```

Writes one more more blocks of data to ST SRI card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the starting block to write to
<i>data</i>	the data to write, it must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>bytesWritten</i>	optional parameter, filled with bytes written if the function partially succeeds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.16.3.65 stSRIWrite:address:data:error:()**

```

- (int) stSRIWrite:
    (int) cardIndex
    address:(int) address
    data:(NSData *) data
    error:(NSError **) error

```

Writes one more more blocks of data to ST SRI card.

**Parameters**

<i>cardIndex</i>	the index of the card as sent by rfCardDetected delegate call
<i>address</i>	the starting block to write to
<i>data</i>	the data to write, it must be multiple of block size (can be taken from the card info that is coming with rfCardDetected call)
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

number of bytes actually written or 0 if an error occurred

## 2.17 SmartCard Functions

This section includes functions to access SmartCard module and operate with SmartCards.

### Functions

- (BOOL) - [DTDevices::scInit:error:](#)  
*Initializes SmartCard module.*
- (NSData \*) - [DTDevices::scCardPowerOn:error:](#)  
*Powers on the SmartCard, resets it and returns ATR (Answer To Reset).*
- (BOOL) - [DTDevices::scCardPowerOff:error:](#)  
*Powers off SmartCard, call this function when you are done with the card.*
- (BOOL) - [DTDevices::scIsCardPresent:error:](#)  
*Manually checks if there is a card in the reader.*
- (NSData \*) - [DTDevices::scCAPDU:apdu:error:](#)  
*Performs APDU command in the card.*
- (NSData \*) - [DTDevices::scEncryptedCAPDU:encryption:keyID:apdu:error:](#)  
*Performs APDU command in the card and returns response encrypted.*
- (BOOL) - [DTDevices::scClose:error:](#)  
*Shuts down SmartCard module.*

### 2.17.1 Detailed Description

This section includes functions to access SmartCard module and operate with SmartCards.

### 2.17.2 Function Documentation

#### 2.17.2.1 [scCAPDU:apdu:error:\(\)](#)

```
- (NSData *) scCAPDU:
    (SC_SLOTS) slot
    apdu:(NSData *) apdu
    error:(NSError **) error
```

Performs APDU command in the card.

#### Parameters

<i>slot</i>	- which slot you want to operate with, one of:	
	SLOT_MAIN	main SmartCard slot
	SLOT_SAM	SAM module slot
<i>apdu</i>	- the APDU command	
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

**Returns**

APDU response data if function succeeded, nil otherwise

**2.17.2.2 scCardPowerOff:error:()**

```
- (BOOL) scCardPowerOff:
    (SC_SLOTS) slot
    error:(NSError **) error
```

Powers off SmartCard, call this function when you are done with the card.

**Parameters**

<i>slot</i>	- which slot you want to operate with, one of:	
	SLOT_MAIN	main SmartCard slot
	SLOT_SAM	SAM module slot
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.17.2.3 scCardPowerOn:error:()**

```
- (NSData *) scCardPowerOn:
    (SC_SLOTS) slot
    error:(NSError **) error
```

Powers on the SmartCard, resets it and returns ATR (Answer To Reset).

Call this function before you perform any APDU commands

**Parameters**

<i>slot</i>	- which slot you want to operate with, one of:	
	SLOT_MAIN	main SmartCard slot
	SLOT_SAM	SAM module slot
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

**Returns**

ATR response data if function succeeded or nil otherwise

#### 2.17.2.4 `scClose:error:()`

```
- (BOOL) scClose:
    (SC_SLOTS) slot
    error:(NSError **) error
```

Shuts down SmartCard module.

##### Parameters

<i>slot</i>	- which slot you want to operate with, one of:	
	SLOT_MAIN	main SmartCard slot
	SLOT_SAM	SAM module slot
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.17.2.5 `scEncryptedCAPDU:encryption:keyID:apdu:error:()`

```
- (NSData *) scEncryptedCAPDU:
    (SC_SLOTS) slot
    encryption:(int) encryption
    keyID:(int) keyID
    apdu:(NSData *) apdu
    error:(NSError **) error
```

Performs APDU command in the card and returns response encrypted.

##### Parameters

<i>slot</i>	- which slot you want to operate with, one of:	
	SLOT_MAIN	main SmartCard slot
	SLOT_SAM	SAM module slot
<i>encryption</i>	- the encryption algorithm to use, one of ALG_APDU_* constants	
<i>keyID</i>	- keyID to use	
<i>apdu</i>	- the APDU command	
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

##### Returns

APDU encrypted response if successful or nil if function failed.

### 2.17.2.6 `scInit:error:()`

```
- (BOOL) scInit:
    (SC_SLOTS) slot
    error:(NSError **) error
```

Initializes SmartCard module.

Call this function before any other SmartCard related one. Without initialization, no SmartCard events will be fired.

#### Parameters

<i>slot</i>	- which slot you want to operate with, one of:	
	SLOT_MAIN	main SmartCard slot
	SLOT_SAM	SAM module slot
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.17.2.7 `scIsCardPresent:error:()`

```
- (BOOL) scIsCardPresent:
    (SC_SLOTS) slot
    error:(NSError **) error
```

Manually checks if there is a card in the reader.

#### Parameters

<i>slot</i>	- which slot you want to operate with, one of:	
	SLOT_MAIN	main SmartCard slot
	SLOT_SAM	SAM module slot
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information	

#### Returns

TRUE if card is present, FALSE otherwise



## 2.18 Pinpad functions

Specific functions to work with the pinpad - entering and getting pin data, managing keys.

### Enumerations

- enum `DTDevices::DUKPT_KEY_VARIANTS` { `DTDevices::DUKPT_KEY_VARIANT_GENERATE_VERIFY` =2, `DTDevices::DUKPT_KEY_VARIANT_VERIFY` =3, `DTDevices::DUKPT_KEY_VARIANT_ENCRYPT` =4, `DTDevices::DUKPT_KEY_VARIANT_DECRYPT` =5 }
- DUKPT key variant.*

### Functions

- (BOOL) - `DTDevices::ppadPINEntry:startY:timeout:echoChar:message:error:`  
*Initiates synchronous PIN entry procedure.*
- (BOOL) - `DTDevices::ppadPINEntry:startY:timeout:echoChar:message:font:error:`
- (BOOL) - `DTDevices::ppadStartPINEntry:startY:timeout:echoChar:message:error:`  
*Initiates asynchronous PIN entry procedure.*
- (BOOL) - `DTDevices::ppadStartPINEntry:startY:timeout:echoChar:minPin:maxPin:message:font:error:`
- (BOOL) - `DTDevices::ppadCancelPINEntry:`  
*Tries to cancel asynchronous PIN entry procedure.*
- (BOOL) - `DTDevices::ppadMagneticCardEntry:timeout:error:`  
*Initiates synchronous magnetic card entry procedure.*
- (NSData \*) - `DTDevices::ppadGetPINBlockUsingFixedKey:keyVariant:pinFormat:error:`  
*Gets encrypted pin data using pre-loaded 3DES key  
The returned data consists of:*
- (NSData \*) - `DTDevices::ppadGetPINBlockUsingDUKPT:keyVariant:pinFormat:error:`  
*Gets encrypted pin data using DUKPT.*
- (NSData \*) - `DTDevices::ppadGetPINBlockUsingMasterSession:fixedKeyID:pinFormat:error:`  
*Gets encrypted pin data using pre-loaded 3DES key via master/session key way.*
- (BOOL) - `DTDevices::ppadVerifyPINOffline:cardStatus:error:`  
*Offline PIN verification.*
- (NSData \*) - `DTDevices::ppadVerifyPINOfflinePlainAndEncryptResponse:keyID:error:`  
*Offline plain PIN verification and returns the response encrypted.*
- (NSData \*) - `DTDevices::ppadVerifyPINOfflineEncryptedAndEncryptResponse:keyID:error:`  
*Offline encrypted PIN verification and returns the response encrypted.*
- (DTKeyInfo \*) - `DTDevices::ppadGetKeyInfo:error:`  
*Gets information about some of the keys loaded in the pinpad.*
- (NSArray< DTKeyInfo \* > \*) - `DTDevices::ppadGetKeysInfo:`  
*Gets information about the keys loaded in the pinpad.*
- (NSData \*) - `DTDevices::ppadGetDUKPTKeyKSN:error:`  
*Generates next dukpt key and increment the counter in the KSN by 1.*
- (NSData \*) - `DTDevices::ppadCryptoExchangeKeyID:kekID:usage:version:data:cbc:error:`  
*Loads/changes 3DES key into the pinpad.*
- (NSData \*) - `DTDevices::ppadCryptoTR31ExchangeKeyID:kekID:tr31:error:`  
*Loads/changes 3DES key into the pinpad.*
- (NSData \*) - `DTDevices::ppadCrypto3DESGeneratePANMACWithKeyID:error:`  
*Generates HMAC256 of a last card's PAN and returns it.*
- (NSData \*) - `DTDevices::ppadCrypto3DESECBEncryptKeyID:inData:error:`

- Encrypts a data on the pinpad using 3DES ECB.*

  - (NSData \*) - [DTDevices::ppadCrypto3DESECBDecryptKeyID:inData:error:](#)
- Decrypts a data on the pinpad using 3DES ECB.*

  - (NSData \*) - [DTDevices::ppadCrypto3DESCBCDecryptKeyID:inData:error:](#)
- Encrypts a data on the pinpad using 3DES CBC.*

  - (NSData \*) - [DTDevices::ppadCrypto3DESCBCDecryptKeyID:inData:error:](#)
- Decrypts a data on the pinpad using 3DES CBC.*

  - (NSData \*) - [DTDevices::ppadCrypto3DESCBCMACWithMode:keyID:inData:error:](#)
- Generate 3DES CBC MAC.*

  - (NSData \*) - [DTDevices::ppadCryptoDUKPTMACWithMode:inData:error:](#)
- Generate DUKPT CBC MAC using last generated dukpt key.*

  - (BOOL) - [DTDevices::ppadCryptoDelete3DESKeyID:error:](#)
- Deletes already loaded 3DES key.*

  - (NSData \*) - [DTDevices::ppadCryptoDUKPTGenerateKeyWithID:error:](#)
- Generates new DUKPT key and returns the KSN.*

  - (BOOL) - [DTDevices::ppadCryptoDUKPTCopyGeneratedKeyToID:keyVariant:error:](#)
- Generates new DUKPT key and returns the KSN.*

  - (BOOL) - [DTDevices::ppadSetButtonCaption:caption:error:](#)
- Sets the text that is drawn above functional buttons in MPED400.*

  - (DTPinpadInfo \*) - [DTDevices::ppadGetSystemInfo:](#)
- Returns pinpad specific information.*

  - (BOOL) - [DTDevices::ppadKeyboardControl:error:](#)
- Captures or releases keyboard.*

  - (BOOL) - [DTDevices::ppadReadKey:error:](#)
- Reads key from the pinpad.*

  - (BOOL) - [DTDevices::ppadEnableStatusLine:error:](#)
- Enables or disables the status line (showing clock and battery)*

  - (NSData \*) - [DTDevices::ppadCustomCommand:data:timeout:error:](#)
- Executes custom command on a connected pinpad.*

  - (BOOL) - [DTDevices::ppadEnableDebug:modules:error:](#)

## 2.18.1 Detailed Description

Specific functions to work with the pinpad - entering and getting pin data, managing keys.

## 2.18.2 Enumeration Type Documentation

### 2.18.2.1 DUKPT\_KEY\_VARIANTS

– (enum) [DUKPT\\_KEY\\_VARIANTS](#)

DUKPT key variant.

Enumerator

DUKPT_KEY_VARIANT_GENERATE_VERIFY	Generate/verify.
DUKPT_KEY_VARIANT_VERIFY	Verify only.
DUKPT_KEY_VARIANT_ENCRYPT	Encrypt.
DUKPT_KEY_VARIANT_DECRYPT	Decrypt.

### 2.18.3 Function Documentation

#### 2.18.3.1 `ppadCancelPINEntry:()`

```
- (BOOL) ppadCancelPINEntry:
    (NSError **) error
```

Tries to cancel asynchronous PIN entry procedure.

Current pinpad versions do not have native support for async PIN, so this function always returns an error, but it will be implemented in the future.

##### Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.18.3.2 `ppadCrypto3DESCBCDecryptKeyID:initVector:inData:error:()`

```
- (NSData *) ppadCrypto3DESCBCDecryptKeyID:
    (int) keyID
    initVector:(NSData *) initVector
    inData:(NSData *) inData
    error:(NSError **) error
```

Decrypts a data on the pinpad using 3DES CBC.

##### Parameters

<i>keyID</i>	the index of the 3DES key (1-49) to use for decryption
<i>initVector</i>	the initialization vector for the CBC, pass nil or 8 zeroes if you want to use empty IV
<i>inData</i>	the data to decrypt
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

decrypted data block

### 2.18.3.3 `ppadCrypto3DESCBCEncryptKeyID:initVector:inData:error:()`

```
- (NSData *) ppadCrypto3DESCBCEncryptKeyID:
    (int) keyID
    initVector:(NSData *) initVector
    inData:(NSData *) inData
    error:(NSError **) error
```

Encrypts a data on the pinpad using 3DES CBC.

#### Parameters

<i>keyID</i>	the index of the 3DES key (1-49) to use for encryption
<i>initVector</i>	the initialization vector for the CBC, pass nil or 8 zeroes if you want to use empty IV
<i>inData</i>	the data to encrypt
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

encrypted data block

### 2.18.3.4 `ppadCrypto3DESCBCMACWithMode:keyID:initVector:keyVariant:inData:error:()`

```
- (NSData *) ppadCrypto3DESCBCMACWithMode:
    (int) mode
    keyID:(int) keyID
    initVector:(NSData *) initVector
    keyVariant:(NSData *) keyVariant
    inData:(NSData *) inData
    error:(NSError **) error
```

Generate 3DES CBC MAC.

#### Parameters

<i>mode</i>	MAC mode	
	MAC_MODE1	key for ISO 9797-1 MAC Algorithm 1
	MAC_MODE3	key for ISO 9797-1 MAC Algorithm 3
	MAC_MODEB	key for ISO 16609 MAC algorithm 1
<i>keyID</i>	- key ID (1-49)	
<i>initVector</i>	- initialization vector (8 bytes)	
<i>keyVariant</i>	- key variant, XOR-ed with key value (16 bytes)	
<i>inData</i>	- input data buffer	
<i>error</i>	returns error information, you can pass nil if you don't want it	

#### Returns

MAC data

### 2.18.3.5 ppadCrypto3DESECBDecryptKeyID:inData:error:()

```
- (NSData *) ppadCrypto3DESECBDecryptKeyID:
    (int) keyID
    inData:(NSData *) inData
    error:(NSError **) error
```

Decrypts a data on the pinpad using 3DES ECB.

#### Parameters

<i>keyID</i>	the index of the 3DES key (1-49) to use for decryption
<i>inData</i>	the data to decrypt
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

decrypted data block

### 2.18.3.6 ppadCrypto3DESECBEncryptKeyID:inData:error:()

```
- (NSData *) ppadCrypto3DESECBEncryptKeyID:
    (int) keyID
    inData:(NSData *) inData
    error:(NSError **) error
```

Encrypts a data on the pinpad using 3DES ECB.

#### Parameters

<i>keyID</i>	the index of the 3DES key (1-49) to use for encryption
<i>inData</i>	the data to encrypt
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

encrypted data block

### 2.18.3.7 ppadCrypto3DESGeneratePANMACWithKeyID:error:()

```
- (NSData *) ppadCrypto3DESGeneratePANMACWithKeyID:
    (int) keyID
    error:(NSError **) error
```

Generates HMAC256 of a last card's PAN and returns it.

**Parameters**

<i>keyID</i>	the index of the 3DES key (1-49) to use for encryption
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

PAN's HMAC256

**2.18.3.8 ppadCryptoDelete3DESKeyID:error:()**

```
- (BOOL) ppadCryptoDelete3DESKeyID:
    (int) keyID
    error:(NSError **) error
```

Deletes already loaded 3DES key.

**Parameters**

<i>keyID</i>	the index of the 3DES key (1-49) to use for decryption
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.18.3.9 ppadCryptoDUKPTCopyGeneratedKeyToID:keyVariant:error:()**

```
- (BOOL) ppadCryptoDUKPTCopyGeneratedKeyToID:
    (int) keyID
    keyVariant:(DUKPT_KEY_VARIANTS) keyVariant
    error:(NSError **) error
```

Generates new DUKPT key and returns the KSN.

**Parameters**

<i>keyID</i>	the index of the DUKPT key (0-7)
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

KSN upon success, nil otherwise

2.18.3.10 `ppadCryptoDUKPTGenerateKeyWithID:error:()`

```
- (NSData *) ppadCryptoDUKPTGenerateKeyWithID:
    (int) keyID
    error:(NSError **) error
```

Generates new DUKPT key and returns the KSN.

## Parameters

<i>keyID</i>	the index of the DUKPT key (0-7)
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

KSN upon success, nil otherwise

2.18.3.11 `ppadCryptoDUKPTMACWithMode:initVector:keyVariant:inData:error:()`

```
- (NSData *) ppadCryptoDUKPTMACWithMode:
    (int) mode
    initVector:(NSData *) initVector
    keyVariant:(NSData *) keyVariant
    inData:(NSData *) inData
    error:(NSError **) error
```

Generate DUKPT CBC MAC using last generated dukpt key.

## Parameters

<i>mode</i>	MAC mode	
	MAC_MODE1	key for ISO 9797-1 MAC Algorithm 1
	MAC_MODE3	key for ISO 9797-1 MAC Algorithm 3
	MAC_MODEB	key for ISO 16609 MAC algorithm 1
<i>initVector</i>	- initialization vector (8 bytes)	
<i>keyVariant</i>	- key variant, XOR-ed with key value (16 bytes)	
<i>inData</i>	- input data buffer	
<i>error</i>	returns error information, you can pass nil if you don't want it	

## Returns

MAC data

2.18.3.12 `ppadCryptoExchangeKeyID:kekID:usage:version:data:cbc:error:()`

```
- (NSData *) ppadCryptoExchangeKeyID:
    (int) keyID
```

```

    kekID:(int) kekID
    usage:(int) usage
    version:(int) version
    data:(NSData *) data
    cbc:(BOOL) cbc
    error:(NSError **) error

```

Loads/changes 3DES key into the pinpad.

The key is encrypted via 3DES (ECB or CBC) by a Key Encryption Key already loaded. If KBPK type is used as KEK, then only other KEK (data encrypt, decrypt, pin) can be loaded, not the data key itself.

#### Parameters

<i>keyID</i>	- key the index where key shall be saved. For DUKPT keys this value can be between 0 and 1. For other keys the value can be between 1 and 49
<i>kekID</i>	- key the index of key, used to decrypt the encrypted key data when loading. The value can be between 0 and 49, where on index 0 resides the HMK key
<i>usage</i>	the key usage (type of key) attributes. See the KEY_USAGE_* constant field values.
<i>version</i>	the key version. Not used if key usage is KEY_USAGE_DUKPT
<i>data</i>	the 16 or 26 byte of input data to be processed. The first 16 bytes must contains encrypted key and next 10 bytes (if presents) are key serial number.
<i>cbc</i>	set to TRUE if the data was generated using CBC, FALSE if ECB
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

key check value upon success, nil otherwise

#### 2.18.3.13 ppadCryptoTR31ExchangeKeyID:kekID:tr31:error:()

```

- (NSData *) ppadCryptoTR31ExchangeKeyID:
    (int) keyID
    kekID:(int) kekID
    tr31:(NSString *) tr31
    error:(NSError **) error

```

Loads/changes 3DES key into the pinpad.

The key is encrypted with TR31 by an already loaded KEK, KBPK or HMK. If KBPK type is used as KEK, then all key types can be loaded.

#### Parameters

<i>keyID</i>	- the index where key shall be saved. For DUKPT keys this value can be between 0 and 1. For other keys the value can be between 1 and 49
<i>kekID</i>	- the index of the key, used to decrypt the encrypted key data when loading. The value can be between 0 and 49, where on index 0 resides the HMK key
<i>tr31</i>	the TR31 data block
<i>error</i>	returns error information, you can pass nil if you don't want it



**Returns**

key check value upon success, nil otherwise

**2.18.3.14 ppadCustomCommand:data:timeout:error:()**

```
- (NSData *) ppadCustomCommand:
    (int) command
    data:(NSData *) data
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

Executes custom command on a connected pinpad.

**Parameters**

<i>command</i>	command code
<i>data</i>	command data or nil if not needed
<i>timeout</i>	timeout to wait for the command to respond, default is 3 seconds
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

command response data or nil if command failed

**2.18.3.15 ppadEnableDebug:modules:error:()**

```
- (BOOL) ppadEnableDebug:
    (BOOL) enabled
    modules:(uint32_t) modules
    error:(NSError **) error
```

**2.18.3.16 ppadEnableStatusLine:error:()**

```
- (BOOL) ppadEnableStatusLine:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables the status line (showing clock and battery)

**Parameters**

<i>enabled</i>	enables or disables the status line
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.18.3.17 ppadGetDUKPTKeyKSN:error:()**

```
- (NSData *) ppadGetDUKPTKeyKSN:
    (int) keyID
    error:(NSError **) error
```

Generates next dukpt key and increment the counter in the KSN by 1.

The generated key can be used in subsequent functions unless they do their own generation.

**Parameters**

<i>keyID</i>	- key ID (0-7)
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

generated KSN upon success, nil otherwise

**2.18.3.18 ppadGetKeyInfo:error:()**

```
- (DTKeyInfo *) ppadGetKeyInfo:
    (int) keyID
    error:(NSError **) error
```

Gets information about some of the keys loaded in the pinpad.

**Parameters**

<i>keyID</i>	- key ID (1-49)
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

key information object upon success, nil otherwise

**2.18.3.19 ppadGetKeysInfo:()**

```
- (NSArray<DTKeyInfo *> *) ppadGetKeysInfo:
    (NSError **) error
```

Gets information about the keys loaded in the pinpad.

This function works in pinpad app 2.4.41.85 or higher, on lower versions it gets maximum of 10 3des keys and 8 dukpt and takes much longer

#### Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

#### Returns

keys info upon success, nil otherwise

#### 2.18.3.20 ppadGetPINBlockUsingDUKPT:keyVariant:pinFormat:error:()

```
- (NSData *) ppadGetPINBlockUsingDUKPT:
    (int) dukptKeyID
    keyVariant:(NSData *) keyVariant
    pinFormat:(int) pinFormat
    error:(NSError **) error
```

Gets encrypted pin data using DUKPT.

The returned data consists of:

- DUKPT/3DES Encrypted PIN code, according to the selected format (8 bytes)
- Current Key Serial Number (10 bytes)

#### Parameters

<i>dukptKeyID</i>	- DUKPT key ID (0-1)
<i>keyVariant</i>	16 bytes of data, that is XOR-ed with the key before encrypting. Pass nil if you don't want that.
<i>pinFormat</i>	PIN format, one of the PIN_FORMAT_* constants, according to ISO 9564
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

encrypted pin block upon success, nil otherwise

#### 2.18.3.21 ppadGetPINBlockUsingFixedKey:keyVariant:pinFormat:error:()

```
- (NSData *) ppadGetPINBlockUsingFixedKey:
    (int) fixedKeyID
    keyVariant:(NSData *) keyVariant
```

```
pinFormat:(int) pinFormat
error:(NSError **) error
```

Gets encrypted pin data using pre-loaded 3DES key  
The returned data consists of:

- 3DES Encrypted PIN code, according to the selected format (8 bytes)

#### Parameters

<i>fixedKeyID</i>	- key ID (1-49)
<i>keyVariant</i>	16 bytes of data, that is XOR-ed with the key before encrypting. Pass nil if you don't want that.
<i>pinFormat</i>	PIN format, one of the PIN_FORMAT_* constants, according to ISO 9564
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

encrypted pin block upon success, nil otherwise

#### 2.18.3.22 ppadGetPINBlockUsingMasterSession:fixedKeyID:pinFormat:error:()

```
- (NSData *) ppadGetPINBlockUsingMasterSession:
    (NSData *) sessionKey
    fixedKeyID:(int) fixedKeyID
    pinFormat:(int) pinFormat
    error:(NSError **) error
```

Gets encrypted pin data using pre-loaded 3DES key via master/session key way.

Master/session involves server, that generates a random 3DES (16 bytes) key and encrypts it with a pre-loaded 3DES key (3DES ECB). The encrypted key is sent to the device and passed on this function along with the key id of the 3DES key used to encrypt the random data key. The pinpad internally decrypts the data to receive the original random 3DES key, encrypts the PIN with it and returns the data

The returned data consists of:

- 3DES Encrypted PIN code, according to the selected format (8 bytes)

#### Parameters

<i>sessionKey</i>	random 3DES key generated by the server and encrypted with existing key on the pinpad (3DES ECB)
<i>fixedKeyID</i>	key ID used to decrypt the random 3DES key (1-49)
<i>pinFormat</i>	PIN format, one of the PIN_FORMAT_* constants, according to ISO 9564
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

encrypted pin block upon success, nil otherwise

2.18.3.23 `ppadGetSystemInfo:()`

```
- (DTPinpadInfo *) ppadGetSystemInfo:
    (NSError **) error
```

Returns pinpad specific information.

## Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

## Returns

class containing pinpad information or nil if function failed

2.18.3.24 `ppadKeyboardControl:error:()`

```
- (BOOL) ppadKeyboardControl:
    (BOOL) capture
    error:(NSError **) error
```

Captures or releases keyboard.

PinPad internally reads the keyboard to operate menus and such, if you want to be able to read keys, then you have to capture it before that, and release after.

## Parameters

<i>capture</i>	- capture the keyboard if TRUE, release if FALSE
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE if function succeeded, FALSE otherwise

2.18.3.25 `ppadMagneticCardEntry:timeout:error:()`

```
- (BOOL) ppadMagneticCardEntry:
    (int) language
    timeout:(int) timeout
    error:(NSError **) error
```

Initiates synchronous magnetic card entry procedure.

The magnetic card data is stored encrypted and protected inside the pinpad. After successful operation card data is sent like any other card read operation - via `magneticCardEncryptedData` with the encryption selected via `emsr↔SetEncryption`. This function is blocking and can take up to timeout seconds, so make sure to call it on a thread or `dispatch_async`

**Parameters**

<i>language</i>	- the language to display prompt on, one of the LANG_* constants
<i>timeout</i>	- timeout in seconds waiting for the user to enter the card data (10-180)
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.18.3.26 ppadPINEntry:startY:timeout:echoChar:message:error:()**

```
- (BOOL) ppadPINEntry:
    (int) startX
  startY:(int) startY
  timeout:(int) timeout
  echoChar:(char) echoChar
  message:(NSString *) message
  error:(NSError **) error
```

Initiates synchronous PIN entry procedure.

The PIN is stored encrypted and protected inside the pinpad. This function is blocking and cannot be cancelled. Upon success use getPinEncrypted... functions to retrieve the data

**Parameters**

<i>startX</i>	- X coordinate in characters from the left end of the defined window where the PIN entry prompt will be drawn
<i>startY</i>	- Y coordinate in characters from the top of the defined window where the PIN entry prompt will be drawn
<i>timeout</i>	- timeout in seconds waiting for the user to enter the pin (10-180)
<i>echoChar</i>	- symbol used to mark the pin digits, allowed are '*', '+' or '-'
<i>message</i>	- text to be displayed to the user. You can use [CR] to move the cursor to the next line.
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.18.3.27 ppadPINEntry:startY:timeout:echoChar:message:font:error:()**

```
- (BOOL) ppadPINEntry:
    (int) startX
  startY:(int) startY
```

```

timeout:(int) timeout
echoChar:(char) echoChar
message:(NSString *) message
font:(int) font
error:(NSError **) error

```

### 2.18.3.28 ppadReadKey:error:()

```

- (BOOL) ppadReadKey:
    (char *) key
    error:(NSError **) error

```

Reads key from the pinpad.

y codes are:

0x00	No key have been pressed
0x01/0x03	Numeric key have been pressed, but no numeric mode is enabled
'0'-'9'	Number keys 0-9, available only in numeric mode
'A'	Accept button have been pressed
'C'	Cancel button have been pressed
'a','b','c'	Functional buttons 1-3

#### Parameters

<i>key</i>	- stores key upon return
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.18.3.29 ppadSetButtonCaption:caption:error:()

```

- (BOOL) ppadSetButtonCaption:
    (int) buttonIndex
    caption:(NSString *) caption
    error:(NSError **) error

```

Sets the text that is drawn above functional buttons in MPED400.

#### Parameters

<i>buttonIndex</i>	- functional button index (1-3)
<i>caption</i>	- text to display
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.18.3.30 ppadStartPINEntry:startY:timeout:echoChar:message:error:()**

```
- (BOOL) ppadStartPINEntry:
    (int) startX
  startY:(int) startY
  timeout:(int) timeout
  echoChar:(char) echoChar
  message:(NSString *) message
  error:(NSError **) error
```

Initiates asynchronous PIN entry procedure.

The PIN is stored encrypted and protected inside the pinpad. This function is not blocking, it passes the answer via delegate. Currently this function calls internal synchronous function from a thread and notifies about the result, but future firmware versions will have native support where you can cancel pin entry too.

**Parameters**

<i>startX</i>	- X coordinate in characters from the left end of the defined window where the PIN entry prompt will be drawn
<i>startY</i>	- Y coordinate in characters from the top of the defined window where the PIN entry prompt will be drawn
<i>timeout</i>	- timeout in seconds waiting for the user to enter the pin (10-180)
<i>echoChar</i>	- symbol used to mark the pin digits, allowed are '*', '+' or '-'
<i>message</i>	- text to be displayed to the user. You can use [CR] to move the cursor to the next line.
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.18.3.31 ppadStartPINEntry:startY:timeout:echoChar:minPin:maxPin:message:font:error:()**

```
- (BOOL) ppadStartPINEntry:
    (int) startX
  startY:(int) startY
  timeout:(int) timeout
  echoChar:(char) echoChar
  minPin:(int) minPin
  maxPin:(int) maxPin
  message:(NSString *) message
  font:(int) font
  error:(NSError **) error
```



**Warning**

This function is supported on very specific firmware revisions only use the other variant instead! Initiates asynchronous PIN entry procedure. The PIN is stored encrypted and protected inside the pinpad. This function is not blocking, it passes the answer via delegate. Currently this function calls internal synchronous function from a thread and notifies about the result, but future firmware versions will have native support where you can cancel pin entry too.

**Parameters**

<i>startX</i>	- X coordinate in characters from the left end of the defined window where the PIN entry prompt will be drawn
<i>startY</i>	- Y coordinate in characters from the top of the defined window where the PIN entry prompt will be drawn
<i>timeout</i>	- timeout in seconds waiting for the user to enter the pin (10-180)
<i>echoChar</i>	- symbol used to mark the pin digits, allowed are '*', '+' or '-'
<i>minPin</i>	- minimum length of the pin (default 4, pass -1 to use default value)
<i>maxPin</i>	- maximum length of the pin (default 12, pass -1 to use default value)
<i>message</i>	- text to be displayed to the user. You can use [CR] to move the cursor to the next line.
<i>font</i>	- screen font to use, one of FONT_ constants
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.18.3.32 ppadVerifyPINOffline:cardStatus:error:()**

```
- (BOOL) ppadVerifyPINOffline:
    (BOOL) encrypted
    cardStatus:(uint16_t *) cardStatus
    error:(NSError **) error
```

Offline PIN verification.

**Parameters**

<i>encrypted</i>	- if TRUE the pinpad will use encrypted PIN
<i>cardStatus</i>	- SmartCard status bytes will be stored here upon return
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

### 2.18.3.33 `ppadVerifyPINOfflineEncryptedAndEncryptResponse:keyID:error:()`

```
- (NSData *) ppadVerifyPINOfflineEncryptedAndEncryptResponse:
    (int) encryption
    keyID:(int) keyID
    error:(NSError **) error
```

Offline encrypted PIN verification and returns the response encrypted.

#### Parameters

<i>encryption</i>	- the encryption algorithm to use, one of ALG_APDU_* constants
<i>keyID</i>	- keyID to use
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

encrypted verification result if successful or nil if function failed.

### 2.18.3.34 `ppadVerifyPINOfflinePlainAndEncryptResponse:keyID:error:()`

```
- (NSData *) ppadVerifyPINOfflinePlainAndEncryptResponse:
    (int) encryption
    keyID:(int) keyID
    error:(NSError **) error
```

Offline plain PIN verification and returns the response encrypted.

#### Parameters

<i>encryption</i>	- the encryption algorithm to use, one of ALG_APDU_* constants
<i>keyID</i>	- keyID to use

#### Returns

encrypted verification result if successful or nil if function failed.

## 2.19 Certification Authority Functions

This section includes functions for managing CA keys.

### Functions

- (BOOL) - `DTDevices::caImportKeyNumber:RIDI:module:exponent:error:`  
*Import CA key.*
- (BOOL) - `DTDevices::caWriteKeysToFlash:`  
*Writes CA keys to flash.*
- (NSArray< `DTCAKeyInfo` \* > \*) - `DTDevices::caGetKeysData:`  
*Returns keys data.*
- (NSData \*) - `DTDevices::caImportIssuerKeyNumber:exponent:remainder:certificate:error:`  
*Import issuer key.*
- (NSData \*) - `DTDevices::caImportICCKeyType:exponent:remainder:certificate:error:`  
*Import ICC key.*
- (NSData \*) - `DTDevices::caRSASVerify:inData:error:`  
*RSA verify.*

### 2.19.1 Detailed Description

This section includes functions for managing CA keys.

### 2.19.2 Function Documentation

#### 2.19.2.1 `caGetKeysData:()`

```
- (NSArray<DTCAKeyInfo * > *) caGetKeysData:
    (NSError **) error
```

Returns keys data.

#### Parameters

<code>error</code>	returns error information, you can pass nil if you don't want it
--------------------	--

#### Returns

array of `RFCKeyData` objects or nil if function failed

### 2.19.2.2 `caImportICCKeyType:exponent:remainder:certificate:error:()`

```
- (NSData *) caImportICCKeyType:
    (ICC_TYPES) keyType
    exponent:(NSData *) exponent
    remainder:(NSData *) remainder
    certificate:(NSData *) certificate
    error:(NSError **) error
```

Import ICC key.

#### Parameters

<i>keyType</i>	- key type, one of:	
	TYPE_ICC	ICC
	TYPE_PIN	PIN
<i>exponent</i>	- exponent	
<i>remainder</i>	- remainder	
<i>certificate</i>	- certificate	
<i>error</i>	returns error information, you can pass nil if you don't want it	

#### Returns

decrypted certificate or nil if function failed

### 2.19.2.3 `caImportIssuerKeyNumber:exponent:remainder:certificate:error:()`

```
- (NSData *) caImportIssuerKeyNumber:
    (int) keyNumber
    exponent:(NSData *) exponent
    remainder:(NSData *) remainder
    certificate:(NSData *) certificate
    error:(NSError **) error
```

Import issuer key.

#### Parameters

<i>keyNumber</i>	- key number to decrypt issuer key (0-29)
<i>exponent</i>	- exponent
<i>remainder</i>	- remainder
<i>certificate</i>	- certificate
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

decrypted certificate or nil if function failed

#### 2.19.2.4 `caImportKeyNumber:RIDI:module:exponent:error:()`

```
- (BOOL) caImportKeyNumber:
    (int) keyNumber
    RIDI:(NSData *) RIDI
    module:(NSData *) module
    exponent:(NSData *) exponent
    error:(NSError **) error
```

Import CA key.

##### Parameters

<i>keyNumber</i>	- key number (0-29)
<i>RIDI</i>	- DIR+index (6 bytes)
<i>module</i>	- key module (32-248 bytes)
<i>exponent</i>	- key exponent (1-3 bytes typical)
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.19.2.5 `caRSASVerify:inData:error:()`

```
- (NSData *) caRSASVerify:
    (RSA_VERIFY_KEY) keyType
    inData:(NSData *) inData
    error:(NSError **) error
```

RSA verify.

##### Parameters

<i>keyType</i>	- key type, one of:	
	KEY_ISSUER	Issuer key
	KEY_ICC	ICC key
<i>inData</i>	- input data	
<i>error</i>	returns error information, you can pass nil if you don't want it	

##### Returns

output data or nil if function failed

### 2.19.2.6 caWriteKeysToFlash:()

```
- (BOOL) caWriteKeysToFlash:  
    (NSError **) error
```

Writes CA keys to flash.

It is important to call this function after changing the keys if you don't want to lose them after device is turned off.

#### Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

## 2.20 Universal EMV2 Kernel

Universal EMV Level 2 kernel functions, structures and definitions.

Universal EMV Level 2 kernel functions, structures and definitions.

## 2.21 PinPad EMV Kernel

EMV Level 2 kernel functions, structures and definitions.

### Modules

- [EMV Operation Workflow](#)

*Description and block diagrams of various operations with the pinpad.*

- [EMV TAGs](#)

*EMV TAGs you can use with their properties.*

- [EMV Status Codes](#)

*These status codes are returned from every EMV function to indicate the result of it.*

- [Transaction Start](#)

*This section includes the command used to start the transaction: ATR validation and application selection.*

- [Transaction Processing](#)

*This section covers the different phases of the transaction:*

*Initial process*

*Data reading*

*Card data authentication*

*Restrictions processing*

*Risk Control*

*Cardholder authentication*

*Certificate generation*

*Make Transaction decision*

*Make default decision.*

- [Issuer Authentication](#)

*The commands listed here are intended to process the data coming from the issuer as part of the response to the online authorization request.*

- [General Commands](#)

*These commands are not part of the basic transaction management but provide the kernel with more flexibility, and can be used by the application for its own particular requirements.*

- [Data Access](#)

*The commands described below are used to access the data items used by the kernel.*

### Macros

- `#define EMV_STRUCTURES_DEFINED`

- `#define TVR_DEFAULT_TDOL_USED 0x0508`

*This is the list of the bits of the TVR that can be checked or updated.*

- `#define TVR_ISSUER_AUTH_FAILED 0x0507`

- `#define TVR_SCRIPT_FAIL_BEFORE_AC 0x0506`

- `#define TVR_SCRIPT_FAIL_AFTER_AC 0x0505`

- `#define TVR_TERMINAL_LIMIT_EXCEEDED 0x0408`

- `#define TVR_LOWER_OFF_LIMIT_EXCEEDED 0x0407`

- `#define TVR_UPPER_OFF_LIMIT_EXCEEDED 0x0406`

- `#define TVR_RANDOM_SELECTION_ONLINE 0x0405`

- `#define TVR_MERCHANT_FORCE_ONLINE 0x0404`

- `#define TVR_CARDHOLDER_VERIF_FAILURE 0x0308`

- `#define TVR_VERIF_METHOD_UNKNOWN 0x0307`

- `#define TVR_PIN_LIMIT_EXCEEDED 0x0306`

- `#define TVR_PIN_ASKED_PINPAD_FAILURE 0x0305`

- `#define TVR_PIN_ASKED_BUT_NOT_ENTERED 0x0304`



- #define TVR\_ONLINE\_PIN\_ENTERED 0x0303
  - #define TVR\_SOFTWARE\_VERSIONS 0x0208
  - #define TVR\_APPLICATION\_EXPIRED 0x0207
  - #define TVR\_APPLICATION\_NOT\_EFFECTIVE 0x0206
  - #define TVR\_REQ\_SERVICE\_NOT\_ALLOWED 0x0205
  - #define TVR\_NEW\_CARD 0x0204
  - #define TVR\_OFFDATA\_AUTH\_NOT\_DONE 0x0108
  - #define TVR\_STATIC\_AUTH\_FAILED 0x0107
  - #define TVR\_DATA\_NOT\_FOUND 0x0106
  - #define TVR\_CARD\_IN\_HOT\_LIST 0x0105
  - #define TVR\_DYNAMIC\_AUTH\_FAILED 0x0104
  - #define TVR\_COMBINED\_DDA\_FAILED 0x0103
  - #define TSI\_OFFDATA\_AUTH\_DONE 0x0108
- This is the list of the bits of the TSI that can be checked or updated.*
- #define TSI\_CARDHOLDER\_VERIF\_DONE 0x0107
  - #define TSI\_CARD\_RISK\_DONE 0x0106
  - #define TSI\_ISSUER\_AUTH\_DONE 0x0105
  - #define TSI\_TERMINAL\_RISK\_DONE 0x0104
  - #define TSI\_SCRIPT\_PROCESS\_DONE 0x0103

## Enumerations

- enum DTDevices::APP\_SELECTION\_METHODS { DTDevices::SELECTION\_PSE =0, DTDevices::SELECTION\_AIDLIST }
- enum DTDevices::APP\_MATCH\_CRITERIAS { DTDevices::MATCH\_FULL =1, DTDevices::MATCH\_PARTIAL\_VISA, DTDevices::MATCH\_PARTIAL\_EUROPAY }
- enum DTDevices::AUTH\_RESULTS { DTDevices::AUTH\_RESULT\_SUCCESS =1, DTDevices::AUTH\_RESULT\_FAILURE, DTDevices::AUTH\_FAIL\_PIN\_ENTRY\_NOT\_DONE, DTDevices::AUTH\_FAIL\_USER\_CANCELLATION }
- enum DTDevices::BYPASS\_MODES { DTDevices::BYPASS\_CURRENT\_METHOD\_MODE =0, DTDevices::BYPASS\_ALL\_METHODS\_MODE }
- enum DTDevices::CERTIFICATE\_AC\_TYPES { DTDevices::CERTIFICATE\_AAC =0, DTDevices::CERTIFICATE\_TC, DTDevices::CERTIFICATE\_ARQC }
- enum DTDevices::CARD\_RISK\_TYPES { DTDevices::CDOL\_1 =1, DTDevices::CDOL\_2 }
- enum DTDevices::TAG\_TYPES { DTDevices::TAG\_TYPE\_BINARY =0, DTDevices::TAG\_TYPE\_BCD, DTDevices::TAG\_TYPE\_STRING }

### 2.21.1 Detailed Description

EMV Level 2 kernel functions, structures and definitions.

#### Kernel initialisation and version verification

Firstly the application will have to initialise the library, this will only have to be done once at the unit power up. At the same time it will be convenient also to check the version info provided by the kernel to make sure that is the expected one.

After the initialisation, the first thing to do will be to set all the data items needed to start the transaction, mainly these items correspond to configuration issues:

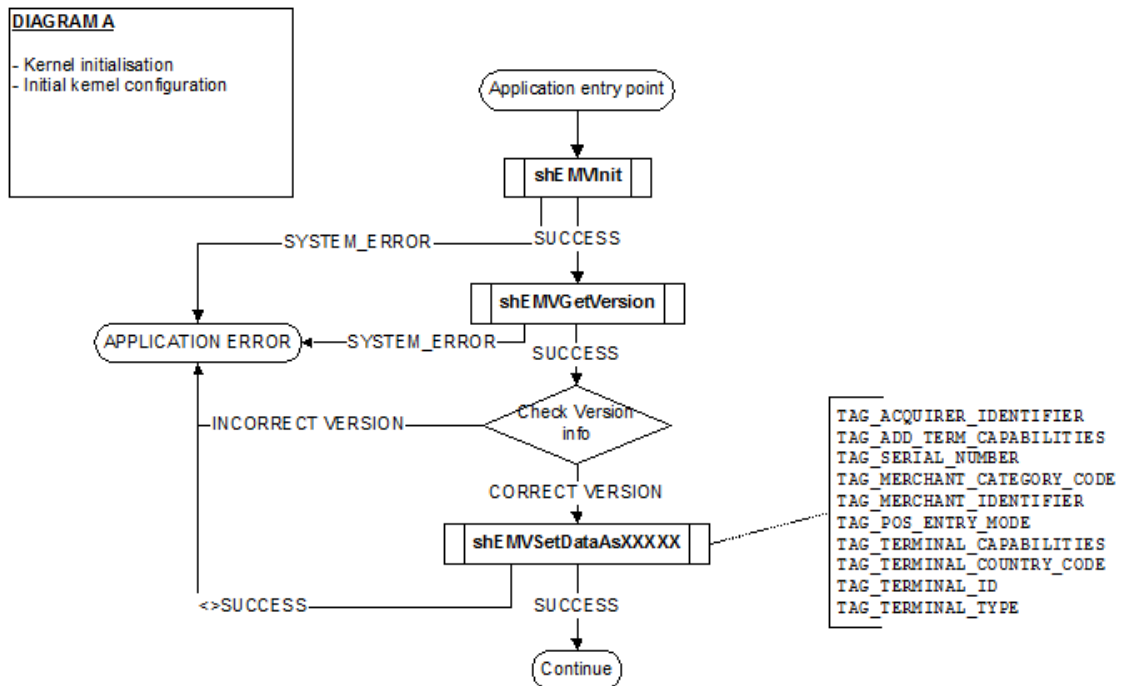


Figure 2.1 Kernel initialisation and version verification

### Card recognition and ATR validation

The application will be in charge of detecting the presence of the smart card in the reader using the corresponding firmware function call, the application must power on the card also, the kernel is used in this phase to validate the ATR got from the card.

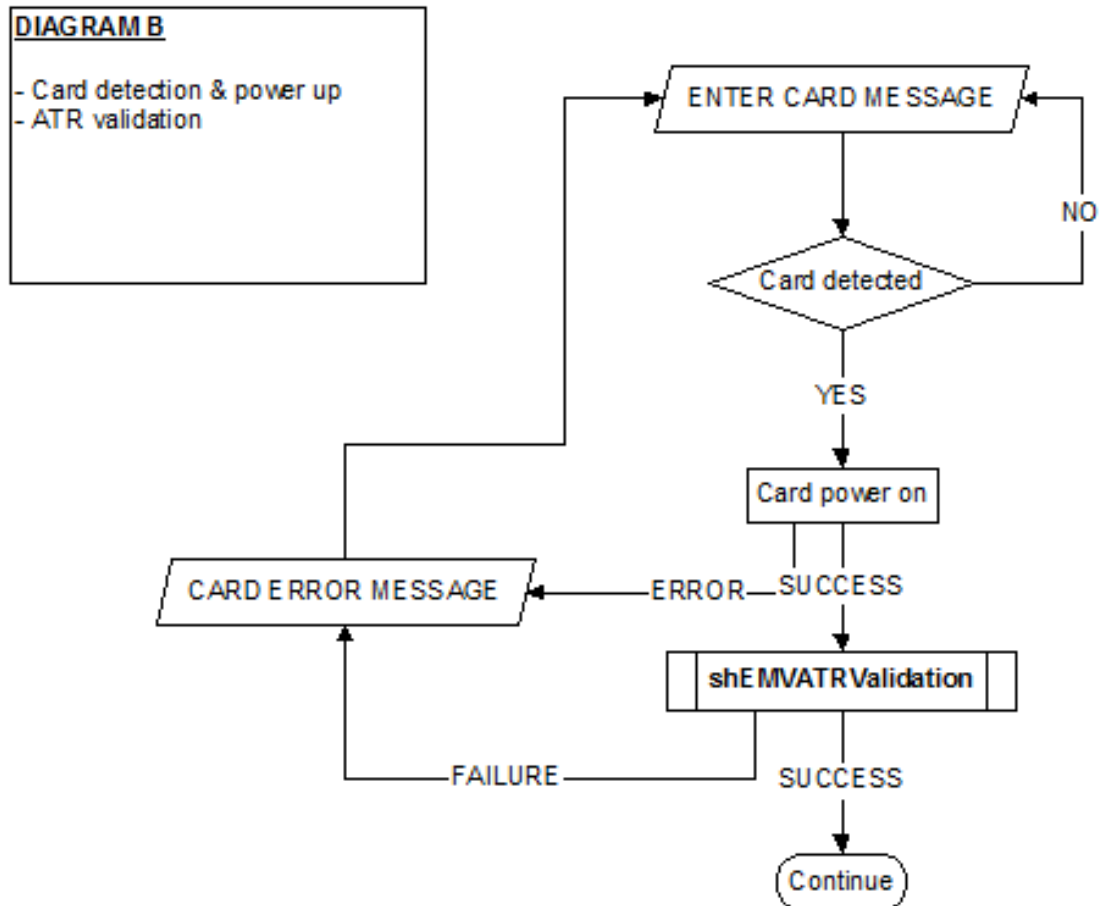


Figure 2.2 Card recognition and ATR validation

### Application selection & initiation

Once the card has been powered on and the ATR validated to ensure that is a valid EMV card, the next step is to proceed with the application selection and initiation.

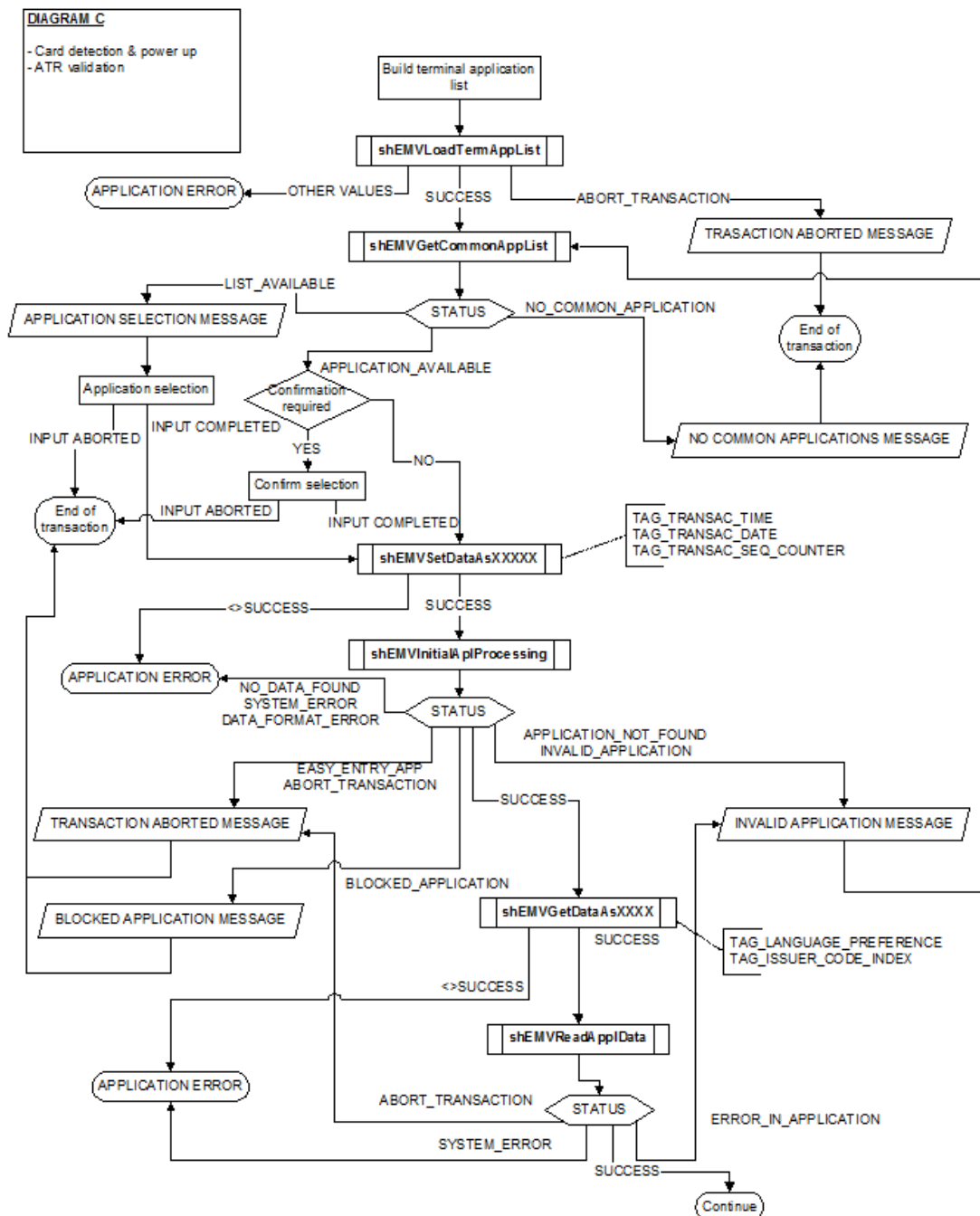


Figure 2.3 Application selection &amp; initiation

### Transaction data processing

Next the rest of the EMV transaction phases will be completed prior to the transaction decision, this includes:

- Card data authentication.
- Restrictions processing.
- Risk control.
- Cardholder verification.

For the card data authentication process the function `shEMVAuthentication` is called with the amount detection flag set to `FALSE` because it's assumed that the amount was already entered and is available for the application, if that's

not the case if the application wants to use the actual value for the amount can enable this flag and provide the amount if requested during the dynamic authentication.

If the application is not offline enabled the call to the function shEMVTerminalRisk can be made without setting the data previously as shown in the diagram.

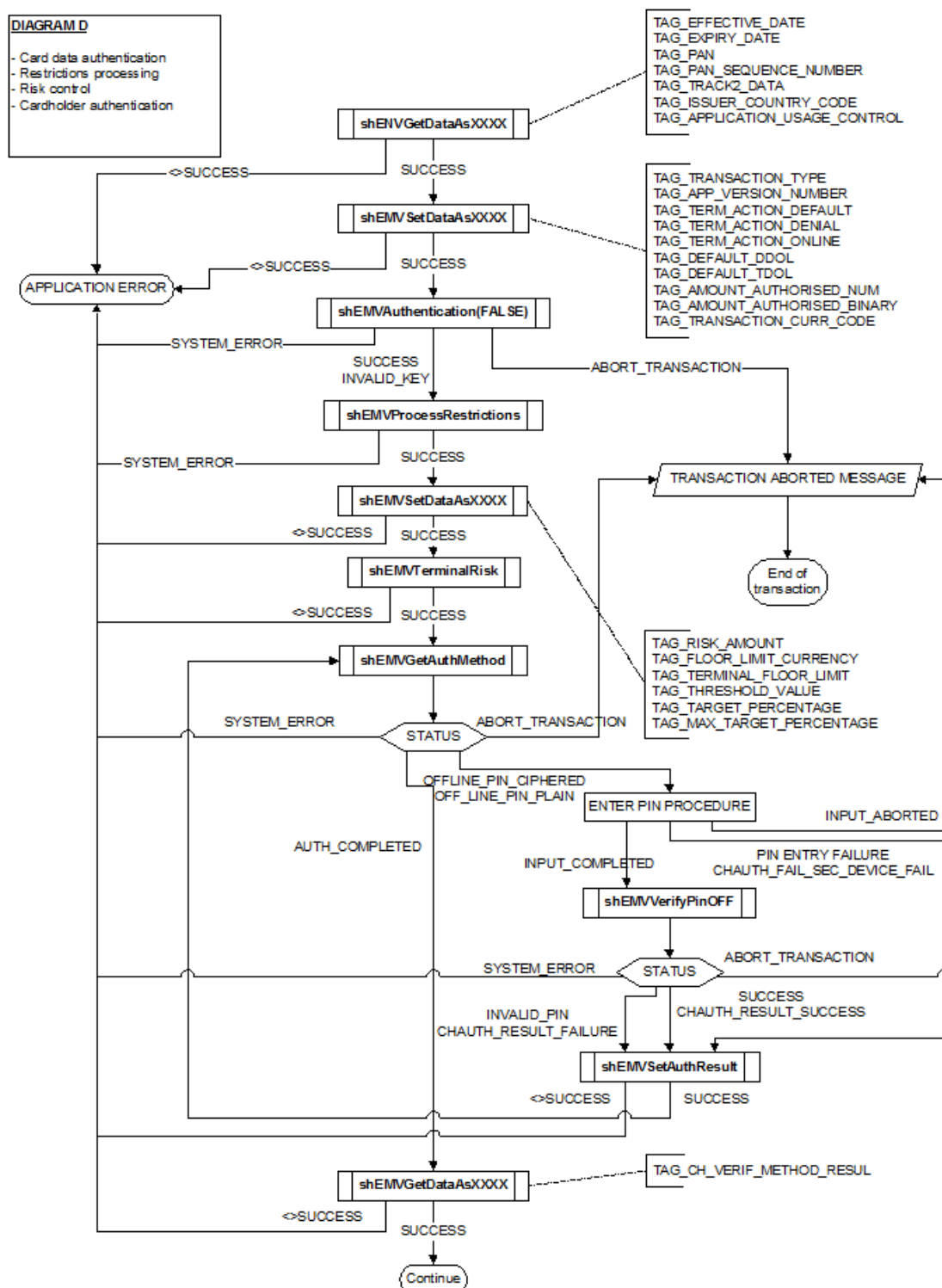


Figure 2.4 Data authentication process

### Application transaction decision

At this point of the transaction, it's where the first decision is made. All the previous procedures results have been

reflected on the TVR & TSI, and in this case the former is used to determine what type of transaction will be carried out from here.

Additionally for offline applications it will be necessary to check if the card is in the host list, if so the appropriate TVR bit must be updated.

The “offline possible” verification normally consists of a validation of the transactions log to ensure that the application can store the transaction data properly as well as any additional validation such as BIN control.

If the application has online only capabilities the result TRANSACTION\_APPROVED should never be received as the response to the shEMVMakeTransDecision call, anyhow if this happens the transaction should be considered denied.

Once the cryptogram has been generated, it's necessary to check its type according to the original requested type. So, it's not acceptable to get a TC when requesting an AAC or ARQC, for that reason the verification types “AC Requested < XX” appear on the flow diagram.

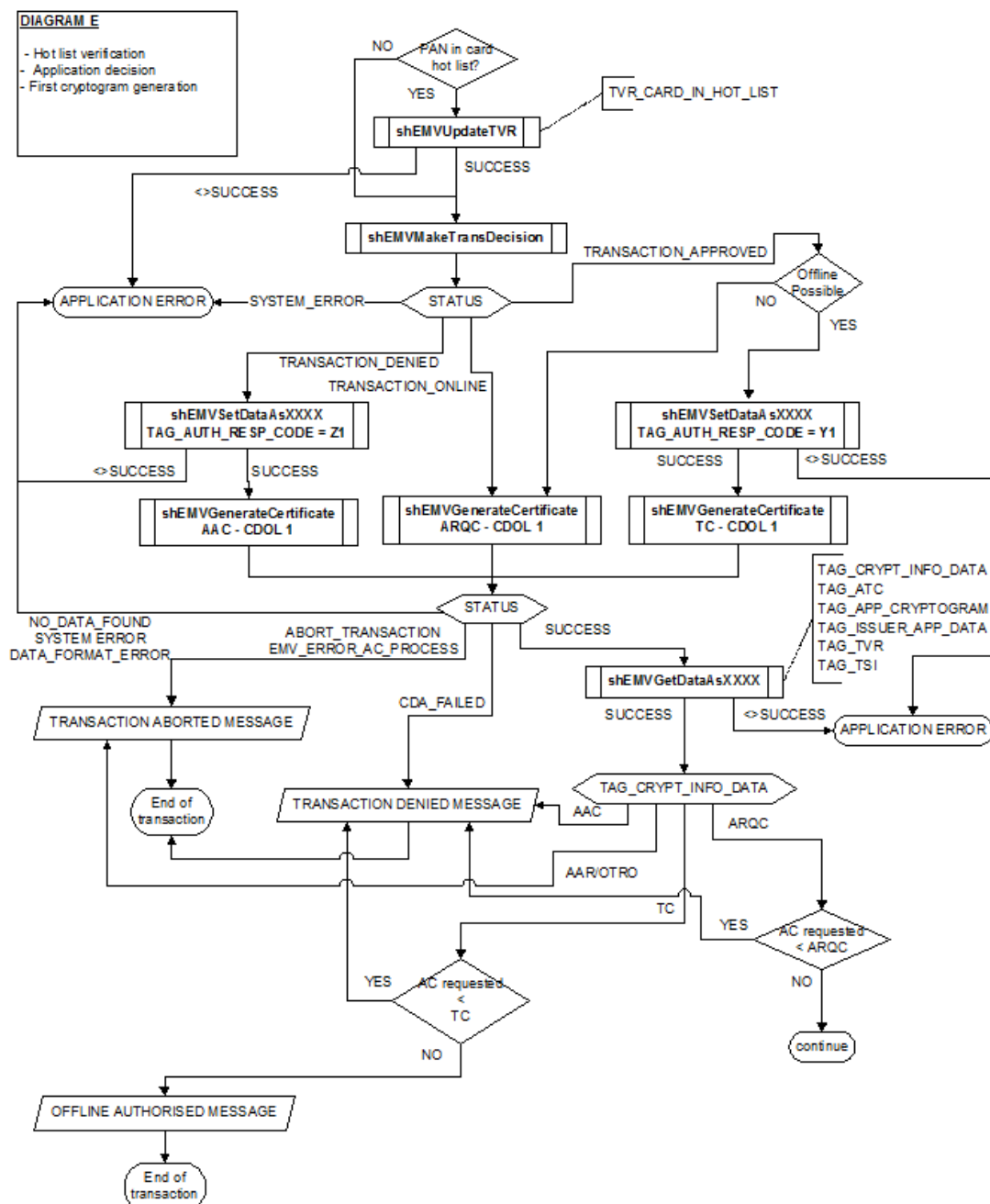


Figure 2.5 Diagram

### Transaction card decision

When the issuer decision is known, it must be informed to the card requesting the appropriate cryptogram type, so that it's the card the one who has the final decision regarding the transaction. The refund/reversal procedure is out of the scope of the kernel, anyway all the data items needed can be accessed through the shEMVGetDataAsXXXX functions.

Additionally the storage of the scripts results, second cryptogram for further report to the issuer is also out of the scope of this specification and will have to be determined by the particular payment system.





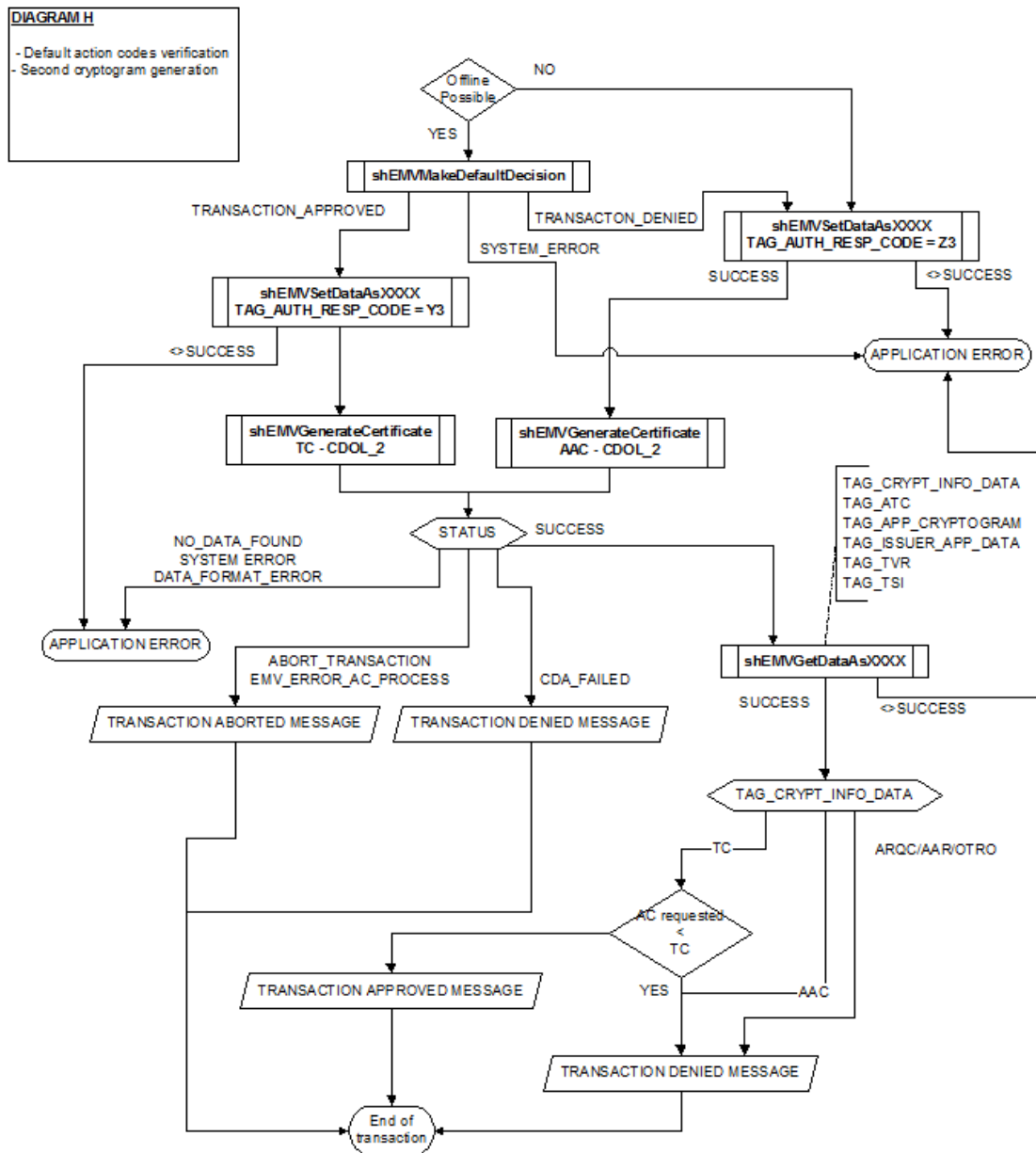


Figure 2.7 Default processing

## 2.21.2 Macro Definition Documentation

### 2.21.2.1 EMV\_STRUCTURES\_DEFINED

```
#define EMV_STRUCTURES_DEFINED
```

### 2.21.2.2 TSI\_CARD\_RISK\_DONE

```
#define TSI_CARD_RISK_DONE 0x0106
```

#### 2.21.2.3 TSI\_CARDHOLDER\_VERIF\_DONE

```
#define TSI_CARDHOLDER_VERIF_DONE 0x0107
```

#### 2.21.2.4 TSI\_ISSUER\_AUTH\_DONE

```
#define TSI_ISSUER_AUTH_DONE 0x0105
```

#### 2.21.2.5 TSI\_OFFDATA\_AUTH\_DONE

```
#define TSI_OFFDATA_AUTH_DONE 0x0108
```

This is the list of the bits of the TSI that can be checked or updated.

#### 2.21.2.6 TSI\_SCRIPT\_PROCESS\_DONE

```
#define TSI_SCRIPT_PROCESS_DONE 0x0103
```

#### 2.21.2.7 TSI\_TERMINAL\_RISK\_DONE

```
#define TSI_TERMINAL_RISK_DONE 0x0104
```

#### 2.21.2.8 TVR\_APPLICATION\_EXPIRED

```
#define TVR_APPLICATION_EXPIRED 0x0207
```

#### 2.21.2.9 TVR\_APPLICATION\_NOT\_EFFECTIVE

```
#define TVR_APPLICATION_NOT_EFFECTIVE 0x0206
```

**2.21.2.10 TVR\_CARD\_IN\_HOT\_LIST**

```
#define TVR_CARD_IN_HOT_LIST 0x0105
```

**2.21.2.11 TVR\_CARDHOLDER\_VERIF\_FAILURE**

```
#define TVR_CARDHOLDER_VERIF_FAILURE 0x0308
```

**2.21.2.12 TVR\_COMBINED\_DDA\_FAILED**

```
#define TVR_COMBINED_DDA_FAILED 0x0103
```

**2.21.2.13 TVR\_DATA\_NOT\_FOUND**

```
#define TVR_DATA_NOT_FOUND 0x0106
```

**2.21.2.14 TVR\_DEFAULT\_TDOL\_USED**

```
#define TVR_DEFAULT_TDOL_USED 0x0508
```

This is the list of the bits of the TVR that can be checked or updated.

**2.21.2.15 TVR\_DYNAMIC\_AUTH\_FAILED**

```
#define TVR_DYNAMIC_AUTH_FAILED 0x0104
```

**2.21.2.16 TVR\_ISSUER\_AUTH\_FAILED**

```
#define TVR_ISSUER_AUTH_FAILED 0x0507
```

**2.21.2.17 TVR\_LOWER\_OFF\_LIMIT\_EXCEEDED**

```
#define TVR_LOWER_OFF_LIMIT_EXCEEDED 0x0407
```

**2.21.2.18 TVR\_MERCHANT\_FORCE\_ONLINE**

```
#define TVR_MERCHANT_FORCE_ONLINE 0x0404
```

**2.21.2.19 TVR\_NEW\_CARD**

```
#define TVR_NEW_CARD 0x0204
```

**2.21.2.20 TVR\_OFFDATA\_AUTH\_NOT\_DONE**

```
#define TVR_OFFDATA_AUTH_NOT_DONE 0x0108
```

**2.21.2.21 TVR\_ONLINE\_PIN\_ENTERED**

```
#define TVR_ONLINE_PIN_ENTERED 0x0303
```

**2.21.2.22 TVR\_PIN\_ASKED\_BUT\_NOT\_ENTERED**

```
#define TVR_PIN_ASKED_BUT_NOT_ENTERED 0x0304
```

**2.21.2.23 TVR\_PIN\_ASKED\_PINPAD\_FAILURE**

```
#define TVR_PIN_ASKED_PINPAD_FAILURE 0x0305
```

**2.21.2.24 TVR\_PIN\_LIMIT\_EXCEEDED**

```
#define TVR_PIN_LIMIT_EXCEEDED 0x0306
```

**2.21.2.25 TVR\_RANDOM\_SELECTION\_ONLINE**

```
#define TVR_RANDOM_SELECTION_ONLINE 0x0405
```

**2.21.2.26 TVR\_REQ\_SERVICE\_NOT\_ALLOWED**

```
#define TVR_REQ_SERVICE_NOT_ALLOWED 0x0205
```

**2.21.2.27 TVR\_SCRIPT\_FAIL\_AFTER\_AC**

```
#define TVR_SCRIPT_FAIL_AFTER_AC 0x0505
```

**2.21.2.28 TVR\_SCRIPT\_FAIL\_BEFORE\_AC**

```
#define TVR_SCRIPT_FAIL_BEFORE_AC 0x0506
```

**2.21.2.29 TVR\_SOFTWARE\_VERSIONS**

```
#define TVR_SOFTWARE_VERSIONS 0x0208
```

**2.21.2.30 TVR\_STATIC\_AUTH\_FAILED**

```
#define TVR_STATIC_AUTH_FAILED 0x0107
```

**2.21.2.31 TVR\_TERMINAL\_LIMIT\_EXCEEDED**

```
#define TVR_TERMINAL_LIMIT_EXCEEDED 0x0408
```

**2.21.2.32 TVR\_UPPER\_OFF\_LIMIT\_EXCEEDED**

```
#define TVR_UPPER_OFF_LIMIT_EXCEEDED 0x0406
```

### 2.21.2.33 TVR\_VERIF\_METHOD\_UNKNOWN

```
#define TVR_VERIF_METHOD_UNKNOWN 0x0307
```

## 2.21.3 Enumeration Type Documentation

### 2.21.3.1 APP\_MATCH\_CRITERIAS

– (enum) [APP\\_MATCH\\_CRITERIAS](#)

#### Enumerator

MATCH_FULL	
MATCH_PARTIAL_VISA	
MATCH_PARTIAL_EUROPAY	

### 2.21.3.2 APP\_SELECTION\_METHODS

– (enum) [APP\\_SELECTION\\_METHODS](#)

#### Enumerator

SELECTION_PSE	
SELECTION_AIDLIST	

### 2.21.3.3 AUTH\_RESULTS

– (enum) [AUTH\\_RESULTS](#)

#### Enumerator

AUTH_RESULT_SUCCESS	
AUTH_RESULT_FAILURE	
AUTH_FAIL_PIN_ENTRY_NOT_DONE	
AUTH_FAIL_USER_CANCELLATION	

#### 2.21.3.4 BYPASS\_MODES

– (enum) [BYPASS\\_MODES](#)

##### Enumerator

BYPASS_CURRENT_METHOD_MODE	
BYPASS_ALL_METHODS_MODE	

#### 2.21.3.5 CARD\_RISK\_TYPES

– (enum) [CARD\\_RISK\\_TYPES](#)

##### Enumerator

CDOL <sub>↔</sub> _1	
CDOL <sub>↔</sub> _2	

#### 2.21.3.6 CERTIFICATE\_AC\_TYPES

– (enum) [CERTIFICATE\\_AC\\_TYPES](#)

##### Enumerator

CERTIFICATE_AAC	
CERTIFICATE_TC	
CERTIFICATE_ARQC	

#### 2.21.3.7 TAG\_TYPES

– (enum) [TAG\\_TYPES](#)

##### Enumerator

TAG_TYPE_BINARY	
TAG_TYPE_BCD	
TAG_TYPE_STRING	

## 2.22 EMV Operation Workflow

Description and block diagrams of various operations with the pinpad.

Description and block diagrams of various operations with the pinpad.

### Kernel initialisation and version verification

Firstly the application will have to initialise the library, this will only have to be done once at the unit power up. At the same time it will be convenient also to check the version info provided by the kernel to make sure that is the expected one.

After the initialisation, the first thing to do will be to set all the data items needed to start the transaction, mainly these items correspond to configuration issues:

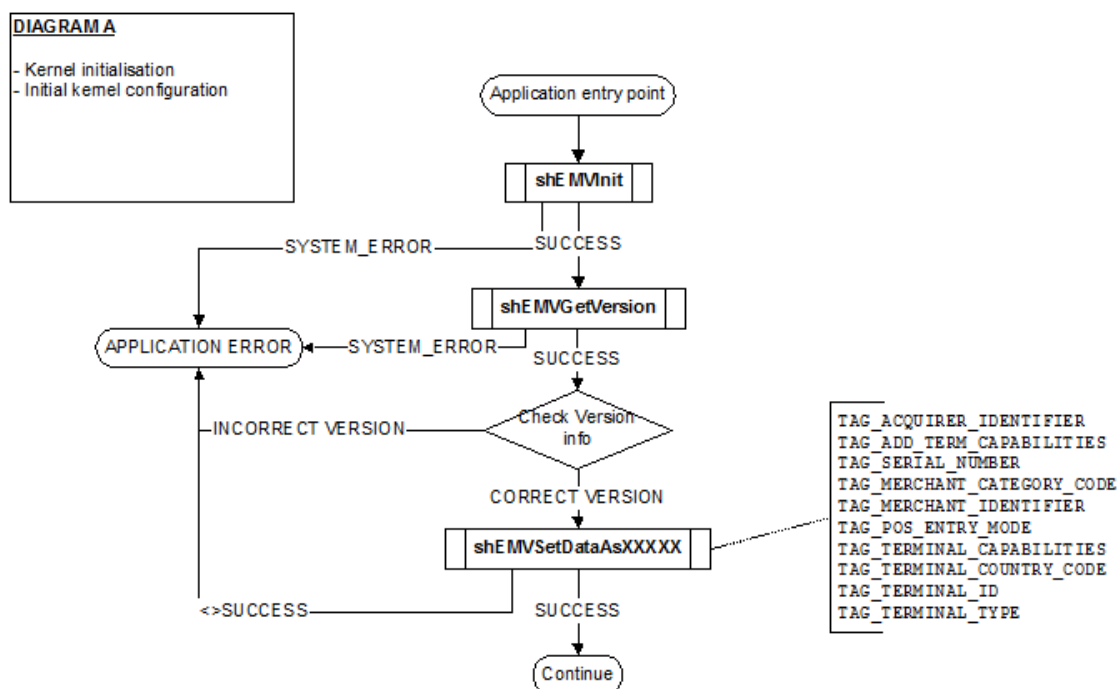


Figure 2.8 Kernel initialisation and version verification

### Card recognition and ATR validation

The application will be in charge of detecting the presence of the smart card in the reader using the corresponding firmware function call, the application must power on the card also, the kernel is used in this phase to validate the ATR got from the card.



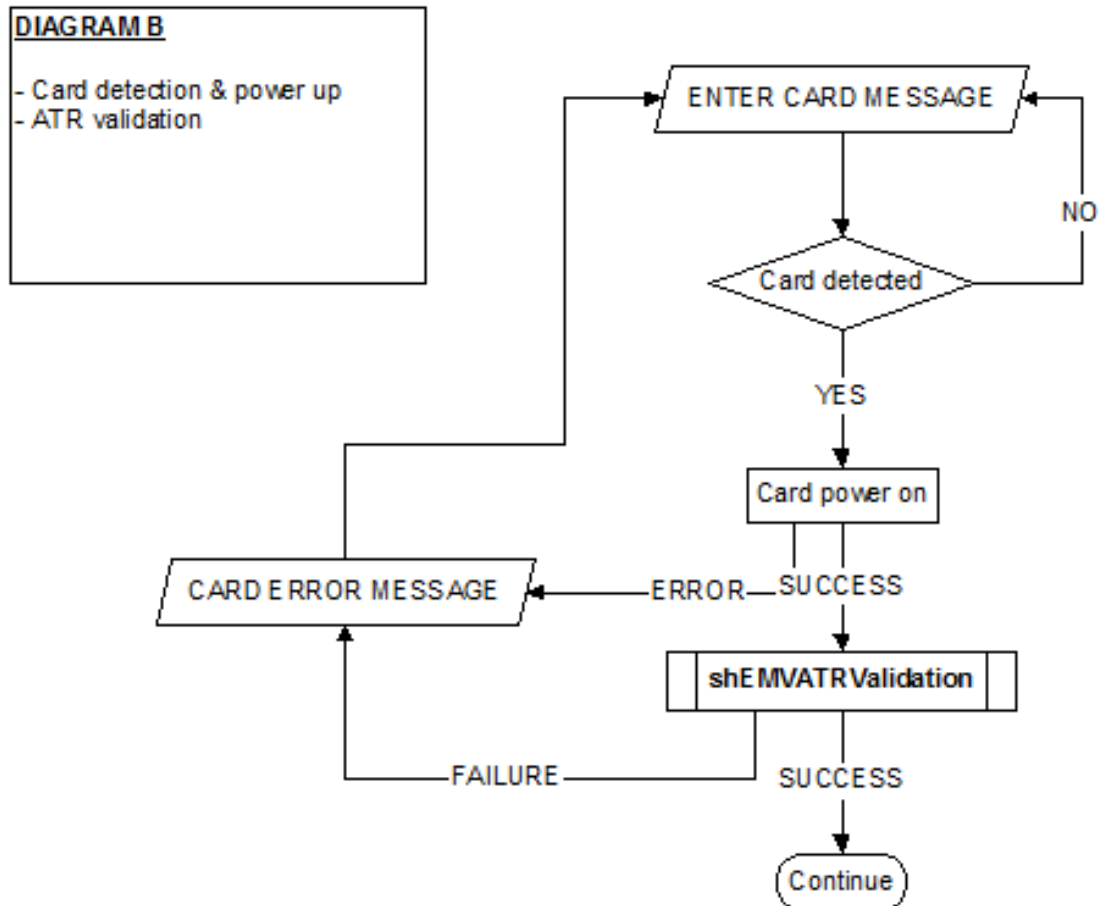


Figure 2.9 Card recognition and ATR validation

### Application selection & initiation

Once the card has been powered on and the ATR validated to ensure that is a valid EMV card, the next step is to proceed with the application selection and initiation.

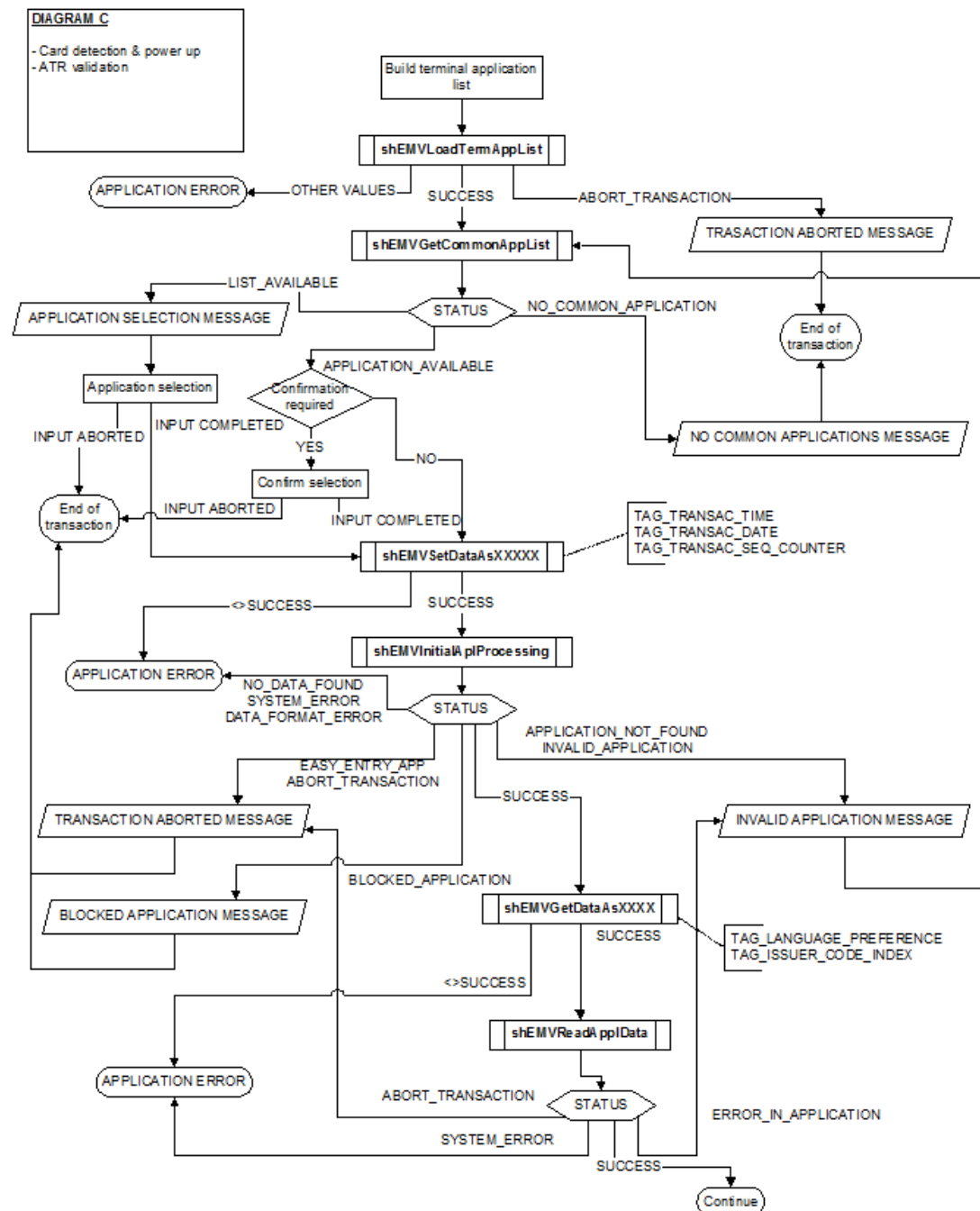


Figure 2.10 Application selection &amp; initiation

### Transaction data processing

Next the rest of the EMV transaction phases will be completed prior to the transaction decision, this includes:

- Card data authentication.
- Restrictions processing.
- Risk control.
- Cardholder verification.

For the card data authentication process the function `shEMVAuthentication` is called with the amount detection flag set to `FALSE` because it's assumed that the amount was already entered and is available for the application, if that's

not the case if the application wants to use the actual value for the amount can enable this flag and provide the amount if requested during the dynamic authentication.

If the application is not offline enabled the call to the function shEMVTerminalRisk can be made without setting the data previously as shown in the diagram.

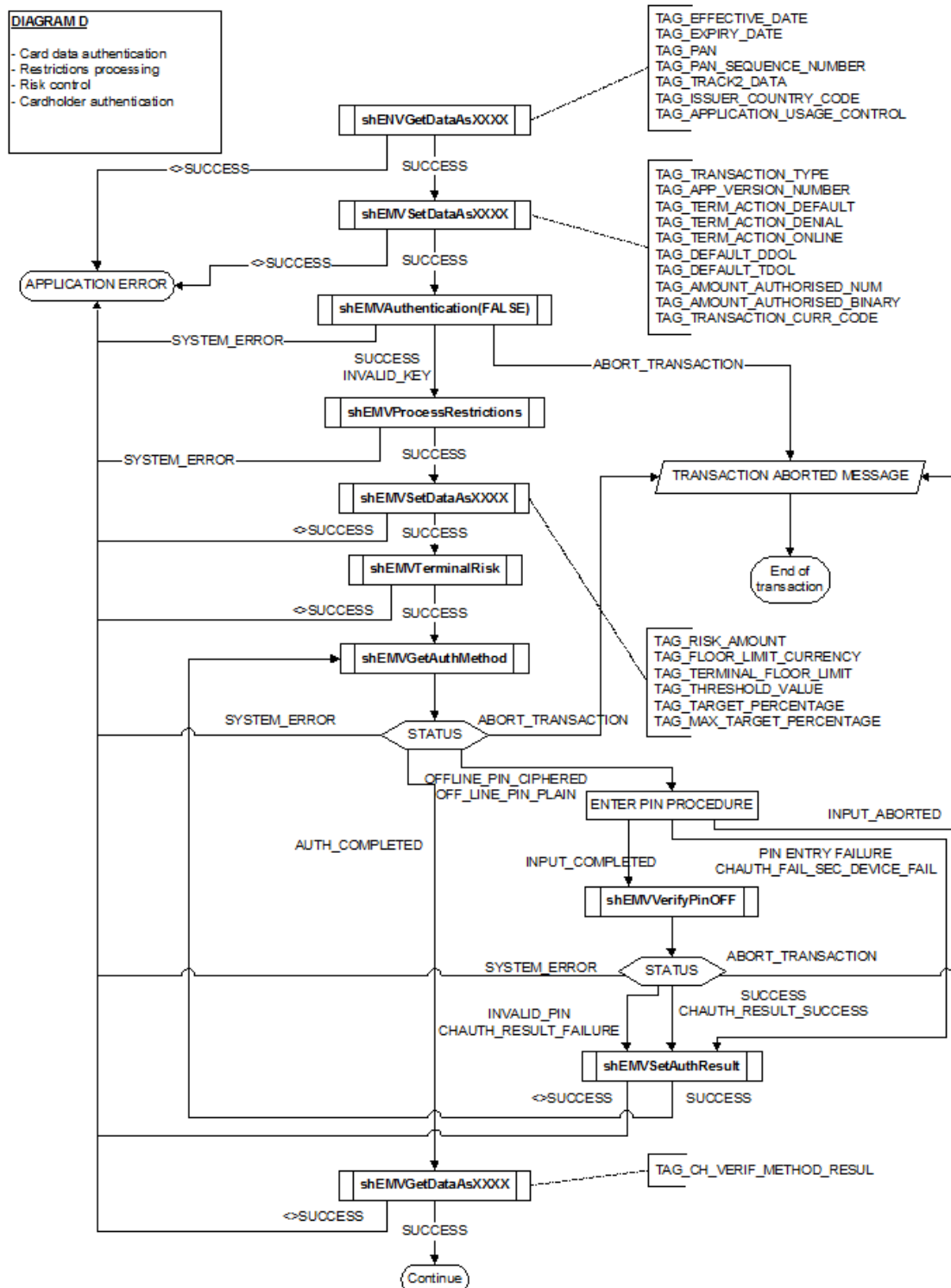


Figure 2.11 Data authentication process

### Application transaction decision

At this point of the transaction, it's where the first decision is made. All the previous procedures results have been

reflected on the TVR & TSI, and in this case the former is used to determine what type of transaction will be carried out from here.

Additionally for offline applications it will be necessary to check if the card is in the host list, if so the appropriate TVR bit must be updated.

The “offline possible” verification normally consists of a validation of the transactions log to ensure that the application can store the transaction data properly as well as any additional validation such as BIN control.

If the application has online only capabilities the result TRANSACTION\_APPROVED should never be received as the response to the shEMVMakeTransDecision call, anyhow if this happens the transaction should be considered denied.

Once the cryptogram has been generated, it's necessary to check its type according to the original requested type. So, it's not acceptable to get a TC when requesting an AAC or ARQC, for that reason the verification types “AC Requested < XX” appear on the flow diagram.

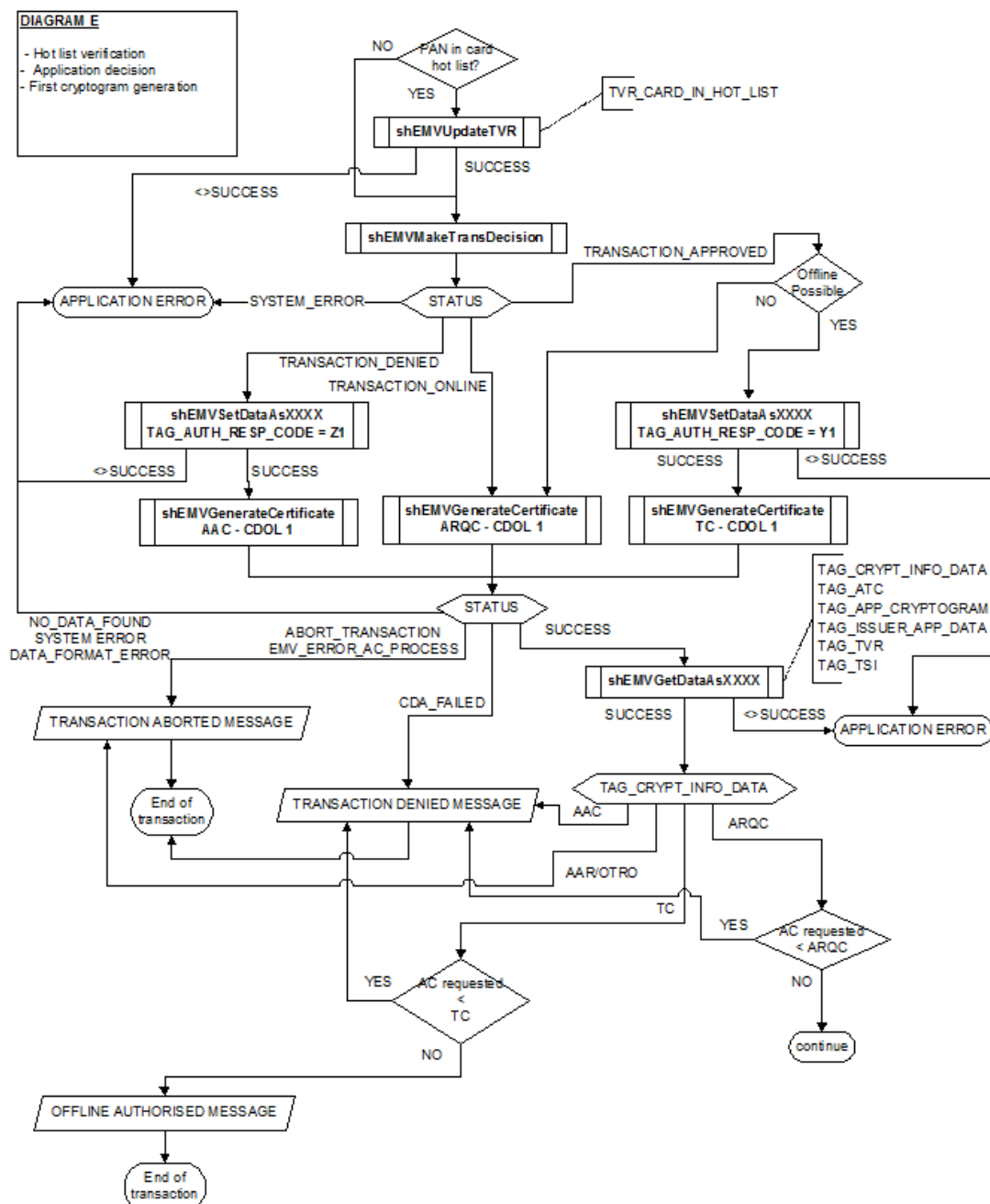


Figure 2.12 Diagram

### Transaction card decision

When the issuer decision is known, it must be informed to the card requesting the appropriate cryptogram type, so that it's the card the one who has the final decision regarding the transaction. The refund/reversal procedure is out of the scope of the kernel, anyway all the data items needed can be accessed through the shEMVGetDataAsXXXX functions.

Additionally the storage of the scripts results, second cryptogram for further report to the issuer is also out of the scope of this specification and will have to be determined by the particular payment system.



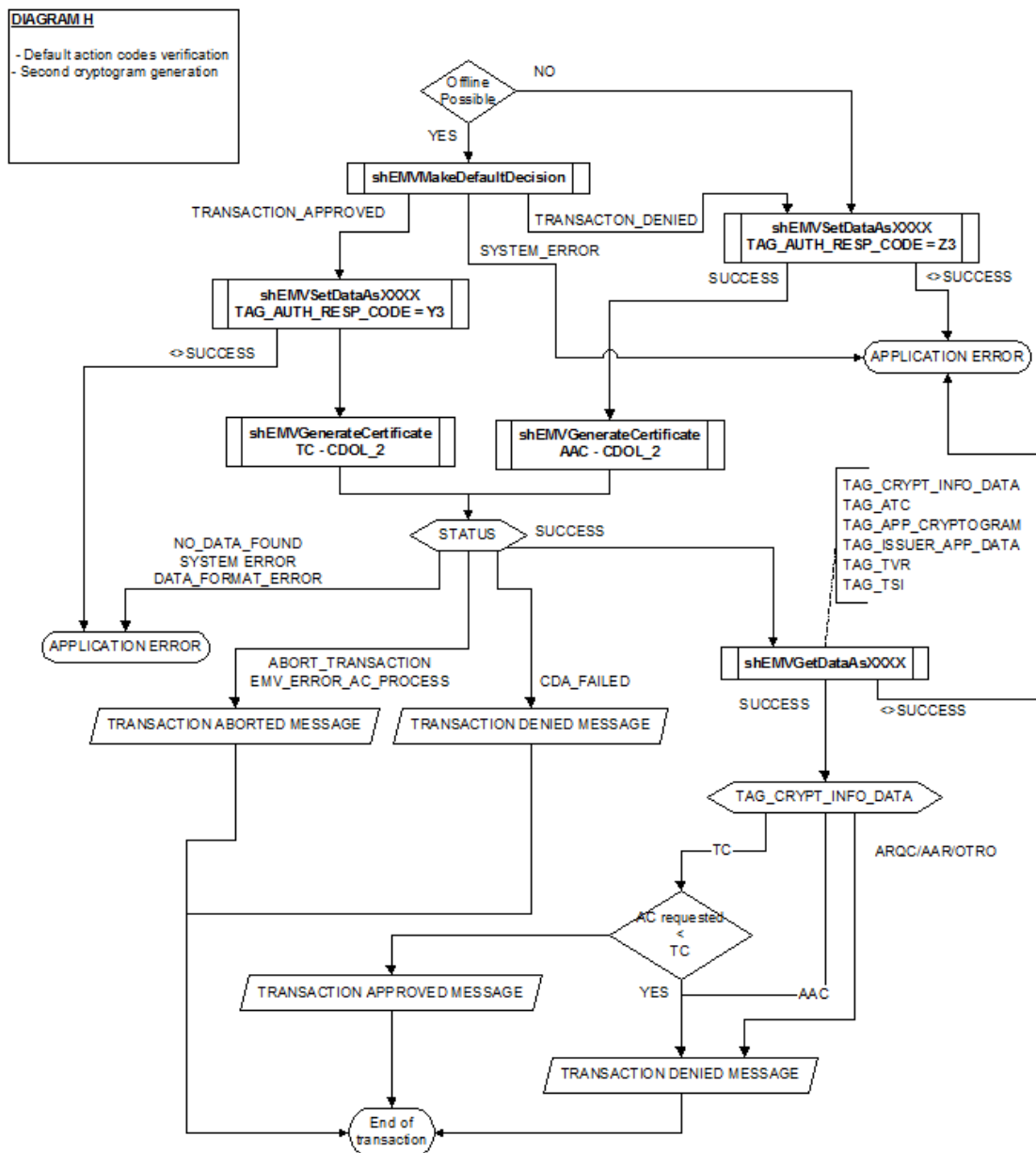


Figure 2.14 Default processing

## 2.23 EMV TAGs

EMV TAGs you can use with their properties.

### Macros

- #define TAG\_PAN 0x5A

*Source: ICC*  
*Length: ..10*  
*Format: N*  
*Read: YES*  
*Write: NO*

- #define TAG\_CDOL\_1 0x8C

*Source: ICC*  
*Length: ..252*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_CDOL\_2 0x8D

*Source: ICC*  
*Length: ..252*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_CVM\_LIST 0x8E

*Source: ICC*  
*Length: ..252*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_TDOL 0x97

*Source: ICC*  
*Length: ..252*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_ISSUER\_PK\_CERTIFICATE 0x90

*Source: ICC*  
*Length: ..248*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_SIGNED\_STA\_APP\_DAT 0x93

*Source: ICC*  
*Length: ..248*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_ISSUER\_PK\_REMAINDER 0x92



Source: ICC  
Length: ..248  
Format: B  
Read: YES  
Write: NO

- #define TAG\_CA\_PK\_INDEX 0x8F

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

- #define TAG\_CARDHOLDER\_NAME 0x5F20

Source: ICC  
Length: 2-26  
Format: A  
Read: YES  
Write: NO

- #define TAG\_SERVICE\_CODE 0x5F30

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

- #define TAG\_CARDHOLDER\_NAME\_EXTEN 0x9F0B

Source: ICC  
Length: 27-45  
Format: A  
Read: YES  
Write: NO

- #define TAG\_EXPIRY\_DATE 0x5F24

Source: ICC  
Length: 3  
Format: B  
Read: YES  
Write: NO

- #define TAG\_EFFECTIVE\_DATE 0x5F25

Source: ICC  
Length: 3  
Format: B  
Read: YES  
Write: NO

- #define TAG\_ISSUER\_COUNTRY\_CODE 0x5F28

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

- #define TAG\_ISSUER\_COUNTRY\_CODE\_A2 0x5F55

Source: ICC  
Length: 2

*Format: A*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_ISSUER\\_COUNTRY\\_CODE\\_A3](#) 0x5F56

*Source: ICC*  
*Length: 3*  
*Format: A*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_PAN\\_SEQUENCE\\_NUMBER](#) 0x5F34

*Source: ICC*  
*Length: 1*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_APP\\_DISCRETION\\_DAT](#) 0x9F05

*Source: ICC*  
*Length: 1-32*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_APP\\_USAGE\\_CONTROL](#) 0x9F07

*Source: ICC*  
*Length: 2*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_ICC\\_APP\\_VERSION\\_NUMBER](#) 0x9F08

*Source: ICC*  
*Length: 2*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_ISSUER\\_ACTION\\_DEFAULT](#) 0x9F0D

*Source: ICC*  
*Length: 5*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_ISSUER\\_ACTION\\_DENIAL](#) 0x9F0E

*Source: ICC*  
*Length: 5*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define [TAG\\_ISSUER\\_ACTION\\_ONLINE](#) 0x9F0F

*Source: ICC*  
*Length: 5*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_APPL\_REF\_CURRENCY 0x9F3B  
  
    Source: ICC  
    Length: 2-8  
    Format: N  
    Read: YES  
    Write: NO
- #define TAG\_APPL\_CURRENCY\_CODE 0x9F42  
  
    Source: ICC  
    Length: 2  
    Format: N  
    Read: YES  
    Write: NO
- #define TAG\_APPL\_REF\_CURRENCY\_EXP 0x9F43  
  
    Source: ICC  
    Length: 1-4  
    Format: N  
    Read: YES  
    Write: NO
- #define TAG\_APPL\_CURRENCY\_EXP 0x9F44  
  
    Source: ICC  
    Length: 1  
    Format: N  
    Read: YES  
    Write: NO
- #define TAG\_ICC\_PK\_CERTIFICATE 0x9F46  
  
    Source: ICC  
    Length: 248  
    Format: B  
    Read: YES  
    Write: NO
- #define TAG\_ICC\_PIN\_PK\_CERTIFICATE 0x9F2D  
  
    Source: ICC  
    Length: 248  
    Format: B  
    Read: YES  
    Write: NO
- #define TAG\_ICC\_PK\_EXP 0x9F47  
  
    Source: ICC  
    Length: 1-3  
    Format: B  
    Read: YES  
    Write: NO
- #define TAG\_ICC\_PIN\_PK\_EXP 0x9F2E  
  
    Source: ICC  
    Length: 1-3  
    Format: B  
    Read: YES  
    Write: NO
- #define TAG\_ICC\_PK\_REMAINDER 0x9F48  
  
    Source: ICC

Length: 248  
 Format: B  
 Read: YES  
 Write: NO

- #define TAG\_ICC\_PIN\_PK\_REMAINDER 0x9F2F

Source: ICC  
 Length: 248  
 Format: B  
 Read: YES  
 Write: NO

- #define TAG\_STA\_DAT\_AUTH\_TAG\_LIST 0x9F4A

Source: ICC  
 Length: ..252  
 Format: B  
 Read: YES  
 Write: NO

- #define TAG\_DDOL 0x9F49

Source: ICC  
 Length: ..252  
 Format: B  
 Read: YES  
 Write: NO

- #define TAG\_ISSUER\_PK\_EXP 0x9F32

Source: ICC  
 Length: 1-3  
 Format: B  
 Read: YES  
 Write: NO

- #define TAG\_LOW\_CONSEC\_OFFLINE\_LIMIT 0x9F14

Source: ICC  
 Length: 1  
 Format: B  
 Read: YES  
 Write: NO

- #define TAG\_UPP\_CONSEC\_OFFLINE\_LIMIT 0x9F23

Source: ICC  
 Length: 1  
 Format: B  
 Read: YES  
 Write: NO

- #define TAG\_TRACK2\_DISCRETION\_DAT 0x9F20

Source: ICC  
 Length: ..22  
 Format: N  
 Read: YES  
 Write: NO

- #define TAG\_TRACK1\_DISCRETION\_DAT 0x9F1F

Source: ICC  
 Length: ..52  
 Format: A  
 Read: YES  
 Write: NO

- #define TAG\_TRACK2\_EQUIVALENT\_DATA 0x57

Source: ICC  
Length: ..19  
Format: B  
Read: YES  
Write: NO

- #define TAG\_UNPREDICTABLE\_NUMBER 0x9F37

Source: KER  
Length: 4  
Format: B  
Read: YES  
Write: NO

- #define TAG\_ACQUIRER\_IDENTIFIER 0x9F01

Source: APP  
Length: 6  
Format: N  
Read: YES  
Write: YES

- #define TAG\_ADD\_TERM\_CAPABILITIES 0x9F40

Source: APP  
Length: 5  
Format: B  
Read: YES  
Write: YES

- #define TAG\_AMOUNT\_AUTHORISED\_BINARY 0x81

Source: APP  
Length: 4  
Format: B  
Read: YES  
Write: YES

- #define TAG\_AMOUNT\_AUTHORISED\_NUM 0x9F02

Source: APP  
Length: 6  
Format: N  
Read: YES  
Write: YES

- #define TAG\_AMOUNT\_OTHER\_BINARY 0x9F04

Source: APP  
Length: 4  
Format: B  
Read: YES  
Write: YES

- #define TAG\_AMOUNT\_OTHER\_NUM 0x9F03

Source: APP  
Length: 6  
Format: N  
Read: YES  
Write: YES

- #define TAG\_AMOUNT\_REF\_CURR 0x9F3A

Source: APP

- Length: 4*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_APP\_CRYPTOGRAM 0x9F26
  - Source: ICC*
  - Length: 8*
  - Format: B*
  - Read: YES*
  - Write: NO*
- #define TAG\_AFL 0x94
  - Source: ICC*
  - Length: ...252*
  - Format: B*
  - Read: YES*
  - Write: NO*
- #define TAG\_ICC\_AID 0x4F
  - Source: ICC*
  - Length: 5-16*
  - Format: B*
  - Read: YES*
  - Write: NO*
- #define TAG\_TERM\_AID 0x9F06
  - Source: APP*
  - Length: 5-16*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_AIP 0x82
  - Source: ICC*
  - Length: 2*
  - Format: B*
  - Read: YES*
  - Write: NO*
- #define TAG\_APP\_LABEL 0x50
  - Source: ICC*
  - Length: 1-16*
  - Format: AN*
  - Read: YES*
  - Write: NO*
- #define TAG\_APP\_PREFERRED\_NAME 0x9F12
  - Source: ICC*
  - Length: 1-16*
  - Format: AN*
  - Read: YES*
  - Write: NO*
- #define TAG\_APP\_PRIORITY\_INDICATOR 0x87
  - Source: ICC*
  - Length: 1*
  - Format: B*
  - Read: YES*
  - Write: NO*

- #define TAG\_ATC 0x9F36

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

- #define TAG\_APP\_VERSION\_NUMBER 0x9F09

Source: APP  
Length: 2  
Format: B  
Read: YES  
Write: YES

- #define TAG\_AUTH\_CODE 0x89

Source: APP  
Length: 6  
Format: AN  
Read: YES  
Write: YES

- #define TAG\_AUTH\_RESP\_CODE 0x8A

Source: APP  
Length: 2  
Format: AN  
Read: YES  
Write: YES

- #define TAG\_CH\_VERIF\_METHOD\_RESULT 0x9F34

Source: KER  
Length: 3  
Format: B  
Read: YES  
Write: NO

- #define TAG\_CA\_PUBLIC\_KEY\_INDEX 0x9F22

Source: APP  
Length: 1  
Format: B  
Read: YES  
Write: YES

- #define TAG\_CRYPT\_INFO\_DATA 0x9F27

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

- #define TAG\_DAT\_AUTH\_CODE 0x9F45

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

- #define TAG\_ICC\_DYN\_NUMBER 0x9F4C

Source: ICC

*Length: 2-8*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_SERIAL\_NUMBER 0x9F1E

*Source: APP*  
*Length: 8*  
*Format: AN*  
*Read: YES*  
*Write: YES*

- #define TAG\_ISSUER\_APP\_DAT 0x9F10

*Source: ICC*  
*Length: ..32*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_ISSUER\_AUTH\_DAT 0x91

*Source: APP*  
*Length: 8-16*  
*Format: B*  
*Read: YES*  
*Write: YES*

- #define TAG\_ISSUER\_CODE\_INDEX 0x9F11

*Source: ICC*  
*Length: 1*  
*Format: N*  
*Read: YES*  
*Write: NO*

- #define TAG\_LANGUAGE\_PREFERENCE 0x5F2D

*Source: ICC*  
*Length: 2-8*  
*Format: AN*  
*Read: YES*  
*Write: NO*

- #define TAG\_LATC 0x9F13

*Source: ICC*  
*Length: 2*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_MERCHANT\_CATEGORY\_CODE 0x9F15

*Source: APP*  
*Length: 2*  
*Format: N*  
*Read: YES*  
*Write: YES*

- #define TAG\_MERCHANT\_IDENTIFIER 0x9F16

*Source: APP*  
*Length: 15*  
*Format: AN*  
*Read: YES*  
*Write: YES*



- #define TAG\_PIN\_TRY\_COUNTER 0x9F17  
  
Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO
- #define TAG\_POS\_ENTRY\_MODE 0x9F39  
  
Source: APP  
Length: 1  
Format: N  
Read: YES  
Write: YES
- #define TAG\_PDOL 0x9F38  
  
Source: ICC  
Length: ..252  
Format: B  
Read: YES  
Write: NO
- #define TAG\_TERMINAL\_CAPABILITIES 0x9F33  
  
Source: APP  
Length: 3  
Format: B  
Read: YES  
Write: YES
- #define TAG\_TERMINAL\_COUNTRY\_CODE 0x9F1A  
  
Source: APP  
Length: 2  
Format: N  
Read: YES  
Write: YES
- #define TAG\_TERMINAL\_FLOOR\_LIMIT 0x9F1B  
  
Source: APP  
Length: 4  
Format: B  
Read: YES  
Write: YES
- #define TAG\_TERMINAL\_ID 0x9F1C  
  
Source: APP  
Length: 8  
Format: AN  
Read: YES  
Write: YES
- #define TAG\_TERMINAL\_RISK\_DAT 0x9F1D  
  
Source: APP  
Length: 1-8  
Format: B  
Read: YES  
Write: YES
- #define TAG\_TERMINAL\_TYPE 0x9F35  
  
Source: APP

- Length: 1*
  - Format: N*
  - Read: YES*
  - Write: YES*
- #define TAG\_TVR 0x95
  - Source: KER*
  - Length: 5*
  - Format: B*
  - Read: YES*
  - Write: NO*
- #define TAG\_TRANSACTION\_CURR\_CODE 0x5F2A
  - Source: APP*
  - Length: 2*
  - Format: N*
  - Read: YES*
  - Write: YES*
- #define TAG\_TRANSACTION\_CURR\_EXP 0x5F36
  - Source: APP*
  - Length: 1*
  - Format: N*
  - Read: YES*
  - Write: YES*
- #define TAG\_TRANSACTION\_DATE 0x9A
  - Source: APP*
  - Length: 3*
  - Format: N*
  - Read: YES*
  - Write: YES*
- #define TAG\_TRANSACTION\_REF\_CURR\_CODE 0x9F3C
  - Source: APP*
  - Length: 2*
  - Format: N*
  - Read: YES*
  - Write: YES*
- #define TAG\_TRANSACTION\_REF\_CURR\_EXP 0x9F3D
  - Source: APP*
  - Length: 1*
  - Format: N*
  - Read: YES*
  - Write: YES*
- #define TAG\_TRANSACTION\_SEQ\_COUNTER 0x9F41
  - Source: APP*
  - Length: 2-4*
  - Format: N*
  - Read: YES*
  - Write: YES*
- #define TAG\_TSI 0x9B
  - Source: KER*
  - Length: 2*
  - Format: B*
  - Read: YES*
  - Write: NO*

- #define TAG\_TRANSACTION\_TIME 0x9F21

Source: APP  
Length: 3  
Format: N  
Read: YES  
Write: YES

- #define TAG\_TRANSACTION\_TYPE 0x9C

Source: APP  
Length: 1  
Format: N  
Read: YES  
Write: YES

- #define TAG\_SIGNED\_DYN\_APP\_DAT 0x9F4B

Source: ICC  
Length: ..248  
Format: B  
Read: YES  
Write: NO

- #define TAG\_TC\_HASH\_VALUE 0x98

Source: APP  
Length: 20  
Format: B  
Read: YES  
Write: YES

- #define TAG\_ACCOUNT\_TYPE 0x5F37

Source: APP  
Length: 1  
Format: N  
Read: YES  
Write: YES

- #define TAG\_BANK\_IDENTIFIER\_CODE 0x5F54

Source: ICC  
Length: 8-11  
Format: AN  
Read: YES  
Write: NO

- #define TAG\_IBAN 0x5F53

Source: ICC  
Length: ..34  
Format: AN  
Read: YES  
Write: NO

- #define TAG\_ISSUER\_IDENTIFICATION\_NUMBER 0x42

Source: ICC  
Length: 3  
Format: N  
Read: YES  
Write: NO

- #define TAG\_ISSUER\_URL 0x5F50

Source: ICC

- Length: ..255*
  - Format: AN*
  - Read: YES*
  - Write: NO*
- #define TAG\_LOG\_ENTRY 0x9F4D
  - Source: ICC*
  - Length: 2*
  - Format: B*
  - Read: YES*
  - Write: NO*
- #define TAG\_TRANSACTION\_CATEGORY\_CODE 0x9F53
  - Source: APP*
  - Length: 1*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_RISK\_AMOUNT 0xDF02
  - Source: APP*
  - Length: 4*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_TERM\_ACTION\_DEFAULT 0xDF03
  - Source: APP*
  - Length: 5*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_TERM\_ACTION\_DENIAL 0xDF04
  - Source: APP*
  - Length: 5*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_TERM\_ACTION\_ONLINE 0xDF05
  - Source: APP*
  - Length: 5*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_THRESHOLD\_VALUE 0xDF07
  - Source: APP*
  - Length: 5*
  - Format: B*
  - Read: YES*
  - Write: YES*
- #define TAG\_TARGET\_PERCENTAGE 0xDF08
  - Source: APP*
  - Length: 1*
  - Format: B*
  - Read: YES*
  - Write: YES*

- #define TAG\_MAX\_TARGET\_PERCENTAGE 0xDF09

*Source: APP*  
*Length: 1*  
*Format: B*  
*Read: YES*  
*Write: YES*

- #define TAG\_DEFAULT\_DDOL 0xDF15

*Source: APP*  
*Length: ...252*  
*Format: B*  
*Read: YES*  
*Write: YES*

- #define TAG\_DEFAULT\_TDOL 0xDF18

*Source: APP*  
*Length: ..252*  
*Format: B*  
*Read: YES*  
*Write: YES*

- #define TAG\_FLOOR\_LIMIT\_CURRENCY 0xDF19

*Source: APP*  
*Length: 2*  
*Format: B*  
*Read: YES*  
*Write: YES*

- #define TAG\_OFF\_AUTH\_DAT 0xDF23

*Source: APP*  
*Length: ..2048*  
*Format: B*  
*Read: YES*  
*Write: NO*

- #define TAG\_ISSUER\_SCRIPTS 0xDF24

*Source: APP*  
*Length: ..256*  
*Format: B*  
*Read: YES*  
*Write: YES*

- #define TAG\_ISSUER\_SCRIPTS\_RESULT 0xDF25

*Source: APP*  
*Length: ..256*  
*Format: B*  
*Read: YES*  
*Write: NO*

### 2.23.1 Detailed Description

EMV TAGs you can use with their properties.

### 2.23.2 Macro Definition Documentation

### 2.23.2.1 TAG\_ACCOUNT\_TYPE

```
#define TAG_ACCOUNT_TYPE 0x5F37
```

Source: APP

Length: 1

Format: N

Read: YES

Write: YES

### 2.23.2.2 TAG\_ACQUIRER\_IDENTIFIER

```
#define TAG_ACQUIRER_IDENTIFIER 0x9F01
```

Source: APP

Length: 6

Format: N

Read: YES

Write: YES

### 2.23.2.3 TAG\_ADD\_TERM\_CAPABILITIES

```
#define TAG_ADD_TERM_CAPABILITIES 0x9F40
```

Source: APP

Length: 5

Format: B

Read: YES

Write: YES

### 2.23.2.4 TAG\_AFL

```
#define TAG_AFL 0x94
```

Source: ICC

Length: ...252

Format: B

Read: YES

Write: NO

**2.23.2.5 TAG\_AIP**

```
#define TAG_AIP 0x82
```

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

**2.23.2.6 TAG\_AMOUNT\_AUTHORISED\_BINARY**

```
#define TAG_AMOUNT_AUTHORISED_BINARY 0x81
```

Source: APP  
Length: 4  
Format: B  
Read: YES  
Write: YES

**2.23.2.7 TAG\_AMOUNT\_AUTHORISED\_NUM**

```
#define TAG_AMOUNT_AUTHORISED_NUM 0x9F02
```

Source: APP  
Length: 6  
Format: N  
Read: YES  
Write: YES

**2.23.2.8 TAG\_AMOUNT\_OTHER\_BINARY**

```
#define TAG_AMOUNT_OTHER_BINARY 0x9F04
```

Source: APP  
Length: 4  
Format: B  
Read: YES  
Write: YES

### 2.23.2.9 TAG\_AMOUNT\_OTHER\_NUM

```
#define TAG_AMOUNT_OTHER_NUM 0x9F03
```

Source: APP

Length: 6

Format: N

Read: YES

Write: YES

### 2.23.2.10 TAG\_AMOUNT\_REF\_CURR

```
#define TAG_AMOUNT_REF_CURR 0x9F3A
```

Source: APP

Length: 4

Format: B

Read: YES

Write: YES

### 2.23.2.11 TAG\_APP\_CRYPTOGAM

```
#define TAG_APP_CRYPTOGAM 0x9F26
```

Source: ICC

Length: 8

Format: B

Read: YES

Write: NO

### 2.23.2.12 TAG\_APP\_DISCRETION\_DAT

```
#define TAG_APP_DISCRETION_DAT 0x9F05
```

Source: ICC

Length: 1-32

Format: B

Read: YES

Write: NO



**2.23.2.13 TAG\_APP\_LABEL**

```
#define TAG_APP_LABEL 0x50
```

Source: ICC  
Length: 1-16  
Format: AN  
Read: YES  
Write: NO

**2.23.2.14 TAG\_APP\_PREFERRED\_NAME**

```
#define TAG_APP_PREFERRED_NAME 0x9F12
```

Source: ICC  
Length: 1-16  
Format: AN  
Read: YES  
Write: NO

**2.23.2.15 TAG\_APP\_PRIORITY\_INDICATOR**

```
#define TAG_APP_PRIORITY_INDICATOR 0x87
```

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

**2.23.2.16 TAG\_APP\_USAGE\_CONTROL**

```
#define TAG_APP_USAGE_CONTROL 0x9F07
```

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.17 TAG\_APP\_VERSION\_NUMBER

```
#define TAG_APP_VERSION_NUMBER 0x9F09
```

Source: APP

Length: 2

Format: B

Read: YES

Write: YES

#### 2.23.2.18 TAG\_APPL\_CURRENCY\_CODE

```
#define TAG_APPL_CURRENCY_CODE 0x9F42
```

Source: ICC

Length: 2

Format: N

Read: YES

Write: NO

#### 2.23.2.19 TAG\_APPL\_CURRENCY\_EXP

```
#define TAG_APPL_CURRENCY_EXP 0x9F44
```

Source: ICC

Length: 1

Format: N

Read: YES

Write: NO

#### 2.23.2.20 TAG\_APPL\_REF\_CURRENCY

```
#define TAG_APPL_REF_CURRENCY 0x9F3B
```

Source: ICC

Length: 2-8

Format: N

Read: YES

Write: NO

**2.23.2.21 TAG\_APPL\_REF\_CURRENCY\_EXP**

```
#define TAG_APPL_REF_CURRENCY_EXP 0x9F43
```

Source: ICC  
Length: 1-4  
Format: N  
Read: YES  
Write: NO

**2.23.2.22 TAG\_ATC**

```
#define TAG_ATC 0x9F36
```

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

**2.23.2.23 TAG\_AUTH\_CODE**

```
#define TAG_AUTH_CODE 0x89
```

Source: APP  
Length: 6  
Format: AN  
Read: YES  
Write: YES

**2.23.2.24 TAG\_AUTH\_RESP\_CODE**

```
#define TAG_AUTH_RESP_CODE 0x8A
```

Source: APP  
Length: 2  
Format: AN  
Read: YES  
Write: YES

#### 2.23.2.25 TAG\_BANK\_IDENTIFIER\_CODE

```
#define TAG_BANK_IDENTIFIER_CODE 0x5F54
```

Source: ICC  
Length: 8-11  
Format: AN  
Read: YES  
Write: NO

#### 2.23.2.26 TAG\_CA\_PK\_INDEX

```
#define TAG_CA_PK_INDEX 0x8F
```

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.27 TAG\_CA\_PUBLIC\_KEY\_INDEX

```
#define TAG_CA_PUBLIC_KEY_INDEX 0x9F22
```

Source: APP  
Length: 1  
Format: B  
Read: YES  
Write: YES

#### 2.23.2.28 TAG\_CARDHOLDER\_NAME

```
#define TAG_CARDHOLDER_NAME 0x5F20
```

Source: ICC  
Length: 2-26  
Format: A  
Read: YES  
Write: NO

**2.23.2.29 TAG\_CARDHOLDER\_NAME\_EXTEN**

```
#define TAG_CARDHOLDER_NAME_EXTEN 0x9F0B
```

Source: ICC  
Length: 27-45  
Format: A  
Read: YES  
Write: NO

**2.23.2.30 TAG\_CDOL\_1**

```
#define TAG_CDOL_1 0x8C
```

Source: ICC  
Length: ..252  
Format: B  
Read: YES  
Write: NO

**2.23.2.31 TAG\_CDOL\_2**

```
#define TAG_CDOL_2 0x8D
```

Source: ICC  
Length: ..252  
Format: B  
Read: YES  
Write: NO

**2.23.2.32 TAG\_CH\_VERIF\_METHOD\_RESULT**

```
#define TAG_CH_VERIF_METHOD_RESULT 0x9F34
```

Source: KER  
Length: 3  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.33 TAG\_CRYPT\_INFO\_DATA

```
#define TAG_CRYPT_INFO_DATA 0x9F27
```

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.34 TAG\_CVM\_LIST

```
#define TAG_CVM_LIST 0x8E
```

Source: ICC  
Length: ..252  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.35 TAG\_DAT\_AUTH\_CODE

```
#define TAG_DAT_AUTH_CODE 0x9F45
```

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.36 TAG\_DDOL

```
#define TAG_DDOL 0x9F49
```

Source: ICC  
Length: ..252  
Format: B  
Read: YES  
Write: NO

**2.23.2.37 TAG\_DEFAULT\_DDOL**

```
#define TAG_DEFAULT_DDOL 0xDF15
```

Source: APP  
Length: ...252  
Format: B  
Read: YES  
Write: YES

**2.23.2.38 TAG\_DEFAULT\_TDOL**

```
#define TAG_DEFAULT_TDOL 0xDF18
```

Source: APP  
Length: ..252  
Format: B  
Read: YES  
Write: YES

**2.23.2.39 TAG\_EFFECTIVE\_DATE**

```
#define TAG_EFFECTIVE_DATE 0x5F25
```

Source: ICC  
Length: 3  
Format: B  
Read: YES  
Write: NO

**2.23.2.40 TAG\_EXPIRY\_DATE**

```
#define TAG_EXPIRY_DATE 0x5F24
```

Source: ICC  
Length: 3  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.41 TAG\_FLOOR\_LIMIT\_CURRENCY

```
#define TAG_FLOOR_LIMIT_CURRENCY 0xDF19
```

Source: APP

Length: 2

Format: B

Read: YES

Write: YES

#### 2.23.2.42 TAG\_IBAN

```
#define TAG_IBAN 0x5F53
```

Source: ICC

Length: ..34

Format: AN

Read: YES

Write: NO

#### 2.23.2.43 TAG\_ICC\_AID

```
#define TAG_ICC_AID 0x4F
```

Source: ICC

Length: 5-16

Format: B

Read: YES

Write: NO

#### 2.23.2.44 TAG\_ICC\_APP\_VERSION\_NUMBER

```
#define TAG_ICC_APP_VERSION_NUMBER 0x9F08
```

Source: ICC

Length: 2

Format: B

Read: YES

Write: NO



**2.23.2.45 TAG\_ICC\_DYN\_NUMBER**

```
#define TAG_ICC_DYN_NUMBER 0x9F4C
```

Source: ICC  
Length: 2-8  
Format: B  
Read: YES  
Write: NO

**2.23.2.46 TAG\_ICC\_PIN\_PK\_CERTIFICATE**

```
#define TAG_ICC_PIN_PK_CERTIFICATE 0x9F2D
```

Source: ICC  
Length: 248  
Format: B  
Read: YES  
Write: NO

**2.23.2.47 TAG\_ICC\_PIN\_PK\_EXP**

```
#define TAG_ICC_PIN_PK_EXP 0x9F2E
```

Source: ICC  
Length: 1-3  
Format: B  
Read: YES  
Write: NO

**2.23.2.48 TAG\_ICC\_PIN\_PK\_REMAINDER**

```
#define TAG_ICC_PIN_PK_REMAINDER 0x9F2F
```

Source: ICC  
Length: 248  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.49 TAG\_ICC\_PK\_CERTIFICATE

```
#define TAG_ICC_PK_CERTIFICATE 0x9F46
```

Source: ICC  
Length: 248  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.50 TAG\_ICC\_PK\_EXP

```
#define TAG_ICC_PK_EXP 0x9F47
```

Source: ICC  
Length: 1-3  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.51 TAG\_ICC\_PK\_REMAINDER

```
#define TAG_ICC_PK_REMAINDER 0x9F48
```

Source: ICC  
Length: 248  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.52 TAG\_ISSUER\_ACTION\_DEFAULT

```
#define TAG_ISSUER_ACTION_DEFAULT 0x9F0D
```

Source: ICC  
Length: 5  
Format: B  
Read: YES  
Write: NO

**2.23.2.53 TAG\_ISSUER\_ACTION\_DENIAL**

```
#define TAG_ISSUER_ACTION_DENIAL 0x9F0E
```

Source: ICC  
Length: 5  
Format: B  
Read: YES  
Write: NO

**2.23.2.54 TAG\_ISSUER\_ACTION\_ONLINE**

```
#define TAG_ISSUER_ACTION_ONLINE 0x9F0F
```

Source: ICC  
Length: 5  
Format: B  
Read: YES  
Write: NO

**2.23.2.55 TAG\_ISSUER\_APP\_DAT**

```
#define TAG_ISSUER_APP_DAT 0x9F10
```

Source: ICC  
Length: ..32  
Format: B  
Read: YES  
Write: NO

**2.23.2.56 TAG\_ISSUER\_AUTH\_DAT**

```
#define TAG_ISSUER_AUTH_DAT 0x91
```

Source: APP  
Length: 8-16  
Format: B  
Read: YES  
Write: YES

#### 2.23.2.57 TAG\_ISSUER\_CODE\_INDEX

```
#define TAG_ISSUER_CODE_INDEX 0x9F11
```

Source: ICC  
Length: 1  
Format: N  
Read: YES  
Write: NO

#### 2.23.2.58 TAG\_ISSUER\_COUNTRY\_CODE

```
#define TAG_ISSUER_COUNTRY_CODE 0x5F28
```

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.59 TAG\_ISSUER\_COUNTRY\_CODE\_A2

```
#define TAG_ISSUER_COUNTRY_CODE_A2 0x5F55
```

Source: ICC  
Length: 2  
Format: A  
Read: YES  
Write: NO

#### 2.23.2.60 TAG\_ISSUER\_COUNTRY\_CODE\_A3

```
#define TAG_ISSUER_COUNTRY_CODE_A3 0x5F56
```

Source: ICC  
Length: 3  
Format: A  
Read: YES  
Write: NO

**2.23.2.61 TAG\_ISSUER\_IDENTIFICATION\_NUMBER**

```
#define TAG_ISSUER_IDENTIFICATION_NUMBER 0x42
```

Source: ICC  
Length: 3  
Format: N  
Read: YES  
Write: NO

**2.23.2.62 TAG\_ISSUER\_PK\_CERTIFICATE**

```
#define TAG_ISSUER_PK_CERTIFICATE 0x90
```

Source: ICC  
Length: ..248  
Format: B  
Read: YES  
Write: NO

**2.23.2.63 TAG\_ISSUER\_PK\_EXP**

```
#define TAG_ISSUER_PK_EXP 0x9F32
```

Source: ICC  
Length: 1-3  
Format: B  
Read: YES  
Write: NO

**2.23.2.64 TAG\_ISSUER\_PK\_REMAINDER**

```
#define TAG_ISSUER_PK_REMAINDER 0x92
```

Source: ICC  
Length: ..248  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.65 TAG\_ISSUER\_SCRIPTS

```
#define TAG_ISSUER_SCRIPTS 0xDF24
```

Source: APP

Length: ..256

Format: B

Read: YES

Write: YES

#### 2.23.2.66 TAG\_ISSUER\_SCRIPTS\_RESULT

```
#define TAG_ISSUER_SCRIPTS_RESULT 0xDF25
```

Source: APP

Length: ..256

Format: B

Read: YES

Write: NO

#### 2.23.2.67 TAG\_ISSUER\_URL

```
#define TAG_ISSUER_URL 0x5F50
```

Source: ICC

Length: ..255

Format: AN

Read: YES

Write: NO

#### 2.23.2.68 TAG\_LANGUAGE\_PREFERENCE

```
#define TAG_LANGUAGE_PREFERENCE 0x5F2D
```

Source: ICC

Length: 2-8

Format: AN

Read: YES

Write: NO

**2.23.2.69 TAG\_LATC**

```
#define TAG_LATC 0x9F13
```

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

**2.23.2.70 TAG\_LOG\_ENTRY**

```
#define TAG_LOG_ENTRY 0x9F4D
```

Source: ICC  
Length: 2  
Format: B  
Read: YES  
Write: NO

**2.23.2.71 TAG\_LOW\_CONSEC\_OFFLINE\_LIMIT**

```
#define TAG_LOW_CONSEC_OFFLINE_LIMIT 0x9F14
```

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

**2.23.2.72 TAG\_MAX\_TARGET\_PERCENTAGE**

```
#define TAG_MAX_TARGET_PERCENTAGE 0xDF09
```

Source: APP  
Length: 1  
Format: B  
Read: YES  
Write: YES

#### 2.23.2.73 TAG\_MERCHANT\_CATEGORY\_CODE

```
#define TAG_MERCHANT_CATEGORY_CODE 0x9F15
```

Source: APP

Length: 2

Format: N

Read: YES

Write: YES

#### 2.23.2.74 TAG\_MERCHANT\_IDENTIFIER

```
#define TAG_MERCHANT_IDENTIFIER 0x9F16
```

Source: APP

Length: 15

Format: AN

Read: YES

Write: YES

#### 2.23.2.75 TAG\_OFF\_AUTH\_DAT

```
#define TAG_OFF_AUTH_DAT 0xDF23
```

Source: APP

Length: ..2048

Format: B

Read: YES

Write: NO

#### 2.23.2.76 TAG\_PAN

```
#define TAG_PAN 0x5A
```

Source: ICC

Length: ..10

Format: N

Read: YES

Write: NO



**2.23.2.77 TAG\_PAN\_SEQUENCE\_NUMBER**

```
#define TAG_PAN_SEQUENCE_NUMBER 0x5F34
```

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

**2.23.2.78 TAG\_PDOL**

```
#define TAG_PDOL 0x9F38
```

Source: ICC  
Length: ..252  
Format: B  
Read: YES  
Write: NO

**2.23.2.79 TAG\_PIN\_TRY\_COUNTER**

```
#define TAG_PIN_TRY_COUNTER 0x9F17
```

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

**2.23.2.80 TAG\_POS\_ENTRY\_MODE**

```
#define TAG_POS_ENTRY_MODE 0x9F39
```

Source: APP  
Length: 1  
Format: N  
Read: YES  
Write: YES

#### 2.23.2.81 TAG\_RISK\_AMOUNT

```
#define TAG_RISK_AMOUNT 0xDF02
```

Source: APP

Length: 4

Format: B

Read: YES

Write: YES

#### 2.23.2.82 TAG\_SERIAL\_NUMBER

```
#define TAG_SERIAL_NUMBER 0x9F1E
```

Source: APP

Length: 8

Format: AN

Read: YES

Write: YES

#### 2.23.2.83 TAG\_SERVICE\_CODE

```
#define TAG_SERVICE_CODE 0x5F30
```

Source: ICC

Length: 2

Format: B

Read: YES

Write: NO

#### 2.23.2.84 TAG\_SIGNED\_DYN\_APP\_DAT

```
#define TAG_SIGNED_DYN_APP_DAT 0x9F4B
```

Source: ICC

Length: ..248

Format: B

Read: YES

Write: NO

**2.23.2.85 TAG\_SIGNED\_STA\_APP\_DAT**

```
#define TAG_SIGNED_STA_APP_DAT 0x93
```

Source: ICC

Length: ..248

Format: B

Read: YES

Write: NO

**2.23.2.86 TAG\_STA\_DAT\_AUTH\_TAG\_LIST**

```
#define TAG_STA_DAT_AUTH_TAG_LIST 0x9F4A
```

Source: ICC

Length: ..252

Format: B

Read: YES

Write: NO

**2.23.2.87 TAG\_TARGET\_PERCENTAGE**

```
#define TAG_TARGET_PERCENTAGE 0xDF08
```

Source: APP

Length: 1

Format: B

Read: YES

Write: YES

**2.23.2.88 TAG\_TC\_HASH\_VALUE**

```
#define TAG_TC_HASH_VALUE 0x98
```

Source: APP

Length: 20

Format: B

Read: YES

Write: YES

#### 2.23.2.89 TAG\_TDOL

```
#define TAG_TDOL 0x97
```

Source: ICC  
Length: ..252  
Format: B  
Read: YES  
Write: NO

#### 2.23.2.90 TAG\_TERM\_ACTION\_DEFAULT

```
#define TAG_TERM_ACTION_DEFAULT 0xDF03
```

Source: APP  
Length: 5  
Format: B  
Read: YES  
Write: YES

#### 2.23.2.91 TAG\_TERM\_ACTION\_DENIAL

```
#define TAG_TERM_ACTION_DENIAL 0xDF04
```

Source: APP  
Length: 5  
Format: B  
Read: YES  
Write: YES

#### 2.23.2.92 TAG\_TERM\_ACTION\_ONLINE

```
#define TAG_TERM_ACTION_ONLINE 0xDF05
```

Source: APP  
Length: 5  
Format: B  
Read: YES  
Write: YES

**2.23.2.93 TAG\_TERM\_AID**

```
#define TAG_TERM_AID 0x9F06
```

Source: APP  
Length: 5-16  
Format: B  
Read: YES  
Write: YES

**2.23.2.94 TAG\_TERMINAL\_CAPABILITIES**

```
#define TAG_TERMINAL_CAPABILITIES 0x9F33
```

Source: APP  
Length: 3  
Format: B  
Read: YES  
Write: YES

**2.23.2.95 TAG\_TERMINAL\_COUNTRY\_CODE**

```
#define TAG_TERMINAL_COUNTRY_CODE 0x9F1A
```

Source: APP  
Length: 2  
Format: N  
Read: YES  
Write: YES

**2.23.2.96 TAG\_TERMINAL\_FLOOR\_LIMIT**

```
#define TAG_TERMINAL_FLOOR_LIMIT 0x9F1B
```

Source: APP  
Length: 4  
Format: B  
Read: YES  
Write: YES

#### 2.23.2.97 TAG\_TERMINAL\_ID

```
#define TAG_TERMINAL_ID 0x9F1C
```

Source: APP

Length: 8

Format: AN

Read: YES

Write: YES

#### 2.23.2.98 TAG\_TERMINAL\_RISK\_DAT

```
#define TAG_TERMINAL_RISK_DAT 0x9F1D
```

Source: APP

Length: 1-8

Format: B

Read: YES

Write: YES

#### 2.23.2.99 TAG\_TERMINAL\_TYPE

```
#define TAG_TERMINAL_TYPE 0x9F35
```

Source: APP

Length: 1

Format: N

Read: YES

Write: YES

#### 2.23.2.100 TAG\_THRESHOLD\_VALUE

```
#define TAG_THRESHOLD_VALUE 0xDF07
```

Source: APP

Length: 5

Format: B

Read: YES

Write: YES

**2.23.2.101 TAG\_TRACK1\_DISCRETION\_DAT**

```
#define TAG_TRACK1_DISCRETION_DAT 0x9F1F
```

Source: ICC  
Length: ..52  
Format: A  
Read: YES  
Write: NO

**2.23.2.102 TAG\_TRACK2\_DISCRETION\_DAT**

```
#define TAG_TRACK2_DISCRETION_DAT 0x9F20
```

Source: ICC  
Length: ..22  
Format: N  
Read: YES  
Write: NO

**2.23.2.103 TAG\_TRACK2\_EQUIVALENT\_DATA**

```
#define TAG_TRACK2_EQUIVALENT_DATA 0x57
```

Source: ICC  
Length: ..19  
Format: B  
Read: YES  
Write: NO

**2.23.2.104 TAG\_TRANSACTION\_CATEGORY\_CODE**

```
#define TAG_TRANSACTION_CATEGORY_CODE 0x9F53
```

Source: APP  
Length: 1  
Format: B  
Read: YES  
Write: YES

**2.23.2.105 TAG\_TRANSACTION\_CURR\_CODE**

```
#define TAG_TRANSACTION_CURR_CODE 0x5F2A
```

Source: APP

Length: 2

Format: N

Read: YES

Write: YES

**2.23.2.106 TAG\_TRANSACTION\_CURR\_EXP**

```
#define TAG_TRANSACTION_CURR_EXP 0x5F36
```

Source: APP

Length: 1

Format: N

Read: YES

Write: YES

**2.23.2.107 TAG\_TRANSACTION\_DATE**

```
#define TAG_TRANSACTION_DATE 0x9A
```

Source: APP

Length: 3

Format: N

Read: YES

Write: YES

**2.23.2.108 TAG\_TRANSACTION\_REF\_CURR\_CODE**

```
#define TAG_TRANSACTION_REF_CURR_CODE 0x9F3C
```

Source: APP

Length: 2

Format: N

Read: YES

Write: YES



**2.23.2.109 TAG\_TRANSACTION\_REF\_CURR\_EXP**

```
#define TAG_TRANSACTION_REF_CURR_EXP 0x9F3D
```

Source: APP  
Length: 1  
Format: N  
Read: YES  
Write: YES

**2.23.2.110 TAG\_TRANSACTION\_SEQ\_COUNTER**

```
#define TAG_TRANSACTION_SEQ_COUNTER 0x9F41
```

Source: APP  
Length: 2-4  
Format: N  
Read: YES  
Write: YES

**2.23.2.111 TAG\_TRANSACTION\_TIME**

```
#define TAG_TRANSACTION_TIME 0x9F21
```

Source: APP  
Length: 3  
Format: N  
Read: YES  
Write: YES

**2.23.2.112 TAG\_TRANSACTION\_TYPE**

```
#define TAG_TRANSACTION_TYPE 0x9C
```

Source: APP  
Length: 1  
Format: N  
Read: YES  
Write: YES

**2.23.2.113 TAG\_TSI**

```
#define TAG_TSI 0x9B
```

Source: KER  
Length: 2  
Format: B  
Read: YES  
Write: NO

**2.23.2.114 TAG\_TVR**

```
#define TAG_TVR 0x95
```

Source: KER  
Length: 5  
Format: B  
Read: YES  
Write: NO

**2.23.2.115 TAG\_UNPREDICTABLE\_NUMBER**

```
#define TAG_UNPREDICTABLE_NUMBER 0x9F37
```

Source: KER  
Length: 4  
Format: B  
Read: YES  
Write: NO

**2.23.2.116 TAG\_UPP\_CONSEC\_OFFLINE\_LIMIT**

```
#define TAG_UPP_CONSEC_OFFLINE_LIMIT 0x9F23
```

Source: ICC  
Length: 1  
Format: B  
Read: YES  
Write: NO

## 2.24 EMV Status Codes

These status codes are returned from every EMV function to indicate the result of it.

### Macros

- #define `EMV_SUCCESS` 0  
*Operation successful.*
- #define `EMV_LIST_AVAILABLE` 1  
*More than one matching applications found.*
- #define `EMV_APPLICATION_AVAILABLE` 2  
*Only one matching application found.*
- #define `EMV_NO_COMMON_APPLICATION` 3  
*No matching applications found.*
- #define `EMV_EASY_ENTRY_APP` 4  
*Easy Entry application.*
- #define `EMV_AMOUNT_NEEDED` 5  
*Amount is requested by the dynamic data authentication.*
- #define `EMV_RESULT_NEEDED` 6  
*Result needed.*
- #define `EMV_AUTH_COMPLETED` 7  
*Authentication is completed.*
- #define `EMV_AUTH_NOT_DONE` 8  
*Authentication was not performed.*
- #define `EMV_OFFLINE_PIN_PLAIN` 9  
*OFFLINE plain text pin is required.*
- #define `EMV_ONLINE_PIN` 10  
*ONLINE pin is required.*
- #define `EMV_OFFLINE_PIN_CIPHERED` 11  
*OFFLINE ciphered pin is required.*
- #define `EMV_BLOCKED_APPLICATION` 12  
*Explicit selection was done and blocked AIDs were found.*
- #define `EMV_TRANSACTION_ONLINE` 13  
*An online request should be done.*
- #define `EMV_TRANSACTION_APPROVED` 14  
*Transaction can be accepted offline.*
- #define `EMV_TRANSACTION_DENIED` 15  
*Transaction must be declined.*
- #define `EMV_CDA_FAILED` 16  
*CDA failed and the cryptogram got is not an AAC or the data handed for DDA was not found.*
- #define `EMV_INVALID_PIN` 17  
*Incorrect PIN.*
- #define `EMV_INVALID_PIN_LAST_ATTEMPT` 18  
*Incorrect PIN, last attempt available only.*
- #define `EMV_FAILURE` 50  
*Command failed, possibly due wrong input parameters - wrong ATR, bit values, etc.*
- #define `EMV_NO_DATA_FOUND` 51  
*Incoming data pointer is null or empty.*
- #define `EMV_SYSTEM_ERROR` 52

- Internal system error occurred.*
- #define [EMV\\_DATA\\_FORMAT\\_ERROR](#) 53
  - Incorrect format found in the input parameters.*
- #define [EMV\\_INVALID\\_ATR](#) 54
  - Invalid ATR sequence, not according to specs.*
- #define [EMV\\_ABORT\\_TRANSACTION](#) 55
  - Severe error occurred transaction must be aborted.*
- #define [EMV\\_APPLICATION\\_NOT\\_FOUND](#) 56
  - AID not found in the card.*
- #define [EMV\\_INVALID\\_APPLICATION](#) 57
  - Application is not correct.*
- #define [EMV\\_ERROR\\_IN\\_APPLICATION](#) 58
  - Some error during read process.*
- #define [EMV\\_CARD\\_BLOCKED](#) 59
  - Status word got from the PSE selection indicates that the card is blocked.*
- #define [EMV\\_NO\\_SCRIPT\\_LOADED](#) 60
  - No script loaded.*
- #define [EMV\\_TAG\\_NOT\\_FOUND](#) 61
  - No script loaded.*
- #define [EMV\\_INVALID\\_TAG](#) 62
  - Tag cannot be read.*
- #define [EMV\\_INVALID\\_LENGTH](#) 63
  - Length of the buffer is incorrect.*
- #define [EMV\\_INVALID\\_HASH](#) 64
  - Error in the HASH verification.*
- #define [EMV\\_INVALID\\_KEY](#) 65
  - No key was found to do the verification.*
- #define [EMV\\_NO\\_MORE\\_KEYS](#) 66
  - No more available locations for keys.*
- #define [EMV\\_ERROR\\_AC\\_PROCESS](#) 67
  - Error processing the AC generation.*
- #define [EMV\\_ERROR\\_AC\\_DENIED](#) 68
  - Status word got from the card is 6985.*
- #define [EMV\\_NO\\_CURRENT\\_METHOD](#) 69
  - No method is currently applicable.*
- #define [EMV\\_RESULT\\_ALREADY\\_LOADED](#) 70
  - Result already loaded for the current method.*
- #define [EMV\\_LAST\\_EMVKERNEL\\_ERR\\_CODE](#) 70
- #define [EMV\\_INVALID\\_REMAINDER](#) 80
- #define [EMV\\_INVALID\\_HEADER](#) 81
  - Invalid header.*
- #define [EMV\\_INVALID\\_FOOTER](#) 82
  - Invalid footer.*
- #define [EMV\\_INVALID\\_FORMAT](#) 83
  - Invalid format.*
- #define [EMV\\_INVALID\\_CERTIFICATE](#) 84
  - Invalid certificate.*
- #define [EMV\\_INVALID\\_SIGNATURE](#) 85
  - Invalid signature.*

### 2.24.1 Detailed Description

These status codes are returned from every EMV function to indicate the result of it.

### 2.24.2 Macro Definition Documentation

#### 2.24.2.1 EMV\_ABORT\_TRANSACTION

```
#define EMV_ABORT_TRANSACTION 55
```

Severe error occurred transaction must be aborted.

#### 2.24.2.2 EMV\_AMOUNT\_NEEDED

```
#define EMV_AMOUNT_NEEDED 5
```

Amount is requested by the dynamic data authentication.

#### 2.24.2.3 EMV\_APPLICATION\_AVAILABLE

```
#define EMV_APPLICATION_AVAILABLE 2
```

Only one matching application found.

#### 2.24.2.4 EMV\_APPLICATION\_NOT\_FOUND

```
#define EMV_APPLICATION_NOT_FOUND 56
```

AID not found in the card.

#### 2.24.2.5 EMV\_AUTH\_COMPLETED

```
#define EMV_AUTH_COMPLETED 7
```

Authentication is completed.

#### 2.24.2.6 EMV\_AUTH\_NOT\_DONE

```
#define EMV_AUTH_NOT_DONE 8
```

Authentication was not performed.

#### 2.24.2.7 EMV\_BLOCKED\_APPLICATION

```
#define EMV_BLOCKED_APPLICATION 12
```

Explicit selection was done and blocked AIDs were found.

#### 2.24.2.8 EMV\_CARD\_BLOCKED

```
#define EMV_CARD_BLOCKED 59
```

Status word got from the PSE selection indicates that the card is blocked.

#### 2.24.2.9 EMV\_CDA\_FAILED

```
#define EMV_CDA_FAILED 16
```

CDA failed and the cryptogram got is not an AAC or the data handed for DDA was not found.

#### 2.24.2.10 EMV\_DATA\_FORMAT\_ERROR

```
#define EMV_DATA_FORMAT_ERROR 53
```

Incorrect format found in the input parameters.

#### 2.24.2.11 EMV\_EASY\_ENTRY\_APP

```
#define EMV_EASY_ENTRY_APP 4
```

Easy Entry application.

**2.24.2.12 EMV\_ERROR\_AC\_DENIED**

```
#define EMV_ERROR_AC_DENIED 68
```

Status word got from the card is 6985.

**2.24.2.13 EMV\_ERROR\_AC\_PROCESS**

```
#define EMV_ERROR_AC_PROCESS 67
```

Error processing the AC generation.

**2.24.2.14 EMV\_ERROR\_IN\_APPLICATION**

```
#define EMV_ERROR_IN_APPLICATION 58
```

Some error during read process.

**2.24.2.15 EMV\_FAILURE**

```
#define EMV_FAILURE 50
```

Command failed, possibly due wrong input parameters - wrong ATR, bit values, etc.

**2.24.2.16 EMV\_INVALID\_APPLICATION**

```
#define EMV_INVALID_APPLICATION 57
```

Application is not correct.

**2.24.2.17 EMV\_INVALID\_ATR**

```
#define EMV_INVALID_ATR 54
```

Invalid ATR sequence, not according to specs.

#### 2.24.2.18 EMV\_INVALID\_CERTIFICATE

```
#define EMV_INVALID_CERTIFICATE 84
```

Invalid certificate.

#### 2.24.2.19 EMV\_INVALID\_FOOTER

```
#define EMV_INVALID_FOOTER 82
```

Invalid footer.

#### 2.24.2.20 EMV\_INVALID\_FORMAT

```
#define EMV_INVALID_FORMAT 83
```

Invalid format.

#### 2.24.2.21 EMV\_INVALID\_HASH

```
#define EMV_INVALID_HASH 64
```

Error in the HASH verification.

#### 2.24.2.22 EMV\_INVALID\_HEADER

```
#define EMV_INVALID_HEADER 81
```

Invalid header.

#### 2.24.2.23 EMV\_INVALID\_KEY

```
#define EMV_INVALID_KEY 65
```

No key was found to do the verification.



**2.24.2.24 EMV\_INVALID\_LENGTH**

```
#define EMV_INVALID_LENGTH 63
```

Length of the buffer is incorrect.

**2.24.2.25 EMV\_INVALID\_PIN**

```
#define EMV_INVALID_PIN 17
```

Incorrect PIN.

**2.24.2.26 EMV\_INVALID\_PIN\_LAST\_ATTEMPT**

```
#define EMV_INVALID_PIN_LAST_ATTEMPT 18
```

Incorrect PIN, last attempt available only.

**2.24.2.27 EMV\_INVALID\_REMAINDER**

```
#define EMV_INVALID_REMAINDER 80
```

**2.24.2.28 EMV\_INVALID\_SIGNATURE**

```
#define EMV_INVALID_SIGNATURE 85
```

Invalid signature.

**2.24.2.29 EMV\_INVALID\_TAG**

```
#define EMV_INVALID_TAG 62
```

Tag cannot be read.

#### 2.24.2.30 EMV\_LAST\_EMVKERNEL\_ERR\_CODE

```
#define EMV_LAST_EMVKERNEL_ERR_CODE 70
```

#### 2.24.2.31 EMV\_LIST\_AVAILABLE

```
#define EMV_LIST_AVAILABLE 1
```

More than one matching applications found.

#### 2.24.2.32 EMV\_NO\_COMMON\_APPLICATION

```
#define EMV_NO_COMMON_APPLICATION 3
```

No matching applications found.

#### 2.24.2.33 EMV\_NO\_CURRENT\_METHOD

```
#define EMV_NO_CURRENT_METHOD 69
```

No method is currently applicable.

#### 2.24.2.34 EMV\_NO\_DATA\_FOUND

```
#define EMV_NO_DATA_FOUND 51
```

Incoming data pointer is null or empty.

#### 2.24.2.35 EMV\_NO\_MORE\_KEYS

```
#define EMV_NO_MORE_KEYS 66
```

No more available locations for keys.

**2.24.2.36 EMV\_NO\_SCRIPT\_LOADED**

```
#define EMV_NO_SCRIPT_LOADED 60
```

No script loaded.

**2.24.2.37 EMV\_OFFLINE\_PIN\_CIPHERED**

```
#define EMV_OFFLINE_PIN_CIPHERED 11
```

OFFLINE ciphered pin is required.

**2.24.2.38 EMV\_OFFLINE\_PIN\_PLAIN**

```
#define EMV_OFFLINE_PIN_PLAIN 9
```

OFFLINE plain text pin is required.

**2.24.2.39 EMV\_ONLINE\_PIN**

```
#define EMV_ONLINE_PIN 10
```

ONLINE pin is required.

**2.24.2.40 EMV\_RESULT\_ALREADY\_LOADED**

```
#define EMV_RESULT_ALREADY_LOADED 70
```

Result already loaded for the current method.

**2.24.2.41 EMV\_RESULT\_NEEDED**

```
#define EMV_RESULT_NEEDED 6
```

Result needed.

#### 2.24.2.42 EMV\_SUCCESS

```
#define EMV_SUCCESS 0
```

Operation successful.

#### 2.24.2.43 EMV\_SYSTEM\_ERROR

```
#define EMV_SYSTEM_ERROR 52
```

Internal system error occurred.

#### 2.24.2.44 EMV\_TAG\_NOT\_FOUND

```
#define EMV_TAG_NOT_FOUND 61
```

No script loaded.

#### 2.24.2.45 EMV\_TRANSACTION\_APPROVED

```
#define EMV_TRANSACTION_APPROVED 14
```

Transaction can be accepted offline.

#### 2.24.2.46 EMV\_TRANSACTION\_DENIED

```
#define EMV_TRANSACTION_DENIED 15
```

Transaction must be declined.

#### 2.24.2.47 EMV\_TRANSACTION\_ONLINE

```
#define EMV_TRANSACTION_ONLINE 13
```

An online request should be done.

## 2.25 Transaction Start

This section includes the command used to start the transaction: ATR validation and application selection.

### Functions

- (BOOL) - [DTDevices::emvInitialise:](#)  
*This command initializes the emv kernel, call it before calling any other EMV function.*
- (BOOL) - [DTDevices::emvDeinitialise:](#)  
*This command deinitializes the emv kernel and frees the allocated resources, call it after you are done with the EMV transaction.*
- (BOOL) - [DTDevices::emvATRValidation:warmReset:error:](#)  
*The command is in charge of validating the ATR sequence got from the card to ensure that is fully EMV compliant and that obeys the rules stated in the specification.*
- (BOOL) - [DTDevices::emvLoadAppList:selectionMethod:includeBlockedAIDs:error:](#)  
*The command initiates the application selection process, loading the application list supported by the terminal.*
- (NSArray< [DTEMVApplication](#) \* > \*) - [DTDevices::emvGetCommonAppList:error:](#)  
*The command gets back the list of common applications supported by the terminal and the card, actually this commands will end or resume the selection procedure.*

### 2.25.1 Detailed Description

This section includes the command used to start the transaction: ATR validation and application selection.

### 2.25.2 Function Documentation

#### 2.25.2.1 `emvATRValidation:warmReset:error:()`

```
- (BOOL) emvATRValidation:
    (NSData *) ATR
    warmReset:(BOOL) warmReset
    error:(NSError **) error
```

The command is in charge of validating the ATR sequence got from the card to ensure that is fully EMV compliant and that obeys the rules stated in the specification.

#### Note

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

#### Parameters

<i>warmReset</i>	- holds the type of power up applied if cold or warm power up.
<i>ATR</i>	- ATR sequence received form the card: TS+T0+TB1+TC1+TS+T0+TB1+TC1+TD1+TD2+TA3+TB3+TCK
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.25.2.2 emvDeinitialise:()**

```
- (BOOL) emvDeinitialise:
    (NSError **) error
```

This command deinitializes the emv kernel and frees the allocated resources, call it after you are done with the EMV transaction.

**Note**

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

**2.25.2.3 emvGetCommonAppList:error:()**

```
- (NSArray<DTEMVApplication *> *) emvGetCommonAppList:
    (BOOL *) confirmationRequired
    error:(NSError **) error
```

The command gets back the list of common applications supported by the terminal and the card, actually this commands will end or resume the selection procedure.

Initially the command will check the provided data, if it's empty string, the status NO\_DATA\_FOUND will be returned, if during the procedure any internal error occurs the status will be EMV\_SYSTEM\_ERROR. On the other hand, if the process and be completed correctly the possible status returned will be: EMV\_LIST\_AVAILABLE, EMV\_APPLICATION\_AVAILABLE, EMV\_NO\_COMMON\_APPLICATION according to the number of common applications found.

**Note**

The application may know beforehand the number of common applications by retrieving the value of the data item TAG\_COMMON\_APP\_NUMBER.

In the event of an application error that doesn't force to abort the transaction, this command will be called again as many times as necessary while the list won't be empty. Internally the Kernel will remove the wrong application so that the selection could be resumed.

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

## Parameters

<i>confirmationRequired</i>	- defines if USER Confirmation is required
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

Array of [DTEMVApplication](#) upon success, nil otherwise

2.25.2.4 `emvInitialise:()`

```
- (BOOL) emvInitialise:
    (NSError **) error
```

This command initializes the emv kernel, call it before calling any other EMV function.

## Note

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

## Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

## Returns

TRUE upon success, FALSE otherwise

2.25.2.5 `emvLoadAppList:selectionMethod:includeBlockedAIDs:error:()`

```
- (BOOL) emvLoadAppList:
    (NSArray< DTEMVApplication * > *) appList
    selectionMethod:(APP_SELECTION_METHODS) selectionMethod
    includeBlockedAIDs:(BOOL) includeBlockedAIDs
    error:(NSError **) error
```

The command initiates the application selection process, loading the application list supported by the terminal.

The maximum number of application that can be loaded into the kernel is up to 75. This number is only constrained by the max packet size that can be exchanged on the port (2Kb).

Initially the command will inspect the incoming data to make sure that if data are provided and that all the data related to terminal applications is valid. If no data has been provided (the list is empty) the status `EMV_NO_DATA_FOUND` will be returned, in the event of a format failure of the applications data the result got will be `EMV_DATA_FORMAT_ERROR`. If during the internal procedure of the commands a system error occurs the command will return with the status `EMV_SYSTEM_ERROR`, on the other hand if the error occurs dealing with the card or with the data got and the transaction must be aborted according to EMV specs, the result will be `EMV_ABORT_TRANSACTION`. If the process can be completed correctly and the list is properly parsed and managed the status `SUCCESS` will be returned.

**Note**

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

**Parameters**

<i>appList</i>	- an array of application <a href="#">DTEMVApplication</a>	
<i>selectionMethod</i>	- defines the selection preferred method:	
	SELECTION_PSE	Selection by PSE
	SELECTION_AIDLIST	Selection by AID list
<i>includeBlockedAIDs</i>	- indicates if blocked AIDs should be included	
<i>error</i>	returns error information, you can pass nil if you don't want it	

**Returns**

TRUE upon success, FALSE otherwise



## 2.26 Transaction Processing

This section covers the different phases of the transaction:

Initial process  
 Data reading  
 Card data authentication  
 Restrictions processing  
 Risk Control  
 Cardholder authentication  
 Certificate generation  
 Make Transaction decision  
 Make default decision.

### Functions

- (BOOL) - [DTDevices::emvInitialAppProcessing:error:](#)  
*Once an application has been selected, the next phase is to start the transaction with it by issuing the GET PROC←ESSING ommand and analyzing the information got.*
- (BOOL) - [DTDevices::emvReadAppData:error:](#)  
*The command reads and validates the data informed in the AFL and that will be used along the transaction.*
- (BOOL) - [DTDevices::emvAuthentication:error:](#)  
*Through this command the card data is authenticated depending on the capabilities of the card and the kernel.*
- (BOOL) - [DTDevices::emvProcessRestrictions:](#)  
*The command performs the restrictions processing related to application version, application usage control and effective and expiry dates.*
- (BOOL) - [DTDevices::emvTerminalRisk:error:](#)  
*The application risk control is done by this command, including Floorlimit checking, Random selection (only if offline is enabled) and Velocity checking.*
- (BOOL) - [DTDevices::emvGetAuthenticationMethod:](#)  
*The command starts or resumes the cardholder authentication procedure, the current verification method is communicated to the application.*
- (BOOL) - [DTDevices::emvSetAuthenticationResult:error:](#)  
*Using this command the kernel gets the result of the previously informed verification method.*
- (BOOL) - [DTDevices::emvVerifyPinOffline:](#)  
*The command allows the application to apply the offline PIN verification (plaintext or encrypted) method.*
- (BOOL) - [DTDevices::emvGenerateCertificate:risk:error:](#)  
*Using this command the application will be able to generate an application cryptogram, the first or the second one, as required by the transaction.*
- (BOOL) - [DTDevices::emvMakeTransactionDecision:](#)  
*The command checks the action codes (provided by the application and read from the card), the TVR and will determine how the transaction is resolved.*
- (BOOL) - [DTDevices::emvMakeDefaultDecision:](#)  
*The command checks the default action code (provided by the application and read from the card), the TVR and will determine how the transaction is resolved by default.*

### 2.26.1 Detailed Description

This section covers the different phases of the transaction:

Initial process  
 Data reading  
 Card data authentication

Restrictions processing  
Risk Control  
Cardholder authentication  
Certificate generation  
Make Transaction decision  
Make default decision.

## 2.26.2 Function Documentation

### 2.26.2.1 `emvAuthentication:error:()`

```
- (BOOL) emvAuthentication:
    (BOOL) checkAmount
    error:(NSError **) error
```

Through this command the card data is authenticated depending on the capabilities of the card and the kernel.

The method could be static or dynamic, in this case is completed here, or combined that will be carried out later at the application cryptogram generation stage.

If the authentication can be performed (successfully or not) the command will return `EMV_SUCCESS`. If an internal error occurs the status got will be `EMV_SYSTEM_ERROR`. `EMV_ABORT_TRANSACTION` will be returned if the transaction must be immediately terminated due to a severe error in the processing. If the check amount flag was enabled and the amount is one of the data items requested by the dynamic data authentication the status `EMV_AMOUNT_NEEDED` will be returned. If the authentication cannot be completed due to a missing CA public key, the status returned will be `EMV_INVALID_KEY`.

#### Note

`EMV_INVALID_KEY` status code will let the application to detect and invalid configuration concerning the CA RSA public keys.

If the selected authentication method is the CDA, the verification of the CA public key presence and the recovery of the issuer public key is done here prior to the actual CDA verification to be done at the AC generation.

The reason for setting the `checkAmount` parameter to `TRUE` is to allow the application to know if the amount is required as part of the dynamic data used for the authentication. This can be useful if the application plans to be sure that the actual amount will be used in the process rather than a default value set to zero.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

#### Parameters

<code>checkAmount</code>	- determine whether the amount is checked for the dynamic authentication
<code>error</code>	returns error information, you can pass nil if you don't want it

#### Returns

`TRUE` upon success, `FALSE` otherwise

## 2.26.2.2 emvGenerateCertificate:risk:error:()

```

- (BOOL) emvGenerateCertificate:
    (CERTIFICATE_AC_TYPES) type
    risk:(CARD_RISK_TYPES) risk
    error:(NSError **) error

```

Using this command the application will be able to generate an application cryptogram, the first or the second one, as required by the transaction.

If the incoming pointer to the structure with the parameters is NULL, the result set will be EMV\_NO\_DATA\_FOUND. If any of the incoming parameters value is incorrect the status EMV\_DATA\_FORMAT\_ERROR will be returned. EMV\_SYSTEM\_ERROR will be get by the application if any internal error occurs during the processing. If during the cryptogram generation an error occurs that requires the transaction termination, the status EMV\_ABORT\_TRANSACTION will be informed. If other kind of error occurs during the generation the status EMV\_ERROR\_AC\_PROCESS will be got. If the combined authentication is enabled, EMV\_CDA\_FAILED will be returned to indicate that it failed. Finally if the certificate can be obtained with no error the status will be EMV\_SUCCESS.

## Note

If the CDA is the card data authentication mode the CDA will be always requested on the first cryptogram generation if the cryptogram type to be requested is a TC. It will be always disabled for AAC and for an ARQC depends on the CDA mode active.

If the CDA is the card data authentication mode the CDA will be disabled on the second cryptogram generation if the cryptogram type to be requested is an AAC, otherwise if the cryptogram type is a TC it will depend on the CDA mode active.

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

## Parameters

<i>type</i>	- specifies AC type AAC:	
	CERTIFICATE_AAC	AAC
	CERTIFICATE_TC	TC
	CERTIFICATE_ARQC	ARQC
<i>risk</i>	- card risk:	
	CDOL_1	CDOL_1
	CDOL_2	CDOL_2
<i>error</i>	returns error information, you can pass nil if you don't want it	

## Returns

TRUE upon success, FALSE otherwise

## 2.26.2.3 emvGetAuthenticationMethod:()

```

- (BOOL) emvGetAuthenticationMethod:
    (NSError **) error

```

The command starts or resumes the cardholder authentication procedure, the current verification method is communicated to the application.

The lists of methods and conditions is parsed and processed to identify what are the valid ones according to the kernel capabilities the possible methods available are: EMV\_OFF\_LINE\_PIN\_PLAIN, EMV\_ONLINE\_PIN, EMV\_OFFLINE\_PIN\_CIPHERED.

If during the process an internal error occurs the status EMV\_SYSTEM\_ERROR is returned, if the transaction has to be terminated the status EMV\_ABORT\_TRANSACTION will be returned. If there are not more valid methods to be applied the status EMV\_AUTH\_COMPLETED is set.

#### Note

If a combination of methods is required by the card, pin verification plus signature, the kernel directly checks if the latter is possible according to the capabilities, if so the former is informed otherwise the next entry in the list will be processed.

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

#### Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

#### Returns

TRUE upon success, FALSE otherwise

#### 2.26.2.4 emvInitialAppProcessing:error:()

```
- (BOOL) emvInitialAppProcessing:
    (NSData *) aid
    error:(NSError **) error
```

Once an application has been selected, the next phase is to start the transaction with it by issuing the GET PROCESSING command and analyzing the information got.

First the input data are checked, if empty the status EMV\_NO\_DATA\_FOUND is returned, if the length of the AID is incorrect (greater than AID max length or less than TAG min length) the status got will be EMV\_DATA\_FORMAT\_ERROR. If any internal error occurs during the processing the status returned will be EMV\_SYSTEM\_ERROR. Depending on the application type or status the codes EMV\_EASY\_ENTRY\_APP, EMV\_INVALID\_APPLICATION or EMV\_BLOCKED\_APPLICATION could be returned. If the transaction must be aborted due to a processing error with the card or with the data got from it the status returned will be EMV\_ABORT\_TRANSACTION. EMV\_APPLICATION\_NOT\_FOUND will be the status got if the AID provided cannot be found in the card. If everything is correct and the application can be initiated properly the status will be EMV\_SUCCESS.

#### Note

At this point of the transaction it could be possible to resume the application selection by calling the ppEmvGetCommonAppList command again, this will depend on the status got, normally for EMV\_EASY\_ENTRY\_APP, EMV\_INVALID\_APPLICATION or EMV\_BLOCKED\_APPLICATION the selection should be resumed. Upon successful execution, EMV kernel status is stored in emvLastStatus property.

#### Parameters

<i>aid</i>	- indicates the selected application AID
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.26.2.5 emvMakeDefaultDecision:()**

```
- (BOOL) emvMakeDefaultDecision:
    (NSError **) error
```

The command checks the default action code (provided by the application and read from the card), the TVR and will determine how the transaction is resolved by default.

EMV\_SYSTEM\_ERROR will be returned if any internal error occurs during the processing. If any of the bits in the TVR match with the default action codes the status EMV\_TRANSACTION\_DENIED will be returned, otherwise the status will be EMV\_TRANSACTION\_APPROVED instead.

**Note**

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

**2.26.2.6 emvMakeTransactionDecision:()**

```
- (BOOL) emvMakeTransactionDecision:
    (NSError **) error
```

The command checks the action codes (provided by the application and read from the card), the TVR and will determine how the transaction is resolved.

EMV\_SYSTEM\_ERROR will be got by the application if any internal error occurs during the processing. First the denial action codes are checked, if any of the bits in the TVR match the status EMV\_TRANSACTION\_DENIED will be returned, otherwise if the terminal is both offline & online, the online action codes will be checked in the same way and if any of the bits match with the TVR data the status EMV\_TRANSACTION\_ONLINE will be set, if there's no match at all the status will be EMV\_TRANSACTION\_APPROVED instead. If the terminal is offline only the default action code is checked, if any of the bits in the TVR match the status EMV\_TRANSACTION\_DENIED will be returned, otherwise the status got will be EMV\_TRANSACTION\_APPROVED. If the terminal is online only the status EMV\_TRANSACTION\_ONLINE will be returned.

**Note**

According to the latest EMV recommendations concerning the CDA processing (Specification update bulletin No. 44) if the CDA is the card data authentication mechanism to be performed, the previous key recovery process will be accomplished prior to the transaction decision so that CDA errors could be detected in advance and reflected on the TVR.

The online/offline capability of the terminal is determined by the value of the tag TAG\_TERMINAL\_TYPE.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

**Parameters**

<code>error</code>	returns error information, you can pass nil if you don't want it
--------------------	--

**Returns**

TRUE upon success, FALSE otherwise

**2.26.2.7 emvProcessRestrictions:()**

```
- (BOOL) emvProcessRestrictions:
    (NSError **) error
```

The command performs the restrictions processing related to application version, application usage control and effective and expiry dates.

If the process can be completed correctly the returned status will be SUCCESS, if any internal error occurs the status will be EMV\_SYSTEM\_ERROR instead.

**Note**

To complete this process the kernel needs from the application the following data items to have been provided prior to this command: • TAG\_APP\_VERSION\_NUMBER • TAG\_TERMINAL\_TYPE • TAG\_ADD\_TERM\_↵ CAPABILITIES • TAG\_TERMINAL\_COUNTRY\_CODE • TAG\_TRANSAC\_DATE • TAG\_TRANSAC\_TYPE  
Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

**Parameters**

<code>error</code>	returns error information, you can pass nil if you don't want it
--------------------	--

**Returns**

TRUE upon success, FALSE otherwise

**2.26.2.8 emvReadAppData:error:()**

```
- (BOOL) emvReadAppData:
    (NSArray< NSNumber * > *) tags
    error:(NSError **) error
```

The command reads and validates the data informed in the AFL and that will be used along the transaction.

If during the AFL data reading and validating an error occurs that commits the transaction to be terminated, the status `EMV_ABORT_TRANSACTION` will be returned. If the error allows the application selection to be resumed, the status returned will be `EMV_ERROR_IN_APPLICATION`. If `psrEMVManTagList` is not `NULL`, the presence of the tags provided here will be checked. If during the procedure any internal error occurs, `EMV_SYSTEM_ERROR` will be returned. On the other hand, if everything is correct and the data can be extracted and validated, the status `EMV_SUCCESS` will be the value returned.

#### Note

At this point of the transaction it could be possible to resume the application selection by calling the `ppEmvGetCommonAppList` command again, this will depend on the status got, normally for `EMV_ERROR_IN_APPLICATION` the selection should be resumed.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

#### Parameters

<i>tags</i>	- an array of tags to return
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.26.2.9 `emvSetAuthenticationResult:error:()`

```
- (BOOL) emvSetAuthenticationResult:
    (AUTH_RESULTS) result
    error:(NSError **) error
```

Using this command the kernel gets the result of the previously informed verification method.

Firstly the value of the result informed must be checked, if its value is not a valid one the status `EMV_DATA_FORMAT_ERROR` will be returned. If the authentication process was not started and no method is currently active the status `EMV_NO_CURRENT_METHOD` will be got by the application, if the result for the current method was already provided the status will be `EMV_RESULT_ALREADY_LOADED`. `EMV_SYSTEM_ERROR` will be get by the application if any internal error occurs during the processing. When everything is ok and the result can be stored correctly the status sent back is `EMV_SUCCESS`.

#### Note

The actual verification method result according to EMV specs can be recovered by the application at later stage by accessing the data item `TAG_CH_VERIF_METHOD_RESUL`.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

## Parameters

<i>result</i>	- result of the verification method previously informed:	
	AUTH_RESULT_SUCCESS	The method result was successful
	AUTH_RESULT_FAILURE	The method failed
	AUTH_FAIL_PIN_ENTRY_NOT_DONE	PIN entry was bypassed
	AUTH_FAIL_USER_CANCELLATION	PIN entry was cancelled
<i>error</i>	returns error information, you can pass nil if you don't want it	

## Returns

TRUE upon success, FALSE otherwise

2.26.2.10 `emvTerminalRisk:error:()`

```
- (BOOL) emvTerminalRisk:
    (BOOL) forceProcessing
    error:(NSError **) error
```

The application risk control is done by this command, including Floorlimit checking, Random selection (only if offline is enabled) and Velocity checking.

If the process can be completed correctly the returned status will be SUCCESS, if any internal error occurs the status will be EMV\_SYSTEM\_ERROR instead.

## Note

To complete this process the kernel needs from the application the following data items to have been provided previously: • TAG\_RISK\_AMOUNT (if offline enabled) • TAG\_AMOUNT\_AUTHORISED\_BINARY (if online only) • TAG\_FLOOR\_LIMIT\_CURRENCY (optional) • TAG\_TERMINAL\_FLOOR\_LIMIT • TAG\_THRESHOLD\_VALUE (if offline) • TAG\_TARGET\_PERCENTAGE (if offline) • TAG\_MAX\_TARGET\_PERCENTAGE (if offline) • TAG\_TRANSAC\_CURR\_CODE (optional)

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

## Parameters

<i>forceProcessing</i>	- determine whether the process should be carried out despite of the AIP configuration
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.26.2.11 `emvVerifyPinOffline:()`

```
- (BOOL) emvVerifyPinOffline:
    (NSError **) error
```



The command allows the application to apply the offline PIN verification (plaintext or encrypted) method.

Depending on the current PIN entry type (plaintext or encrypted) is verified against the card, if the PIN is no valid and is rejected the status `EMV_INVALID_PIN` will be returned if more than one attempt is still available otherwise the status will be `EMV_INVALID_PIN_LAST_ATTEMPT`. If a severe error occurs so that the transaction should be terminated immediately, the status `EMV_ABORT_TRANSACTION` will be set. If any kind of internal error occurs during the processing, the status `EMV_SYSTEM_ERROR` will be returned. If the verification cannot be completed due to a missing CA public key, the status returned will be `EMV_INVALID_KEY`. Finally if the PIN is entered and verified correctly the status got will be `EMV_SUCCESS`.

#### Note

`EMV_INVALID_KEY` status code will let the application to detect and invalid configuration concerning the CA RSA public keys.

The PIN entry process will have to be accomplished by the application calling to the proper commands provided for that aim.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

#### Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

#### Returns

TRUE upon success, FALSE otherwise

## 2.27 Issuer Authentication

The commands listed here are intended to process the data coming from the issuer as part of the response to the online authorization request.

### Functions

- (BOOL) - [DTDevices::emvAuthenticateIssuer:](#)  
*The command is used to validate the cryptogram got from the issuer.*
- (BOOL) - [DTDevices::emvScriptProcessing:error:](#)  
*The script processing retrieved in the online authorization is handled by this command.*

### 2.27.1 Detailed Description

The commands listed here are intended to process the data coming from the issuer as part of the response to the online authorization request.

### 2.27.2 Function Documentation

#### 2.27.2.1 `emvAuthenticateIssuer:()`

```
- (BOOL) emvAuthenticateIssuer:  
    (NSError **) error
```

The command is used to validate the cryptogram got from the issuer.

If the issuer cryptogram was not set previously, the status EMV\_NO\_DATA\_FOUND will be returned. If during the processing any internal error occurs, the status EMV\_SYSTEM\_ERROR will be set. If everything is ok and the cryptogram is verified, the result will be EMV\_SUCCESS.

#### Note

The data item that the application has to provide to the kernel so that this command could be executed is: TAG\_ISSUER\_AUTH\_DATA  
Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

#### Parameters

<code>error</code>	returns error information, you can pass nil if you don't want it
--------------------	--

#### Returns

TRUE upon success, FALSE otherwise

### 2.27.2.2 emvScriptProcessing:error:()

```
- (BOOL) emvScriptProcessing:
    (int) type
    error:(NSError **) error
```

The script processing retrieved in the online authorization is handled by this command.

First the presence of the script in the data repository is checked, if it's not present the status EMV\_NO\_SCRIPT\_LOADED is returned. If during the processing any internal error occurs the status EMV\_SYSTEM\_ERROR will be set. Once the script has been conveniently processed and issued to the card the status EMV\_SUCCESS will be set.

#### Note

The script data should be provided to the kernel through the data item TAG\_ISSUER\_SCRIPTS, and after the processing is over the results can be recovered by accessing the data item TAG\_ISSUER\_SCRIPTS\_RESULT. The maximum length of the scripts supported is 256 bytes.

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

#### Parameters

<i>type</i>	- script type to be processed:	
	0x71	SCRIPT_71
	0x72	SCRIPT_72
<i>error</i>	returns error information, you can pass nil if you don't want it	

#### Returns

TRUE upon success, FALSE otherwise

## 2.28 General Commands

These commands are not part of the basic transaction management but provide the kernel with more flexibility, and can be used by the application for its own particular requirements.

### Functions

- (BOOL) - [DTDevices::emvUpdateTVRByte:bit:value:error:](#)  
*The command allows modifying the TVR directly, setting or unsetting the desired bits.*
- (BOOL) - [DTDevices::emvUpdateTSIByte:bit:value:error:](#)  
*The command allows modifying the TSI directly, setting or unsetting the desired bits.*
- (BOOL) - [DTDevices::emvCheckTVRByte:bit:error:](#)  
*The command is intended to verify an individual bit within the TVR.*
- (BOOL) - [DTDevices::emvCheckTSIByte:bit:error:](#)  
*The command is intended to verify an individual bit within the TSI.*
- (BOOL) - [DTDevices::emvRemovePublicKey:RID:error:](#)  
*The command is intended to delete a given CA public key.*

### 2.28.1 Detailed Description

These commands are not part of the basic transaction management but provide the kernel with more flexibility, and can be used by the application for its own particular requirements.

### 2.28.2 Function Documentation

#### 2.28.2.1 `emvCheckTSIByte:bit:error:()`

```
- (BOOL) emvCheckTSIByte:
    (int) byte
    bit:(int) bit
    error:(NSError **) error
```

The command is intended to verify an individual bit within the TSI.

Initially the incoming parameters are validated to ensure that are pointing to a valid location within the TSI structure, if that's not the case the status `EMV_DATA_FORMAT_ERROR` will be returned. If during the processing any internal error occurs the status `EMV_SYSTEM_ERROR` will be set. `EMV_SUCCESS` will be returned if the given bit is set otherwise it will be `EMV_FAILURE`.

#### Note

The aim of this command is to let the application to achieve any additional procedure that could need as a particular requirement. Consult section List of TVR and TSI bits for a list of the bits.  
 Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

## Parameters

<i>byte</i>	- defines the byte number. Accepted values are in the range [1..5]
<i>bit</i>	- defines the bit number. Accepted values are in the range [1..8]
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.28.2.2 `emvCheckTVRByte:bit:error:()`

```
- (BOOL) emvCheckTVRByte:
    (int) byte
    bit:(int) bit
    error:(NSError **) error
```

The command is intended to verify an individual bit within the TVR.

Initially the incoming parameters are validated to ensure that are pointing to a valid location within the TVR structure, if that's not the case the status EMV\_DATA\_FORMAT\_ERROR will be returned. If during the processing any internal error occurs the status EMV\_SYSTEM\_ERROR will be set. EMV\_SUCCESS will be returned if the given bit is set otherwise it will be EMV\_FAILURE.

## Note

The aim of this command is to let the application to achieve any additional procedure that could need as a particular requirement. Consult section List of TVR and TSI bits for a list of the bits.  
Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

## Parameters

<i>byte</i>	- defines the byte number. Accepted values are in the range [1..5]
<i>bit</i>	- defines the bit number. Accepted values are in the range [1..8]
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.28.2.3 `emvRemovePublicKey:RID:error:()`

```
- (BOOL) emvRemovePublicKey:
    (int) caIndex
```

```
RID:(NSData *) RID
error:(NSError **) error
```

The command is intended to delete a given CA public key.

If the input pointer is NULL the status returned will be EMV\_NO\_DATA\_FOUND, if the key cannot be found the EMV\_INVALID\_KEY status will be got. If during the processing any internal error occurs the returned status will be EMV\_SYSTEM\_ERROR. Finally if the key can be deleted the status will be EMV\_SUCCESS.

#### Note

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

#### Parameters

<i>RID</i>	- holds the RID data (5 bytes)
<i>calIndex</i>	- certification authority public key index
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.28.2.4 emvUpdateTSIByte:bit:value:error:()

```
- (BOOL) emvUpdateTSIByte:
    (int) byte
    bit:(int) bit
    value:(int) value
    error:(NSError **) error
```

The command allows modifying the TSI directly, setting or unsetting the desired bits.

Initially the incoming parameters are validated to ensure that are pointing to a valid location within the TSI structure, if that's not the case the status EMV\_DATA\_FORMAT\_ERROR will be returned. If during the processing any internal error occurs the status EMV\_SYSTEM\_ERROR will be set. EMV\_SUCCESS will be returned if everything is correct and the TVR could be updated.

#### Note

The aim of this command is to let the application to achieve any additional procedure that could need as a particular requirement. Consult section List of TVR and TSI bits for a list of the bits.  
Upon successful execution, EMV kernel status is stored in emvLastStatus property.

#### Parameters

<i>byte</i>	- defines the byte number to update. Accepted values are in the range [1..5]
<i>bit</i>	- defines the bit number to update. Accepted values are in the range [1..8]
<i>value</i>	- holds the new bit value [0..1]
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.28.2.5 emvUpdateTVRByte:bit:value:error:()**

```
- (BOOL) emvUpdateTVRByte:
    (int) byte
    bit:(int) bit
    value:(int) value
    error:(NSError **) error
```

The command allows modifying the TVR directly, setting or unsetting the desired bits.

Initially the incoming parameters are validated to ensure that are pointing to a valid location within the TVR structure. If that's not the case, the status EMV\_DATA\_FORMAT\_ERROR will be returned. If during the processing any internal error occurs, the status EMV\_SYSTEM\_ERROR will be set. EMV\_SUCCESS will be returned if everything is correct and the TVR could be updated.

**Note**

The aim of this command is to let the application to achieve any additional procedure that could need as a particular requirement. Consult section List of TVR and TSI bits below for the complete list of the bits. Upon successful execution, EMV kernel status is stored in emvLastStatus property.

**Parameters**

<i>byte</i>	- defines the byte number to update. Accepted values are in the range [1..5]
<i>bit</i>	- defines the bit number to update. Accepted values are in the range [1..8]
<i>value</i>	- holds the new bit value [0..1]
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

## 2.29 Data Access

The commands described below are used to access the data items used by the kernel.

### Functions

- (BOOL) - [DTDevices::emvSetDataAsBinary:data:error:](#)  
*The command sets a data item with data in binary format (raw data).*
- (BOOL) - [DTDevices::emvSetDataAsString:data:error:](#)  
*The command sets a data item with data in string format.*
- (NSData \*) - [DTDevices::emvGetDataAsBinary:error:](#)  
*The command gets a data item in binary format (raw data).*
- (NSString \*) - [DTDevices::emvGetDataAsString:error:](#)  
*The command gets a data item in string format.*
- (BOOL) - [DTDevices::emvGetDataDetails:tagType:maxLen:currentLen:error:](#)  
*The command allows the application direct access to the data of a given item.*
- (BOOL) - [DTDevices::emvSetBypassMode:error:](#)  
*With this command is possible to setup the behavior of the KERNEL regarding the PIN based method bypass, so that only the current method will be bypassed or any other found later in the CVM list will be considered so as well.*
- (BOOL) - [DTDevices::emvSetTags:error:](#)  
*Loads multiple tags at the same time, this is much faster than calling them 1 by 1.*
- (NSData \*) - [DTDevices::emvGetTags:error:](#)  
*Reads multiple tags at the same time, this is much faster than calling them 1 by 1.*
- (NSData \*) - [DTDevices::emvGetTagsEncrypted3DES:keyID:uniqueID:error:](#)  
*Reads multiple tags at the same time and sends them encrypted, this is much faster than calling them 1 by 1.*
- (NSData \*) - [DTDevices::emvGetTagsEncryptedDUKPT:keyID:uniqueID:error:](#)  
*Reads multiple tags at the same time and sends them encrypted, this is much faster than calling them 1 by 1.*

### 2.29.1 Detailed Description

The commands described below are used to access the data items used by the kernel.

### 2.29.2 Function Documentation

#### 2.29.2.1 `emvGetDataAsBinary:error:()`

```
- (NSData *) emvGetDataAsBinary:
    (uint32_t) tagID
    error:(NSError **) error
```

The command gets a data item in binary format (raw data).

If the length of the data item is greater than the length of the buffer requested the status `EMV_INVALID_LENGTH` will be set, in the case of not finding the requested item the status `EMV_TAG_NOT_FOUND` will be returned. After checking the item attributes, if the item cannot be read the returned status will be `EMV_INVALID_TAG`. If during the processing any internal error occurs the returned status will be `EMV_SYSTEM_ERROR`. Finally if everything is OK and the data can be extracted the status will be `EMV_SUCCESS`.

#### Note

Using this method there's no applicable conversion, so the data retrieved is in the format that corresponds to the data item. Consult section List of EMV tags for a list of the data items.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.



## Parameters

<i>tagID</i>	- holds the Tag Id of the data item
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

Tag value as data upon success, nil otherwise

**2.29.2.2 emvGetDataAsString:error:()**

```
- (NSString *) emvGetDataAsString:
    (uint32_t) tagID
    error:(NSError **) error
```

The command gets a data item in string format.

If the length of the data item is greater than the length of the buffer requested the status EMV\_INVALID\_LENGTH will be set, in the case of not finding the requested item the status EMV\_TAG\_NOT\_FOUND will be returned. After checking the item attributes, if the item cannot be read the returned status will be EMV\_INVALID\_TAG. If during the processing any internal error occurs the returned status will be EMV\_SYSTEM\_ERROR. Finally if everything is OK and the data can be extracted the status will be EMV\_SUCCESS.

## Note

Using this method there's no applicable conversion, so the data retrieved is in the format that corresponds to the data item. Consult section List of EMV tags for a list of the data items.

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

## Parameters

<i>tagID</i>	- holds the Tag Id of the data item
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

Tag value as string upon success, nil otherwise

**2.29.2.3 emvGetDataDetails:tagType:maxLength:currentLen:error:()**

```
- (BOOL) emvGetDataDetails:
    (uint32_t) tagID
    tagType:(int *) tagType
    maxLength:(int *) maxLength
```

```
currentLen:(int *) currentLen
error:(NSError **) error
```

The command allows the application direct access to the data of a given item.

In the case of not finding the requested item the status EMV\_TAG\_NOT\_FOUND will be returned. If during the processing any internal error occurs, the returned status will be EMV\_SYSTEM\_ERROR. Finally, if everything is OK and the attributes can be extracted, the status will be EMV\_SUCCESS.

#### Warning

The aim of this command is to let the application a direct access to the already assigned buffers of the data items. This could be useful to save and to optimize memory usage. It can be also used to determine the presence of an item or to know its current length.

#### Note

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

#### Parameters

<i>tagID</i>	- holds the Tag Id of the data item	
<i>tagType</i>	- returns the type of the tag:	
	TAG_TYPE_BINARY	Binary data
	TAG_TYPE_BCD	Numeric data (BCD)
	TAG_TYPE_STRING	String data
<i>maxLen</i>	- returns maximum length of the item	
<i>currentLen</i>	- returns current length of the item	
<i>error</i>	returns error information, you can pass nil if you don't want it	

#### Returns

TRUE upon success, FALSE otherwise

#### 2.29.2.4 emvGetTags:error:()

```
- (NSData *) emvGetTags:
    (NSData *) tagList
    error:(NSError **) error
```

Reads multiple tags at the same time, this is much faster than calling them 1 by 1.

Some sensitive tags can only be read encrypted.

#### Note

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

## Parameters

<i>tagList</i>	list of tags to read, the list follows the BER_TLV structure without having length and value, tags can be single or 2bytes
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

BER-TLV data containing tag-length-value or nil if function failed

## 2.29.2.5 emvGetTagsEncrypted3DES:keyID:uniqueID:error:()

```
- (NSData *) emvGetTagsEncrypted3DES:
    (NSData *) tagList
    keyID:(int) keyID
    uniqueID:(uint32_t) uniqueID
    error:(NSError **) error
```

Reads multiple tags at the same time and sends them encrypted, this is much faster than calling them 1 by 1.

Some sensitive tags can only be read encrypted.

## Note

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

## Parameters

<i>tagList</i>	list of tags to read, the list follows the BER_TLV structure without having length and value, tags can be single or 2bytes
<i>keyID</i>	index of the key to use (1-49)
<i>uniqueID</i>	a 4 bytes of unique ID that will be returned back in the packet
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

encrypted packet or nil if function failed. After decryption the data contains:

- random data (4 bytes)
- unique ID (4 bytes) - same ID you have sent to the function
- payload length (2 bytes) - length of the TLV block in BIG ENDIAN
- data (variable) - BER-TLV data, as per EMV books
- crc (2 bytes) - CRC16 CCIT on all the bytes before it
- padding (0-7 bytes) zeroes to pad the packet with

### 2.29.2.6 emvGetTagsEncryptedDUKPT:keyID:uniqueID:error:()

```
- (NSData *) emvGetTagsEncryptedDUKPT:
    (NSData *) tagList
    keyID:(int) keyID
    uniqueID:(uint32_t) uniqueID
    error:(NSError **) error
```

Reads multiple tags at the same time and sends them encrypted, this is much faster than calling them 1 by 1.

Some sensitive tags can only be read encrypted.

#### Note

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

#### Parameters

<i>tagList</i>	list of tags to read, the list follows the BER_TLV structure without having length and value, tags can be single or 2bytes
<i>keyID</i>	index of the DUKPT key to use (0-1). If the keyID is set to 0xFF, then the last DUKPT data key generated is used
<i>uniqueID</i>	a 4 bytes of unique ID that will be returned back in the packet
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

encrypted packet + DUKPT KSN (10 bytes) or nil if function failed. After decryption the data contains:

- random data (4 bytes)
- unique ID (4 bytes) - same ID you have sent to the function
- payload length (2 bytes) - length of the TLV block in BIG ENDIAN
- data (variable) - BER-TLV data, as per EMV books
- crc (2 bytes) - CRC16 CCIT on all the bytes before it
- padding (0-7 bytes) zeroes to pad the packet with

### 2.29.2.7 emvSetBypassMode:error:()

```
- (BOOL) emvSetBypassMode:
    (BYPASS_MODES) mode
    error:(NSError **) error
```

With this command is possible to setup the behavior of the KERNEL regarding the PIN based method bypass, so that only the current method will be bypassed or any other found later in the CVM list will be considered so as well.

If any kind of internal error occurs during the processing or the kernel was not initialized before the status EM↔V\_SYSTEM\_ERROR will be returned. On the other hand if the value can be set correctly the status got will be EMV\_SUCCESS.

**Note**

If this command is not used along the transaction the default value applied by the kernel will be `BYPASS_↔CURRENT_METHOD_MODE`. If the expected behavior is other than the default one the call to this command will have to be done prior to the cardholder authentication procedure and after application selection.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

## Parameters

<i>mode</i>	- bypass mode, one of:	
	BYPASS_CURRENT_METHOD_MODE	Bypass current method
	BYPASS_ALL_METHODS_MODE	Bypass all methods
<i>error</i>	returns error information, you can pass nil if you don't want it	

## Returns

TRUE upon success, FALSE otherwise

## 2.29.2.8 emvSetDataAsBinary:data:error:()

```
- (BOOL) emvSetDataAsBinary:
    (uint32_t) tagID
    data:(NSData *) data
    error:(NSError **) error
```

The command sets a data item with data in binary format (raw data).

Initially the input data is validated, if the buffer is NULL the status EMV\_NO\_DATA\_FOUND will be returned, in case of not locating the tag EMV\_TAG\_NOT\_FOUND will be set, if the length of the incoming data is not in the range accepted by the data item the status EMV\_INVALID\_LENGTH will be returned. The data item attributes are checked to determine whether the item can be written or not, if it's not the case the status returned will be EMV\_INVALID\_TAG. If during the processing any internal error occurs the returned status will be EMV\_SYSTEM\_ERROR. Once the data has been saved properly the status EMV\_SUCCESS will be set.

## Note

Using this method there's no applicable conversion, so the data provided should be in the format that corresponds to the data item to be set. So, in fact, it's like setting a given data item with raw data. Consult section List of EMV tags for a list of the data items.

Upon successful execution, EMV kernel status is stored in emvLastStatus property.

## Parameters

<i>tagID</i>	- holds the Tag Id of the data item
<i>data</i>	- holds the Tag Data
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.29.2.9 `emvSetDataAsString:data:error:()`

```

- (BOOL) emvSetDataAsString:
    (uint32_t) tagID
    data:(NSString *) data
    error:(NSError **) error

```

The command sets a data item with data in string format.

Initially the input data is validated, if the buffer is NULL the status `EMV_NO_DATA_FOUND` will be returned, in case of not locating the tag `EMV_TAG_NOT_FOUND` will be set, if the length of the incoming data is not in the range accepted by the data item the status `EMV_INVALID_LENGTH` will be returned. The data item attributes are checked to determine whether the item can be written or not, if it's not the case the status returned will be `EMV_INVALID_TAG`. If during the processing any internal error occurs the returned status will be `EMV_SYSTEM_ERROR`. Once the data has been saved properly the status `EMV_SUCCESS` will be set.

**Note**

Using this method there's no applicable conversion, so the data provided should be in the format that corresponds to the data item to be set. So, in fact, it's like setting a given data item with raw data. Consult section List of EMV tags for a list of the data items.

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

**Parameters**

<i>tagID</i>	- holds the Tag Id of the data item
<i>data</i>	- holds the Tag Data
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

2.29.2.10 `emvSetTags:error:()`

```

- (BOOL) emvSetTags:
    (NSData *) tlv
    error:(NSError **) error

```

Loads multiple tags at the same time, this is much faster than calling them 1 by 1.

**Note**

Upon successful execution, EMV kernel status is stored in `emvLastStatus` property.

**Parameters**

<i>tlv</i>	BER-TLV lists of tag-length-value, as described in EMV books
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise



## 2.30 User Interface Functions

This section includes functions for managing the display, reading PIN and keyboard.

### Functions

- (BOOL) - [DTDevices::uiGetScreenInfoWidth:height:colorMode:error:](#)  
*Returns screen properties.*
- (BOOL) - [DTDevices::uiDrawText:topLeftX:topLeftY:font:error:](#)  
*Display some text, starting at a specified position.*
- (int) - [DTDevices::uiDisplayMenu:choices:font:timeout:error:](#)  
*Display a menu with choices.*
- (BOOL) - [DTDevices::uiCancelMenu:](#)  
*Cancels running menu.*
- (NSString \*) - [DTDevices::uiDisplayDataPromptWithID:language:maxLength:initialValue:font:timeout:error:](#)  
*Display data prompt from predefined prompt ID.*
- (BOOL) - [DTDevices::uiCancelDataPrompt:](#)  
*Cancels running data prompt.*
- (BOOL) - [DTDevices::uiFillRectangle:topLeftY:width:height:color:error:](#)  
*Fills rectangle on the screen with specified color.*
- (BOOL) - [DTDevices::uiSetContrast:error:](#)  
*Set display contrast.*
- (BOOL) - [DTDevices::uiPutPixel:y:color:error:](#)  
*Draws pixel on the screen with specified color.*
- (BOOL) - [DTDevices::uiDisplayImage:topLeftY:image:error:](#)  
*Displays image on the screen.*
- (BOOL) - [DTDevices::uiStartAnimation:topLeftX:topLeftY:animated:error:](#)  
*Draws predefined animation on the screen.*
- (BOOL) - [DTDevices::uiStopAnimation:error:](#)  
*Stops animation playback started with ppUiStartAnimation.*
- (BOOL) - [DTDevices::uiControlLEDsWithBitMask:error:](#)  
*Enables or disables controllable LEDs on the device based on bit mask.*
- (BOOL) - [DTDevices::uiControlLEDsEx:numLeds:error:](#)  
*Controls the pinpad's leds.*
- (BOOL) - [DTDevices::uiEnableVibrationForTime:error:](#)  
*Activates vibration motor (if available) for a specific time.*
- (BOOL) - [DTDevices::uiEnableSpeaker:error:](#)  
*Enables or disables external speaker.*
- (BOOL) - [DTDevices::uiIsSpeakerEnabled:error:](#)  
*Returns the state of external speaker.*
- (BOOL) - [DTDevices::uiEnableSpeakerButton:error:](#)  
*Enables or disables external speaker button switch.*
- (BOOL) - [DTDevices::uiIsSpeakerButtonEnabled:error:](#)  
*Returns if external speaker control button is enabled.*
- (BOOL) - [DTDevices::uiEnableSpeakerAutoControl:error:](#)  
*Enables or disables external speaker automatic control.*
- (BOOL) - [DTDevices::uiIsSpeakerAutoControlEnabled:error:](#)  
*Returns if external speaker automatic control is enabled.*
- (BOOL) - [DTDevices::uiLoadLogo:align:error:](#)

- Loads logo into device's memory.*

  - (BOOL) - [DTDevices::uiShowInitScreen:](#)

*Shows the init screen with logo, same as when you turn on the pinpad.*
- (BOOL) - [DTDevices::uiEnablePowerButton:error:](#)

*Enables or disables the power button.*
- (BOOL) - [DTDevices::uiEnableCancelButton:error:](#)

*Enables or disables the cancel button during various operations like enter pin or EMV transaction.*
- (BOOL) - [DTDevices::uiGetSettingsMenuMode:error:](#)

*Gets how hardware settings menu button operates.*
- (BOOL) - [DTDevices::uiSetSettingsMenuMode:error:](#)

*Sets how hardware settings menu button operates.*
- (BOOL) - [DTDevices::uiGetSettingsGlobalVolume:error:](#)

*Returns the current global device volume in percents.*
- (BOOL) - [DTDevices::uiSetSettingsGlobalVolume:error:](#)

*Sets the global device volume in percents.*
- (BOOL) - [DTDevices::uiGetSettingsBacklightEnabled:error:](#)

*Gets current default backlight mode.*
- (BOOL) - [DTDevices::uiSetSettingsBacklightEnabled:error:](#)

*Sets current default backlight mode.*
- (BOOL) - [DTDevices::uiGetSettingsInvertDisplay:error:](#)

*Gets current default display color invert mode.*
- (BOOL) - [DTDevices::uiSetSettingsInvertDisplay:error:](#)

*Sets current default display color inversion mode.*

## Properties

- int [DTDevices::uiDisplayWidth](#)
- Contains display width in pixels.*
- int [DTDevices::uiDisplayHeight](#)
- Contains display height in pixels.*
- BOOL [DTDevices::uiDisplayAtBottom](#)
- Contains display height in pixels.*

### 2.30.1 Detailed Description

This section includes functions for managing the display, reading PIN and keyboard.

### 2.30.2 Function Documentation

#### 2.30.2.1 [uiCancelDataPrompt:\(\)](#)

```
- (BOOL) uiCancelDataPrompt:
    (NSError **) error
```

Cancels running data prompt.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.30.2.2 uiCancelMenu:()**

```
- (BOOL) uiCancelMenu:
    (NSError **) error
```

Cancels running menu.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.30.2.3 uiControlLEDsEx:numLeds:error:()**

```
- (BOOL) uiControlLEDsEx:
    (LEDControl []) leds
    numLeds:(int) numLeds
    error:(NSError **) error
```

Controls the pinpad's leds.

**Parameters**

<i>leds</i>	- an array of <a href="#">LEDControl</a> structures, each describing led pattern
<i>numLeds</i>	- the number of <a href="#">LEDControl</a> structures
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

ppErrNone(0) if successful or one of the ppErr\* constants

#### 2.30.2.4 uiControlLEDsWithBitMask:error:()

```
- (BOOL) uiControlLEDsWithBitMask:
    (uint32_t) mask
    error:(NSError **) error
```

Enables or disables controllable LEDs on the device based on bit mask.

##### Parameters

<i>mask</i>	bit mask of the enabled LEDs, 1 means the bit will be lit, 0 - disabled
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.30.2.5 uiDisplayDataPromptWithID:language:maxLength:initialValue:font:timeout:error:()

```
- (NSString *) uiDisplayDataPromptWithID:
    (int) promptID
    language:(LANGUAGES) language
    maxLength:(int) maxLength
    initialValue:(NSString *) initialValue
    font:(FONTS) font
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

Display data prompt from predefined prompt ID.

##### Parameters

<i>promptID</i>	one of the built-in prompts
<i>language</i>	prompt language, one of the LANG_* constants
<i>maxLength</i>	maximum data length
<i>initialValue</i>	optional string to specify the initial value
<i>font</i>	font size, one of the FONT_* constants
<i>timeout</i>	menu timeout in seconds
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

entered data or nil if function failed. Upon amount prompts, the entered data is returned without the decimal separator, i.e. \$12.34 will be returned as "1234"

### 2.30.2.6 `uiDisplayImage:topLeftY:image:error:()`

```
- (BOOL) uiDisplayImage:
    (int) topLeftX
    topLeftY:(int) topLeftY
    image:(UIImage *) image
    error:(NSError **) error
```

Displays image on the screen.

The image is dithered down to black and white before sending.

#### Parameters

<i>topLeftX</i>	- topleft X coordinate of the image in pixels
<i>topLeftY</i>	- topleft Y coordinate of the image in pixels
<i>image</i>	- image to draw
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.30.2.7 `uiDisplayMenu:choices:font:timeout:error:()`

```
- (int) uiDisplayMenu:
    (NSString *) title
    choices:(NSArray< NSString * > *) choices
    font:(FONTS) font
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

Display a menu with choices.

#### Parameters

<i>title</i>	menu's title
<i>choices</i>	list of string
<i>font</i>	font size, one of the FONT_* constants
<i>timeout</i>	menu timeout in seconds
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

selected menu choice (0 based) if function succeeded, -1 otherwise

### 2.30.2.8 uiDrawText:topLeftX:topLeftY:font:error:()

```
- (BOOL) uiDrawText:
    (NSString *) text
    topLeftX:(int) topLeftX
    topLeftY:(int) topLeftY
    font:(FONTS) font
    error:(NSError **) error
```

Display some text, starting at a specified position.

The text can contain control symbols that alter cursor position, colors or whole window. Characters going outside the screen will not be drawn.

#### Parameters

<i>text</i>	- text string to write. Special codes that can be used are:	
	0x0A	newline (moves cursor at the beginning of the next line)
	0x0B	turns on character inversion
	0x0C	turns of character inversion
<i>topLeftX</i>	- topleft X coordinate in pixels	
<i>topLeftY</i>	- topleft Y coordinate in pixels	
<i>font</i>	font size, one of the FONT_* constants	
<i>error</i>	returns error information, you can pass nil if you don't want it	

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.30.2.9 uiEnableCancelButton:error:()

```
- (BOOL) uiEnableCancelButton:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables the cancel button during various operations like enter pin or EMV transaction.

#### Parameters

<i>enabled</i>	true to enable, false to disable, default is true
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

### 2.30.2.10 `uiEnablePowerButton:error:()`

```
- (BOOL) uiEnablePowerButton:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables the power button.

Even if power button is enabled, emergency device shutdown like keeping it held for 15 seconds still works

#### Parameters

<i>enabled</i>	true to enable, false to disable, default is true
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

### 2.30.2.11 `uiEnableSpeaker:error:()`

```
- (BOOL) uiEnableSpeaker:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables external speaker.

The speaker is active as long as the device controlling it is connected/awake, so if you want the speaker to be used in background, you have to set external accessory background mode in your application or use `setAutoOffWhenIdle` to set long standby time

#### Note

enabling external speaker consumes power for the amplifier, so in order to conserve battery, enable it only when needed

#### Parameters

<i>enabled</i>	TRUE if you want to enable the external speaker
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.30.2.12 `uiEnableSpeakerAutoControl:error:()`

```
- (BOOL) uiEnableSpeakerAutoControl:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables external speaker automatic control.

When enabled, if no application is currently connected to the accessory, then the external speaker is automatically turned on for as long as the device is powered on or until a program connects to assume control. Enabling automatic control along with disabling the speaker button, then

#### Note

enabling external speaker consumes power for the amplifier, so in order to conserve battery, enable it only when needed

#### Parameters

<i>enabled</i>	TRUE if you want to enable the external speaker automatic control
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if function succeeded, FALSE otherwise

### 2.30.2.13 `uiEnableSpeakerButton:error:()`

```
- (BOOL) uiEnableSpeakerButton:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables external speaker button switch.

#### Note

enabling external speaker consumes power for the amplifier, so in order to conserve battery, enable it only when needed

#### Parameters

<i>enabled</i>	TRUE if you want to enable the external speaker button
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if function succeeded, FALSE otherwise



**2.30.2.14 uiEnableVibrationForTime:error:()**

```
- (BOOL) uiEnableVibrationForTime:
    (float) time
    error:(NSError **) error
```

Activates vibration motor (if available) for a specific time.

**Parameters**

<i>time</i>	the maximum amount of time the vibration will be active
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.30.2.15 uiFillRectangle:topLeftY:width:height:color:error:()**

```
- (BOOL) uiFillRectangle:
    (int) topLeftX
    topLeftY:(int) topLeftY
    width:(int) width
    height:(int) height
    color:(UIColor *) color
    error:(NSError **) error
```

Fills rectangle on the screen with specified color.

**Parameters**

<i>topLeftX</i>	- topleft X coordinate of the rectangle in pixels
<i>topLeftY</i>	- topleft Y coordinate of the rectangle in pixels
<i>width</i>	- rectangle width in pixels or 0 for automatic calculation
<i>height</i>	- rectangle height in pixels or 0 for automatic calculation
<i>color</i>	- the color to use, either COLOR_INVERT or custom UIColor
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.30.2.16 uiGetScreenInfoWidth:height:colorMode:error:()**

```
- (BOOL) uiGetScreenInfoWidth:
    (int *) width
```

```

height:(int *) height
colorMode:(SCREEN_COLOR_MODES *) colorMode
error:(NSError **) error

```

Returns screen properties.

#### Parameters

<i>width</i>	screen width in pixels will be returned here
<i>height</i>	screen height in pixels will be returned here
<i>colorMode</i>	screen capability to display colors will be returned here, one of the SCREEN_COLOR_MODES constants
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.30.2.17 uiGetSettingsBacklightEnabled:error:()

```

- (BOOL) uiGetSettingsBacklightEnabled:
    (BOOL *) enabled
    error:(NSError **) error

```

Gets current default backlight mode.

#### Parameters

<i>enabled</i>	on return contains if backlight is enabled by default
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.30.2.18 uiGetSettingsGlobalVolume:error:()

```

- (BOOL) uiGetSettingsGlobalVolume:
    (int *) volume
    error:(NSError **) error

```

Returns the current global device volume in percents.

#### Note

Due to how the speaker works, not all values are meaningful and the volume cannot be made linear

## Parameters

<i>volume</i>	returns global device volume in percents (0-100)
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

**2.30.2.19 uiGetSettingsInvertDisplay:error:()**

```
- (BOOL) uiGetSettingsInvertDisplay:
    (BOOL *) invert
    error:(NSError **) error
```

Gets current default display color invert mode.

## Parameters

<i>invert</i>	on return contains if screen foreground and background colors are inverted
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

**2.30.2.20 uiGetSettingsMenuMode:error:()**

```
- (BOOL) uiGetSettingsMenuMode:
    (int *) mode
    error:(NSError **) error
```

Gets how hardware settings menu button operates.

## Parameters

<i>mode</i>	on return contains button mode, one of the SETTINGS_BUTTON_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

#### 2.30.2.21 `uilsSpeakerAutoControlEnabled:error:()`

```
- (BOOL) uiIsSpeakerAutoControlEnabled:  
    (BOOL *) enabled  
    error:(NSError **) error
```

Returns if external speaker automatic control is enabled.

##### Parameters

<i>enabled</i>	stores the current state of the external speaker automatic control, TRUE means it is enabled, FALSE - disabled
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.30.2.22 `uilsSpeakerButtonEnabled:error:()`

```
- (BOOL) uiIsSpeakerButtonEnabled:  
    (BOOL *) enabled  
    error:(NSError **) error
```

Returns if external speaker control button is enabled.

##### Parameters

<i>enabled</i>	stores the current state of the external speaker control button, TRUE means it is enabled, FALSE - disabled
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

TRUE if function succeeded, FALSE otherwise

#### 2.30.2.23 `uilsSpeakerEnabled:error:()`

```
- (BOOL) uiIsSpeakerEnabled:  
    (BOOL *) enabled  
    error:(NSError **) error
```

Returns the state of external speaker.

## Parameters

<i>enabled</i>	stores the current state of the external speaker, TRUE means it is enabled, FALSE - internal speaker is used
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE if function succeeded, FALSE otherwise

## 2.30.2.24 uiLoadLogo:align:error:()

```
- (BOOL) uiLoadLogo:
    (UIImage *) logo
    align:(int) align
    error:(NSError **) error
```

Loads logo into device's memory.

Supported by printers and pinpads only. The logo is persistent and can be deleted only if battery is removed

## Parameters

<i>logo</i>	logo bitmap data
<i>align</i>	logo alignment, one of the ALIGN_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

## 2.30.2.25 uiPutPixel:y:color:error:()

```
- (BOOL) uiPutPixel:
    (int) x
    y:(int) y
    color:(UIColor *) color
    error:(NSError **) error
```

Draws pixel on the screen with specified color.

## Parameters

<i>x</i>	- X coordinate in pixels
<i>y</i>	- Y coordinate in pixels
<i>color</i>	- the color to use, either COLOR_INVERT or custom UIColor
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.30.2.26 uiSetContrast:error:()**

```
- (BOOL) uiSetContrast:
    (int) contrast
    error:(NSError **) error
```

Set display contrast.

**Parameters**

<i>contrast</i>	- display contrast
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise

**2.30.2.27 uiSetSettingsBacklightEnabled:error:()**

```
- (BOOL) uiSetSettingsBacklightEnabled:
    (BOOL) enabled
    error:(NSError **) error
```

Sets current default backlight mode.

This setting persists.

**Parameters**

<i>enabled</i>	if true screen backlight is on by default
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.30.2.28 uiSetSettingsGlobalVolume:error:()**

```
- (BOOL) uiSetSettingsGlobalVolume:
    (int) volume
    error:(NSError **) error
```

Sets the global device volume in percents.

#### Note

Due to how the speaker works, not all values are meaningful and the volume cannot be made linear

#### Parameters

<i>volume</i>	global device volume in percents (0-100)
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.30.2.29 uiSetSettingsInvertDisplay:error:()

```
- (BOOL) uiSetSettingsInvertDisplay:
    (BOOL) invert
    error:(NSError **) error
```

Sets current default display color inversion mode.

#### Parameters

<i>invert</i>	if true then by default display foreground and background colors are swapped, on displays that support this feature
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.30.2.30 uiSetSettingsMenuMode:error:()

```
- (BOOL) uiSetSettingsMenuMode:
    (int) mode
    error:(NSError **) error
```

Sets how hardware settings menu button operates.

#### Parameters

<i>mode</i>	button mode, one of the SETTINGS_BUTTON_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.30.2.31 uiShowInitScreen:()**

```
- (BOOL) uiShowInitScreen:
    (NSError **) error
```

Shows the init screen with logo, same as when you turn on the pinpad.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

**2.30.2.32 uiStartAnimation:topLeftX:topLeftY:animated:error:()**

```
- (BOOL) uiStartAnimation:
    (ANIMATIONS) animationIndex
    topLeftX:(int) topLeftX
    topLeftY:(int) topLeftY
    animated:(BOOL) animated
    error:(NSError **) error
```

Draws predefined animation on the screen.

You can have multiple animations active. Not all animations are present in every pinpad.

**Parameters**

<i>animationIndex</i>	- animation index, one of the ANIM_* constants
<i>topLeftX</i>	- topleft X coordinate of the animation in pixels
<i>topLeftY</i>	- topleft Y coordinate of the animation in pixels
<i>animated</i>	- if TRUE, the animation will play continuous until stopped with ppUiStopAnimation
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE if function succeeded, FALSE otherwise



### 2.30.2.33 uiStopAnimation:error:()

```
- (BOOL) uiStopAnimation:
    (ANIMATIONS) animationIndex
    error:(NSError **) error
```

Stops animation playback started with ppUiStartAnimation.

#### Parameters

<i>animationIndex</i>	- animation index, one of the ANIM_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if function succeeded, FALSE otherwise

## 2.30.3 Properties

### 2.30.3.1 uiDisplayAtBottom

```
- (BOOL) uiDisplayAtBottom [read], [atomic], [assign]
```

Contains display height in pixels.

### 2.30.3.2 uiDisplayHeight

```
- (int) uiDisplayHeight [read], [atomic], [assign]
```

Contains display height in pixels.

### 2.30.3.3 uiDisplayWidth

```
- (int) uiDisplayWidth [read], [atomic], [assign]
```

Contains display width in pixels.

## 2.31 Printing functions

Functions to print graphic, text and barcodes on supported printers.

### Macros

- #define CHANNEL\_PRN 1
- #define CHANNEL\_SMARTCARD 2
- #define CHANNEL\_GPRS 5
- #define CHANNEL\_ENCMSR 14
- #define CHANNEL\_MIFARE 16
- #define CHANNEL\_ZPL 50

### Functions

- (BOOL) - `DTDevices::prnSetGenericPrinterSettingsPageWidth:feedLines:error:`  
*Configures some settings needed by the sdk to operate with unknown ESC/POS printer.*
- (DTPrinterInfo \*) - `DTDevices::prnGetPrinterInfo:`  
*Returns information about the connected printer.*
- (BOOL) - `DTDevices::prnFlushCache:`  
*Forces data still in the sdk buffers to be sent directly to the printer.*
- (BOOL) - `DTDevices::prnWriteDataToChannel:data:error:`  
*Sends data to the connected printer no matter the connection type.*
- (NSData \*) - `DTDevices::prnReadDataFromChannel:length:timeout:error:`  
*Tries to read data from the connected remote device for specified timeout.*
- (NSData \*) - `DTDevices::prnReadDataFromChannel:length:stopByte:timeout:error:`  
*Tries to read data from the connected remote device for specified timeout and until specified byte is received.*
- (BOOL) - `DTDevices::prnWaitPrintJob:error:`  
*Waits specified timeout for the printout to complete.*
- (BOOL) - `DTDevices::prnWaitPrintJob:failOnNoPaper:failOnOverheat:failOnLowBattery:error:`  
*Waits specified timeout for the printout to complete.*
- (BOOL) - `DTDevices::prnGetPrinterStatus:error:`  
*Retrieves current printer status.*
- (BOOL) - `DTDevices::prnSelfTest:error:`  
*Prints selftest.*
- (BOOL) - `DTDevices::prnTurnOff:`  
*Forces printer to turn off.*
- (BOOL) - `DTDevices::prnFeedPaper:error:`  
*Feeds the paper X lines (1/203 of the inch) or as needed (different length based on the printer model) so it allows paper to be teared.*
- (BOOL) - `DTDevices::prnFeedPaperTemporary:error:`
- (BOOL) - `DTDevices::prnRetractPaper:`
- (BOOL) - `DTDevices::prnPrintBarcode:barcode:error:`  
*Prints barcode.*
- (BOOL) - `DTDevices::prnPrintBarcodePDF417:truncated:autoEncoding:eccl:size:error:`  
*Prints PDF-417 barcode.*
- (BOOL) - `DTDevices::prnPrintBarcodeQRCode:eccl:size:error:`  
*Prints QR CODE barcode.*
- (BOOL) - `DTDevices::prnPrintLogo:error:`  
*Prints the stored logo.*

- (BOOL) - [DTDevices::prnSetBarcodeSettings:height:hriPosition:align:error:](#)  
*Set various barcode parameters.*
- (BOOL) - [DTDevices::prnSetBarcodeSettings:height:hriPosition:hriFont:align:error:](#)  
*Set various barcode parameters.*
- (BOOL) - [DTDevices::prnSetDensity:error:](#)  
*Sets printer density level.*
- (BOOL) - [DTDevices::prnSetLineSpace:error:](#)  
*Sets the line "height" in pixels. If the characters are 16 pixels high for example, setting the linespace to 20 will make the printer leave 4 blank lines before next line of text starts.*
- (BOOL) - [DTDevices::prnSetLeftMargin:error:](#)  
*Sets left margin.*
- (BOOL) - [DTDevices::prnPrintText:usingEncoding:error:](#)  
*Prints text with specified font/styles.*
- (BOOL) - [DTDevices::prnPrintText:error:](#)  
*Prints text with specified font/styles.*
- (BOOL) - [DTDevices::prnSetCodepage:error:](#)  
*Changes active code page if possible.*
- (BOOL) - [DTDevices::prnPrintDelimiter:error:](#)  
*Prints the delimiter character at the whole width of the paper, adjusting itself to the paper width.*
- (BOOL) - [DTDevices::prnGetBlackMarkTreshold:error:](#)  
*Returns blackmark sensor treshold or UnsupportedOperationException if printer is not in blackmark mode.*
- (BOOL) - [DTDevices::prnSetBlackMarkTreshold:error:](#)  
*Sets blackmark sensor treshold or UnsupportedOperationException if printer is not in blackmark mode.*
- (BOOL) - [DTDevices::prnCalibrateBlackMark:error:](#)  
*Provides blackmark sensor calibration by scanning 200mm of paper for possible black marks and adjust the sensor treshold.*
- (BOOL) - [DTDevices::prnPrintImage:align:error:](#)  
*Prints Bitmap object using specified alignment.*
- (int) - [DTDevices::prnGetMaxLabelLength:](#)  
*Returns max label length or 0 if unsupported.*
- (BOOL) - [DTDevices::prnSetMaxLabelLength:error:](#)  
*Can set max label length in MM on printers that support it.*
- (BOOL) - [DTDevices::prnStartTransaction:](#)
- (BOOL) - [DTDevices::prnEndTransaction:](#)

### 2.31.1 Detailed Description

Functions to print graphic, text and barcodes on supported printers.

### 2.31.2 Macro Definition Documentation

#### 2.31.2.1 CHANNEL\_ENCMSR

```
#define CHANNEL_ENCMSR 14
```

### 2.31.2.2 CHANNEL\_GPRS

```
#define CHANNEL_GPRS 5
```

### 2.31.2.3 CHANNEL\_MIFARE

```
#define CHANNEL_MIFARE 16
```

### 2.31.2.4 CHANNEL\_PRN

```
#define CHANNEL_PRN 1
```

### 2.31.2.5 CHANNEL\_SMARTCARD

```
#define CHANNEL_SMARTCARD 2
```

### 2.31.2.6 CHANNEL\_ZPL

```
#define CHANNEL_ZPL 50
```

## 2.31.3 Function Documentation

### 2.31.3.1 prnCalibrateBlackMark:error:()

```
- (BOOL) prnCalibrateBlackMark:
    (int *) threshold
    error:(NSError **) error
```

Provides blackmark sensor calibration by scanning 200mm of paper for possible black marks and adjust the sensor threshold.

Make sure you have put the right paper before calling this function.

#### Returns

returns new trashold value for the scanned paper. The trashold is already stored in printer's flash memory so no additional set is needed.

## Parameters

<i>threshold</i>	upon success, the black mark threshold will be returned here
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

## 2.31.3.2 prnEndTransaction:()

```
- (BOOL) prnEndTransaction:
    (NSError **) error
```

## 2.31.3.3 prnFeedPaper:error:()

```
- (BOOL) prnFeedPaper:
    (int) lines
    error:(NSError **) error
```

Feeds the paper X lines (1/203 of the inch) or as needed (different length based on the printer model) so it allows paper to be teared.

## Note

If blackmark mode is active, this function searches for blackmark. If the paper is not blackmark one or the mark can not be found in 360mm, the printer will put itself into out of paper state and will need LF button to be pushed to continue.

## Parameters

<i>lines</i>	the number of lines (1/203 of the inch) to feed or 0 to automatically feed the paper as much as needed to tear the paper.
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

## 2.31.3.4 prnFeedPaperTemporary:error:()

```
- (BOOL) prnFeedPaperTemporary:
    (int) lines
    error:(NSError **) error
```

### 2.31.3.5 prnFlushCache:()

```
- (BOOL) prnFlushCache:
    (NSError **) error
```

Forces data still in the sdk buffers to be sent directly to the printer.

#### Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

#### Returns

TRUE upon success, FALSE otherwise

### 2.31.3.6 prnGetBlackMarkTreshold:error:()

```
- (BOOL) prnGetBlackMarkTreshold:
    (int *) treshold
    error:(NSError **) error
```

Returns blackmark sensor treshold or UnsupportedOperationException if printer is not in blackmark mode.

This value tells the printer how dark a spot on the paper needs to be in order to be considered as blackmark.

#### Parameters

<i>treshold</i>	upon success stores the current blackmark treshold
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

### 2.31.3.7 prnGetMaxLabelLength:()

```
- (int) prnGetMaxLabelLength:
    (NSError **) error
```

Returns max label length or 0 if unsupported.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

max label length in MM upon success, 0 otherwise

**2.31.3.8 prnGetPrinterInfo:()**

```
- (DTPrinterInfo *) prnGetPrinterInfo:
    (NSError **) error
```

Returns information about the connected printer.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

printer information object or nil if error occurred

**2.31.3.9 prnGetPrinterStatus:error:()**

```
- (BOOL) prnGetPrinterStatus:
    (int *) status
    error:(NSError **) error
```

Retrieves current printer status.

This function is useful on printers having no automatic status notifications like DPP-250 and DPP-350.

**Parameters**

<i>status</i>	upon successful execution, printer status (one or more of the PRN_STAT_* constants) will be stored here
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

### 2.31.3.10 prnPrintBarcode:barcode:error:()

```
- (BOOL) prnPrintBarcode:
    (BAR_PRN) bartype
    barcode:(NSData *) barcode
    error:(NSError **) error
```

Prints barcode.

#### Parameters

<i>bartype</i>	Barcode type, one of the BAR_PRN_* constants
<i>barcode</i>	barcode data to be printed
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

### 2.31.3.11 prnPrintBarcodePDF417:truncated:autoEncoding:eccl:size:error:()

```
- (BOOL) prnPrintBarcodePDF417:
    (NSData *) barcode
    truncated:(BOOL) truncated
    autoEncoding:(BOOL) autoEncoding
    eccl:(PDF417_ECCL) eccl
    size:(PDF417_SIZE) size
    error:(NSError **) error
```

Prints PDF-417 barcode.

#### Parameters

<i>truncated</i>	PDF-417 type - standard or truncated
<i>autoEncoding</i>	encoding type - either automatic or binary
<i>eccl</i>	Error correction control level. Possible values 0 to 9. ECCL=9 automatically selects correction level dependent on data length.



## Parameters

<i>size</i>	barcode size, one of <ul style="list-style-type: none"> <li>• 0 - Width=2, Height=4</li> <li>• 1 - Width=2, Height=9</li> <li>• 2 - Width=2, Height=15</li> <li>• 3 - Width=2, Height=20</li> <li>• 4 - Width=7, Height=4</li> <li>• 5 - Width=7, Height=9</li> <li>• 6 - Width=7, Height=15</li> <li>• 7 - Width=7, Height=20</li> <li>• 8 - Width=12, Height=4</li> <li>• 9 - Width=12, Height=9</li> <li>• 10 - Width=12, Height=15</li> <li>• 11 - Width=12, Height=20</li> <li>• 12 - Width=20, Height=4</li> <li>• 13 - Width=20, Height=9</li> <li>• 14 - Width=20, Height=15</li> <li>• 15 - Width=20, Height=20</li> </ul>
<i>barcode</i>	barcode data to be printed
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.31.3.12 `prnPrintBarcodeQRCode:eccl:size:error:()`

```
- (BOOL) prnPrintBarcodeQRCode:
    (NSData *) barcode
    eccl:(QRCODE_ECCL) eccl
    size:(QRCODE_SIZE) size
    error:(NSError **) error
```

Prints QR CODE barcode.

## Parameters

<i>size</i>	barcode symbol size. Possible values: 1, 4, 6, 8, 10, 12, 14
-------------	--

**Parameters**

<i>eccl</i>	Error correction control level, one of <ul style="list-style-type: none"> <li>• 1 - 7%</li> <li>• 2 - 15%</li> <li>• 3 - 25%</li> <li>• 4 - 30%</li> </ul>
<i>barcode</i>	barcode data to be printed
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.31.3.13 prnPrintDelimiter:error:()**

```
- (BOOL) prnPrintDelimiter:
    (char) delimchar
    error:(NSError **) error
```

Prints the delimiter character at the whole width of the paper, adjusting itself to the paper width.

The character is printed with font 12x24

**Parameters**

<i>delimchar</i>	character to print
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.31.3.14 prnPrintImage:align:error:()**

```
- (BOOL) prnPrintImage:
    (UIImage *) image
    align:(int) align
    error:(NSError **) error
```

Prints Bitmap object using specified alignment.

You can print color bitmaps, as they will be converted to black and white using error diffusion and dithering to achieve best results. On older devices this can take some time

## Parameters

<i>image</i>	UIImage object
<i>align</i>	image alignment, one of the ALIGN_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

## 2.31.3.15 prnPrintLogo:error:()

```
- (BOOL) prnPrintLogo:
    (int) mode
    error:(NSError **) error
```

Prints the stored logo.

You can upload log with prnLoadLogo function

## Parameters

<i>mode</i>	logo mode, one of the LOGO_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

## 2.31.3.16 prnPrintText:error:()

```
- (BOOL) prnPrintText:
    (NSString *) textString
    error:(NSError **) error
```

Prints text with specified font/styles.

This function can act as both simple plain text printing and quite complex printing using internal tags to format the text. The function uses the currently font size and style (or default ones) as well as the aligning, however it allows modifications of them inside the text. Any modification of the settings using the tags will be reverted when function completes execution. For example if you have default font selected before using printText and set bold font inside, it will be reverted to plain when function completes. The tags are control commands used to modify the text printing parameters. They are surrounded by {} brackets. A list of all control tags follows:

- {==} - reverts all settings to their defaults. It includes font size, style, aligning

- `{=Fx}` - selects font size. `x` ranges from 0 to 1 as follows:
  - 0: `FONT_9X16` (hieroglyph characters are using the same width as height, i.e. 16x16)
  - 1: `FONT_12X24` (hieroglyph characters are using the same width as height, i.e. 24x24)
- `{=L}` - left text aligning
- `{=C}` - center text aligning
- `{=R}` - right text aligning
- `{=Rx}` - text rotation as follows:
  - 0: not rotated
  - 1: rotated 90 degrees
  - 2: rotated 180 degrees
- `{+/-B}` - sets or unsets bold font style
- `{+/-I}` - sets or unsets italic font style
- `{+/-U}` - sets or unsets underline font style
- `{+/-V}` - sets or unsets inverse font style
- `{+/-W}` - sets or unsets text word-wrapping
- `{+/-DW}` - sets or unsets doubled font width
- `{+/-DH}` - sets or unsets doubled font height

An example of using tags "`{=C}`Plain centered text\n`{=L}`Left centered\n`{+B}`...bold...`{-B}``{+I}`or ITALIC"

#### Parameters

<i>textString</i>	the text to print
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.31.3.17 prnPrintText:usingEncoding:error:()

```
- (BOOL) prnPrintText:
    (NSString *) textString
    usingEncoding:(NSStringEncoding) encoding
    error:(NSError **) error
```

Prints text with specified font/styles.

This function can act as both simple plain text printing and quite complex printing using internal tags to format the text. The function uses the currently font size and style (or default ones) as well as the aligning, however it allows modifications of them inside the text. Any modification of the settings using the tags will be reverted when function completes execution. For example if you have default font selected before using `printText` and set bold font inside, it will be reverted to plain when function completes. The tags are control commands used to modify the text printing parameters. They are surrounded by `{}` brackets. A list of all control tags follows:

- `{=}` - reverts all settings to their defaults. It includes font size, style, aligning
- `{=Fx}` - selects font size. x ranges from 0 to 1 as follows:
  - 0: FONT\_9X16 (hieroglyph characters are using the same width as height, i.e. 16x16)
  - 1: FONT\_12X24
- `{=L}` - left text aligning
- `{=C}` - center text aligning
- `{=R}` - right text aligning
- `{=Rx}` - text rotation as follows:
  - 0: not rotated
  - 1: rotated 90 degrees
  - 2: rotated 180 degrees
- `{+/-B}` - sets or unsets bold font style
- `{+/-I}` - sets or unsets italic font style
- `{+/-U}` - sets or unsets underline font style
- `{+/-V}` - sets or unsets inverse font style
- `{+/-W}` - sets or unsets text word-wrapping
- `{+/-DW}` - sets or unsets doubled font width
- `{+/-DH}` - sets or unsets doubled font height

An example of using tags "`{=C}`Plain centered text\n`{=L}`Left centered\n`{+B}`...bold...`{-B}``{+I}`or ITALIC"

#### Parameters

<i>textString</i>	the text to print
<i>encoding</i>	the encoding to use when converting the string to format suitable to the printer. Default encoding should be <code>NSWindowsCP1252StringEncoding</code> . Currently double-byte encodings like JIS are not supported.
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.31.3.18 `prnReadDataFromChannel:length:stopByte:timeout:error:()`

```

- (NSData *) prnReadDataFromChannel:
    (int) channel
    length:(int) length
    stopByte:(int) stopByte
    timeout:(double) timeout
    error:(NSError **) error

```

Tries to read data from the connected remote device for specified timeout and until specified byte is received.

**Parameters**

<i>channel</i>	one of the CHANNEL_* constants. Use CHANNEL_PRN for generic access to the printer. This parameter has only meaning in protocol mode.
<i>length</i>	maximum amount of bytes to wait for
<i>stopByte</i>	the byte value to trim the result or -1 if not used
<i>timeout</i>	maximim timeout in seconds to wait for data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

actual data being read or nil if error occurred

**2.31.3.19 prnReadDataFromChannel:length:timeout:error:()**

```
- (NSData *) prnReadDataFromChannel:
    (int) channel
    length:(int) length
    timeout:(double) timeout
    error:(NSError **) error
```

Tries to read data from the connected remote device for specified timeout.

**Parameters**

<i>channel</i>	one of the CHANNEL_* constants. Use CHANNEL_PRN for generic access to the printer. This parameter has only meaning in protocol mode.
<i>length</i>	maximum amount of bytes to wait for
<i>timeout</i>	maximim timeout in seconds to wait for data
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

actual data being read or nil if error occurred

**2.31.3.20 prnRetractPaper:()**

```
- (BOOL) prnRetractPaper:
    (NSError **) error
```

**2.31.3.21 prnSelfTest:error:()**

```
- (BOOL) prnSelfTest:
    (BOOL) longest
    error:(NSError **) error
```

Prints selftest.

**Parameters**

<i>longtest</i>	TRUE if you want complete test with fonts and codepage, FALSE for short one
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.31.3.22 prnSetBarcodeSettings:height:hriPosition:align:error:()**

```
- (BOOL) prnSetBarcodeSettings:
    (int) scale
    height:(int) height
    hriPosition:(int) hriPosition
    align:(int) align
    error:(NSError **) error
```

Set various barcode parameters.

**Parameters**

<i>scale</i>	width of each barcode column in pixels (1/203 of the inch) between 2 and 4, default is 3
<i>height</i>	barcode height in pixels between 1 and 255. Default is 77
<i>hriPosition</i>	barcode hri code position, one of the BAR_TEXT_* constants
<i>align</i>	barcode aligning, one of the ALIGN_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.31.3.23 prnSetBarcodeSettings:height:hriPosition:hriFont:align:error:()**

```
- (BOOL) prnSetBarcodeSettings:
    (int) scale
    height:(int) height
```

```

hriPosition:(int) hriPosition
hriFont:(int) hriFont
align:(int) align
error:(NSError **) error

```

Set various barcode parameters.

#### Parameters

<i>scale</i>	width of each barcode column in pixels (1/203 of the inch) between 2 and 4, default is 3
<i>height</i>	barcode height in pixels between 1 and 255. Default is 77
<i>hriPosition</i>	barcode hri code position, one of the BAR_TEXT_* constants
<i>hriFont</i>	hri font used, either PRN_FONT_12X24 or PRN_FONT_9X16
<i>align</i>	barcode aligning, one of the ALIGN_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.31.3.24 prnSetBlackMarkTreshold:error:()

```

- (BOOL) prnSetBlackMarkTreshold:
    (int) treshold
    error:(NSError **) error

```

Sets blackmark sensor treshold or UnsupportedOperationException if printer is not in blackmark mode.

This value tells the printer how dark a spot on the paper needs to be in order to be considered as blackmark.

#### Parameters

<i>treshold</i>	value between 0x20 and 0xc0, default is 0x68
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.31.3.25 prnSetCodepage:error:()

```

- (BOOL) prnSetCodepage:
    (int) codepage
    error:(NSError **) error

```

Changes active code page if possible.

Some printers require manually enabling this with hardware switch (look for ESC t in the printer's manual)



## Parameters

<i>codepage</i>	- code page identifier:
-----------------	-------------------------

OEM code pages: 437 - IBM PC 737 - Greek 775 - Estonian, Lithuanian and Latvian 850 - "Multilingual (Latin-1)" (Western European languages) 852 - "Slavic (Latin-2)" (Central and Eastern European languages) 856 - Cyrillic 857 - Turkish 860 - Portuguese 862 - Hebrew 866 - Cyrillic

Windows ANSI code pages 1250 - Central and East European Latin 1251 - Cyrillic 1252 - West European Latin 1253 - Greek 1254 - Turkish 1255 - Hebrew 1257 - Baltic

## Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

## Returns

TRUE upon success, FALSE otherwise

2.31.3.26 `prnSetDensity:error:()`

```
- (BOOL) prnSetDensity:
    (int) percent
    error:(NSError **) error
```

Sets printer density level.

## Parameters

<i>percent</i>	density level in percents (50%-200%)
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.31.3.27 `prnSetGenericPrinterSettingsPageWidth:feedLines:error:()`

```
- (BOOL) prnSetGenericPrinterSettingsPageWidth:
    (int) width
    feedLines:(int) lines
    error:(NSError **) error
```

Configures some settings needed by the sdk to operate with unknown ESC/POS printer.

## Parameters

<i>width</i>	page width in pixels
<i>lines</i>	the number of lines(in pixels) to feed so the paper can be torn out without cutting the data
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

**2.31.3.28 prnSetLeftMargin:error:()**

```
- (BOOL) prnSetLeftMargin:
    (int) leftMargin
    error:(NSError **) error
```

Sets left margin.

## Parameters

<i>leftMargin</i>	left margin in pixels. Default is 0
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

**2.31.3.29 prnSetLineSpace:error:()**

```
- (BOOL) prnSetLineSpace:
    (int) lineSpace
    error:(NSError **) error
```

Sets the line "height" in pixels If the characters are 16 pixels high for example, setting the linespace to 20 will make the printer leave 4 blank lines before next line of text starts.

You cannot make text lines overlap.

## Parameters

<i>lineSpace</i>	linespace in pixels, or 0 for automatic calculation. Default is 0
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.31.3.30 prnSetMaxLabelLength:error:()**

```
- (BOOL) prnSetMaxLabelLength:
    (int) lengthMM
    error:(NSError **) error
```

Can set max label length in MM on printers that support it.

**Parameters**

<i>lengthMM</i>	max label length in MM (10-1000)
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.31.3.31 prnStartTransaction:()**

```
- (BOOL) prnStartTransaction:
    (NSError **) error
```

**2.31.3.32 prnTurnOff:()**

```
- (BOOL) prnTurnOff:
    (NSError **) error
```

Forces printer to turn off.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

### 2.31.3.33 prnWaitPrintJob:error:()

```
- (BOOL) prnWaitPrintJob:
    (NSTimeInterval) timeout
    error:(NSError **) error
```

Waits specified timeout for the printout to complete.

It is best to call this function with the complete timeout you are willing to wait, rather than calling it in a loop

#### Parameters

<i>timeout</i>	the timeout to wait for the job to finish
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if printer have successfully finished printing and ready to accept new data, FALSE if communication problem or the printer is still busy

### 2.31.3.34 prnWaitPrintJob:failOnNoPaper:failOnOverheat:failOnLowBattery:error:()

```
- (BOOL) prnWaitPrintJob:
    (NSTimeInterval) timeout
    failOnNoPaper:(BOOL) failOnNoPaper
    failOnOverheat:(BOOL) failOnOverheat
    failOnLowBattery:(BOOL) failOnLowBattery
    error:(NSError **) error
```

Waits specified timeout for the printout to complete.

It is best to call this function with the complete timeout you are willing to wait, rather than calling it in a loop

#### Parameters

<i>timeout</i>	the timeout to wait for the job to finish
<i>failOnNoPaper</i>	if true, if paper out is detected, the function will fail with DT_ENO_PAPER error. Only works if the printer is in protocol mode.
<i>failOnOverheat</i>	if true, if printer head overheats (usually the head cools down in a few seconds) the function will fail with DT_EOVERHEAT error. Only works if the printer is in protocol mode.
<i>failOnLowBattery</i>	if true, if the battery is too low for a reliable print, the function will fail with DT_EBATTERY_LOW error. Only works if the printer is in protocol mode.
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE if printer have successfully finished printing and ready to accept new data, FALSE if communication problem or the printer is still busy

**2.31.3.35 prnWriteDataToChannel:data:error:()**

```
- (BOOL) prnWriteDataToChannel:
    (int) channel
    data:(NSData *) data
    error:(NSError **) error
```

Sends data to the connected printer no matter the connection type.

This also handles the internal packet mode, so only the payload needs to be send.

**Parameters**

<i>channel</i>	one of the CHANNEL_* constants. Use CHANNEL_PRN for generic access to the printer. This parameter has only meaning in protocol mode.
<i>data</i>	data bytes to write
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

## 2.32 Printing Page Mode Functions

Functions to work with the printer's page mode.

### Functions

- (BOOL) - [DTDevices::pageIsSupported](#)  
*Returns TRUE if page mode is supported on the connected device.*
- (BOOL) - [DTDevices::pageSetCoordinatesTranslation:error:](#)  
*Enables or disables coordinate translation.*
- (BOOL) - [DTDevices::pageSetLabelHeight:error:](#)  
*Sets virtual page mode label height.*
- (BOOL) - [DTDevices::pageStart:](#)  
*Creates a new virtual page using the maximum supported page height.*
- (BOOL) - [DTDevices::pagePrint:](#)  
*Prints the content of the virtual page.*
- (BOOL) - [DTDevices::pageEnd:](#)  
*Exits page mode.*
- (BOOL) - [DTDevices::pageSetWorkingArea:top:width:height:error:](#)  
*Sets a working area and orientation inside the virtual page.*
- (BOOL) - [DTDevices::pageSetWorkingArea:top:width:height:orientation:error:](#)  
*Sets a working area and orientation inside the virtual page.*
- (BOOL) - [DTDevices::pageFillRectangle:error:](#)  
*Fills the current working area (or whole page if none is set) with the specified color.*
- (BOOL) - [DTDevices::pageFillRectangle:top:width:height:color:error:](#)  
*Fills a rectangle inside the current working area with specified color.*
- (BOOL) - [DTDevices::pageRectangleFrame:top:width:height:framewidth:color:error:](#)  
*Draws a rectangle frame inside the current working area with specified color.*
- (BOOL) - [DTDevices::pageSetRelativePositionLeft:top:error:](#)  
*Sets the cursor position relative to the start of the page working area.*

### 2.32.1 Detailed Description

Functions to work with the printer's page mode.

Page mode is a special operation mode, that allows you to define a virtual page and then draw inside text, graphics, barcodes and print it all at once. Page mode allows for extended positioning of the elements, rotation, inversion and basic graphics elements.

### 2.32.2 Function Documentation

#### 2.32.2.1 `pageEnd:()`

```
- (BOOL) pageEnd:
    (NSError **) error
```

Exits page mode.

## Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

## Returns

TRUE upon success, FALSE otherwise

2.32.2.2 `pageFillRectangle:error:()`

```
- (BOOL) pageFillRectangle:
    (UIColor *) color
    error:(NSError **) error
```

Fills the current working area (or whole page if none is set) with the specified color.

## Parameters

<i>color</i>	- the color to use, either COLOR_INVERT or custom UIColor
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.32.2.3 `pageFillRectangle:top:width:height:color:error:()`

```
- (BOOL) pageFillRectangle:
    (int) left
    top:(int) top
    width:(int) width
    height:(int) height
    color:(UIColor *) color
    error:(NSError **) error
```

Fills a rectangle inside the current working area with specified color.

## Parameters

<i>left</i>	left coordinate of the rectangle
<i>top</i>	top coordinate of the rectangle
<i>width</i>	width of the rectangle
<i>height</i>	height of the rectangle
<i>color</i>	- the color to use, either COLOR_INVERT or custom UIColor
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.32.2.4 pageIsSupported()**

- (BOOL) pageIsSupported

Returns TRUE if page mode is supported on the connected device.

**2.32.2.5 pagePrint():**

- (BOOL) pagePrint:  
                  (NSError \*\*) *error*

Prints the content of the virtual page.

**Note**

The white space from the top and bottom is not printed so the print ends at the last black dot. If you want to feed the paper use the prnFeedPaper function

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

**2.32.2.6 pageRectangleFrame:top:width:height:framewidth:color:error:()**

- (BOOL) pageRectangleFrame:  
          (int) *left*  
          top:(int) *top*  
          width:(int) *width*  
          height:(int) *height*  
          framewidth:(int) *framewidth*  
          color:(UIColor \*) *color*  
          error:(NSError \*\*) *error*

Draws a rectangle frame inside the current working area with specified color.



## Parameters

<i>left</i>	left coordinate of the rectangle
<i>top</i>	top coordinate of the rectangle
<i>width</i>	width of the rectangle
<i>height</i>	height of the rectangle
<i>framewidth</i>	width of the frame (1-64)
<i>color</i>	- the color to use, either COLOR_INVERT or custom UIColor
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.32.2.7 `pageSetCoordinatesTranslation:error:()`

```
- (BOOL) pageSetCoordinatesTranslation:
    (BOOL) enabled
    error:(NSError **) error
```

Enables or disables coordinate translation.

If enabled and a mode different from the default top-left, the coordinates will be adjusted so you use coordinates as if the printout is horizontal top-left start, and they will be automaticall set to the correct values

## Parameters

<i>enabled</i>	enable or disable coordinate translation
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.32.2.8 `pageSetLabelHeight:error:()`

```
- (BOOL) pageSetLabelHeight:
    (int) height
    error:(NSError **) error
```

Sets virtual page mode label height.

By default this height is the height of the virtual page itself and does not need to be changed. The only reason to set it is if you use coordinates translation and one of the bottom-starting coordinate origins, allowing the sdk to correctly calculate values. Without setting it, using bottom-based starting coordinates will result in whole page being printed, wasting paper.

## Parameters

<i>height</i>	page mode height between 0 (automatic) and the page mode max height
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.32.2.9 `pageSetRelativePositionLeft:top:error:()`

```
- (BOOL) pageSetRelativePositionLeft:
    (int) left
    top:(int) top
    error:(NSError **) error
```

Sets the cursor position relative to the start of the page working area.

## Parameters

<i>left</i>	left cursor position
<i>top</i>	top cursor position
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

2.32.2.10 `pageSetWorkingArea:top:width:height:error:()`

```
- (BOOL) pageSetWorkingArea:
    (int) left
    top:(int) top
    width:(int) width
    height:(int) height
    error:(NSError **) error
```

Sets a working area and orientation inside the virtual page.

No drawing can ever occur outside the said area

## Parameters

<i>left</i>	left coordinate of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>top</i>	top coordinate of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>width</i>	width of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>height</i>	height of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.32.2.11 pageSetWorkingArea:top:width:height:orientation:error:()**

```
- (BOOL) pageSetWorkingArea:
    (int) left
    top:(int) top
    width:(int) width
    height:(int) height
    orientation:(int) orientation
    error:(NSError **) error
```

Sets a working area and orientation inside the virtual page.

No drawing can ever occur outside the said area

**Parameters**

<i>left</i>	left coordinate of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>top</i>	top coordinate of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>width</i>	width of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>height</i>	height of the working area in absolute pixels (i.e. does not depend on the page orientation)
<i>orientation</i>	one of the PAGE_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.32.2.12 pageStart:()**

```
- (BOOL) pageStart:
    (NSError **) error
```

Creates a new virtual page using the maximum supported page height.

Use getInfo function to get the maximum page height supported. See pageStart function for more detailed information. The page mode allows constructing a virtual page inside the printer, draw text, graphics, and performs some basic graphics operations (draw rectangles, frames, invert parts of the page) at any place, rotated or not, then print the result. Page mode is useful if you want to create some non-standart printout, or print vertically. Tables functions also work in page mode allowing a huge tables to be created and printed vertically.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

## 2.33 Printing Table Functions

Functions to create, fill and print tables.

### Functions

- (BOOL) - [DTDevices::tableIsSupported](#)  
*Checks if the currently connected printer supports tables.*
- (BOOL) - [DTDevices::tableCreate:error:](#)  
*Create a new table using custom flags.*
- (BOOL) - [DTDevices::tableCreate:](#)  
*Create a new table using default settings - both horizontal and vertical borders around it.*
- (BOOL) - [DTDevices::tableAddColumn:](#)  
*Adds a new column using default settings - 12x24 font, plain, vertical border between the cells, left aligning.*
- (BOOL) - [DTDevices::tableAddColumn:error:](#)  
*Adds a new column using default settings - plain text, vertical border between the cells, left aligning.*
- (BOOL) - [DTDevices::tableAddColumn:style:alignment:error:](#)  
*Adds a new column using custom font and vertical border between the cells.*
- (BOOL) - [DTDevices::tableAddColumn:style:alignment:flags:error:](#)  
*Adds a new column.*
- (BOOL) - [DTDevices::tableAddCell:error:](#)  
*Adds a new cell using the font size and style and aligning of the column that cell belongs to.*
- (BOOL) - [DTDevices::tableAddCell:font:error:](#)  
*Adds a new cell using the font style and aligning of the column that cell belongs to.*
- (BOOL) - [DTDevices::tableAddCell:font:style:error:](#)  
*Adds a new cell using custom font size and style and aligning of the column that cell belongs to.*
- (BOOL) - [DTDevices::tableAddCell:font:style:alignment:error:](#)  
*Adds a new cell using custom font size and style and aligning.*
- (BOOL) - [DTDevices::tableAddDelimiter:](#)  
*Adds a horizontal black line to the entire row that separates it from the next.*
- (BOOL) - [DTDevices::tableSetRowHeight:error:](#)  
*Sets the row height that will be used by default for new cells added.*
- (BOOL) - [DTDevices::tablePrint:](#)  
*Prints current table or returns FALSE if cell data cannot be fit into paper.*

### 2.33.1 Detailed Description

Functions to create, fill and print tables.

### 2.33.2 Function Documentation

#### 2.33.2.1 `tableAddCell:error:()`

```
- (BOOL) tableAddCell:
    (NSString *) data
    error:(NSError **) error
```

Adds a new cell using the font size and style and aligning of the column that cell belongs to.

**Parameters**

<i>data</i>	string data
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.33.2.2 tableAddCell:font:error:()**

```
- (BOOL) tableAddCell:
    (NSString *) data
    font:(int) font
    error:(NSError **) error
```

Adds a new cell using the font style and aligning of the column that cell belongs to.

**Parameters**

<i>data</i>	string data
<i>font</i>	font size, one of the FONT_size constants
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.33.2.3 tableAddCell:font:style:alignment:error:()**

```
- (BOOL) tableAddCell:
    (NSString *) data
    font:(int) font
    style:(int) style
    alignment:(int) alignment
    error:(NSError **) error
```

Adds a new cell using custom font size and style and aligning.

**Parameters**

<i>data</i>	string data
<i>font</i>	font size, one of the FONT_size constants
<i>style</i>	one or more of the font style constants (FONT_BOLD, FONT_ITALIC, etc)
<i>alignment</i>	date aligning, one of the ALIGN_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.33.2.4 tableAddCell:font:style:error:()**

```
- (BOOL) tableAddCell:
    (NSString *) data
    font:(int) font
    style:(int) style
    error:(NSError **) error
```

Adds a new cell using custom font size and style and aligning of the column that cell belongs to.

**Parameters**

<i>data</i>	string data
<i>font</i>	font size, one of the FONT_size constants
<i>style</i>	one or more of the font style constants (FONT_BOLD, FONT_ITALIC, etc)
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.33.2.5 tableAddColumn:()**

```
- (BOOL) tableAddColumn:
    (NSError **) error
```

Adds a new column using default settings - 12x24 font, plain, vertical border between the cells, left aligning.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

**2.33.2.6 tableAddColumn:error:()**

```
- (BOOL) tableAddColumn:
    (int) font
    error:(NSError **) error
```

Adds a new column using default settings - plain text, vertical border between the cells, left aligning.

#### Parameters

<i>font</i>	one of the FONT_size constants
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.33.2.7 tableAddColumn:style:alignment:error:()

```
- (BOOL) tableAddColumn:
    (int) font
    style:(int) style
    alignment:(int) alignment
    error:(NSError **) error
```

Adds a new column using custom font and vertical border between the cells.

#### Parameters

<i>font</i>	one of the FONT_size constants
<i>style</i>	one or more of the font style constants (FONT_BOLD, FONT_ITALIC, etc)
<i>alignment</i>	text alignment inside the cell, one of the ALIGN_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

TRUE upon success, FALSE otherwise

#### 2.33.2.8 tableAddColumn:style:alignment:flags:error:()

```
- (BOOL) tableAddColumn:
    (int) font
    style:(int) style
    alignment:(int) alignment
    flags:(int) flags
    error:(NSError **) error
```

Adds a new column.

#### Parameters

<i>font</i>	one of the FONT_size constants
-------------	--------------------------------



## Parameters

<i>style</i>	one or more of the font style constants (FONT_BOLD, FONT_ITALIC, etc)
<i>alignment</i>	text alignment inside the cell, one of the ALIGN_* constants
<i>flags</i>	one or more of the TABLE_BORDERS_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

## Returns

TRUE upon success, FALSE otherwise

## 2.33.2.9 tableAddDelimiter:()

```
- (BOOL) tableAddDelimiter:
    (NSError **) error
```

Adds a horizontal black line to the entire row that separates it from the next.

## Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

## Returns

TRUE upon success, FALSE otherwise

## 2.33.2.10 tableCreate:()

```
- (BOOL) tableCreate:
    (NSError **) error
```

Create a new table using default settings - both horizontal and vertical borders around it.

## Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

## Returns

TRUE upon success, FALSE otherwise

#### 2.33.2.11 tableCreate:error:()

```
- (BOOL) tableCreate:
    (int) flags
    error:(NSError **) error
```

Create a new table using custom flags.

##### Parameters

<i>flags</i>	one or more of the TABLE_BORDERS_* constants
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

TRUE upon success, FALSE otherwise

#### 2.33.2.12 tableIsSupported()

```
- (BOOL) tableIsSupported
```

Checks if the currently connected printer supports tables.

##### Returns

TRUE if tables are supported

#### 2.33.2.13 tablePrint:()

```
- (BOOL) tablePrint:
    (NSError **) error
```

Prints current table or returns FALSE if cell data cannot be fit into paper.

##### Parameters

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

##### Returns

TRUE upon success, FALSE otherwise

2.33.2.14 `tableSetRowHeight:error:()`

```
- (BOOL) tableSetRowHeight:
    (int) height
    error:(NSError **) error
```

Sets the row height that will be used by default for new cells added.

**Parameters**

<i>height</i>	row height, any value less than the characters height will be auto fixed. Default is <code>LINESPACE_DEFAULT</code>
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

## 2.34 iHUB functions

Functions to set and control iHUB device.

### Functions

- (iHUBDevice \*) - [DTDevices::iHUBGetDeviceFormPort:error:](#)
- (NSArray< iHUBPortInfo \* > \*) - [DTDevices::iHUBGetPortsInfo:](#)  
*Returns information about available ports on iHUB.*
- (BOOL) - [DTDevices::iHUBSetPortConfig:forPort:error:](#)  
*Reads configuration of the specific port.*
- (BOOL) - [DTDevices::iHUBSetPortConfig:forPort:recreateConnection:error:](#)  
*Reads configuration of the specific port.*
- (BOOL) - [DTDevices::iHUBSetUSBCharge:forPort:error:](#)  
*Enables/disables some of the usb ports to act like charging station only.*
- (BOOL) - [DTDevices::iHUBSetAppleChargingCurrent:error:](#)  
*Sets the maximum charging current given to the connected iOS device.*
- (BOOL) - [DTDevices::iHUBGetAppleChargingCurrent:error:](#)  
*Returns current maximum charging current given to the connected iOS device.*

### Variables

- NSString \* [DTDevices::kPortConfigNone](#)  
*Empty configuration, use when you want to manually control the device.*
- NSString \* [DTDevices::kPortConfigUSBCharge](#)  
*Port is used as charging station only.*
- NSString \* [DTDevices::kPortConfigLineaOldUSBSEr](#)  
*Linea 4 and older 30-pin lineas, supported by the universal sdk.*
- NSString \* [DTDevices::kPortConfigLineaUSBSEr](#)  
*Linea 5, 6, mini and all lightning connector lineas, supported by the universal sdk.*
- NSString \* [DTDevices::kPortConfigLineaUSB](#)  
*Linea with USB port access.*
- NSString \* [DTDevices::kPortConfigPinpadUSB](#)  
*All pinpads set as usb device, connected via normal mini-usb cable, supported by the universal sdk.*
- NSString \* [DTDevices::kPortConfigPinpadUSBSEr](#)  
*All pinpads, connected via usb-to-serial cable, supported by the universal sdk.*
- NSString \* [DTDevices::kPortConfigPrinterESCPOSUSB](#)  
*All esc/pos printers set as usb device, connected via normal usb cable, supported by the universal sdk.*
- NSString \* [DTDevices::kPortConfigPrinterESCPOSSerial](#)  
*All esc/pos printers set as RS232 device, connected via serial cable, supported by the universal sdk.*
- NSString \* [DTDevices::kPortConfigPrinterFiscalUSB](#)  
*All new fiscal printers (FMP-350 and later) set as usb device, connected via normal usb cable, supported by the fiscal sdk.*
- NSString \* [DTDevices::kPortConfigPrinterFiscalOldUSB](#)  
*All old fiscal printers set as usb device, connected via normal usb cable, supported by the fiscal sdk.*
- NSString \* [DTDevices::kPortConfigBarcodeHID](#)  
*HID barcode, supported by universal sdk.*
- NSString \* [DTDevices::kPortConfigBarcodeUSB](#)  
*USB barcode, providing usb to serial capability, supported by universal sdk.*

- NSString \* [DTDevices::kPortConfigBarcodeSerial](#)  
*Serial port barcode, supported by universal sdk.*
- NSString \* [DTDevices::kPortConfigMSRHID](#)  
*HID magnetic stripe reader, needs to be set up as keyboard emulation, supported by universal sdk.*
- NSString \* [DTDevices::kPortConfigMagtekMSR](#)
- NSString \* [DTDevices::kPortConfigKeyboardHID](#)
- NSString \* [DTDevices::kPortConfigPrinterGenericESCPOSUSB](#)
- NSString \* [DTDevices::kPortConfigPrinterGenericESCPOSSerial](#)

### 2.34.1 Detailed Description

Functions to set and control iHUB device.

### 2.34.2 Function Documentation

#### 2.34.2.1 iHUBGetAppleChargingCurrent:error:()

```
- (BOOL) iHUBGetAppleChargingCurrent:
    (int *) current
    error:(NSError **) error
```

Returns current maximum charging current given to the connected iOS device.

##### Parameters

<i>current</i>	- maximum current, up to 2400mA
<i>error</i>	returns error information, you can pass nil if you don't want it

##### Returns

TRUE upon success, FALSE otherwise

#### 2.34.2.2 iHUBGetDeviceFormPort:error:()

```
- (iHUBDevice *) iHUBGetDeviceFormPort:
    (int) port
    error:(NSError **) error
```

#### 2.34.2.3 iHUBGetPortsInfo:()

```
- (NSArray<iHUBPortInfo *> *) iHUBGetPortsInfo:
    (NSError **) error
```

Returns information about available ports on iHUB.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

an array of [iHUBPortInfo](#) classes, or nil if function failed

**2.34.2.4 iHUBSetAppleChargingCurrent:error:()**

```
- (BOOL) iHUBSetAppleChargingCurrent:
    (int) current
    error:(NSError **) error
```

Sets the maximum charging current given to the connected iOS device.

**Parameters**

<i>current</i>	- maximum current, up to 2400mA
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.34.2.5 iHUBSetPortConfig:forPort:error:()**

```
- (BOOL) iHUBSetPortConfig:
    (NSString *) config
    forPort:(int) forPort
    error:(NSError **) error
```

Reads configuration of the specific port.

The configuration is a string, one of the kPortConfig\* constants

**Parameters**

<i>config</i>	configuration string, one of the kPortConfig* constants
<i>forPort</i>	slave port number
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.34.2.6 iHUBSetPortConfig:forPort:recreateConnection:error:()**

```
- (BOOL) iHUBSetPortConfig:
    (NSString *) config
    forPort:(int) forPort
    recreateConnection:(BOOL) recreateConnection
    error:(NSError **) error
```

Reads configuration of the specific port.

The configuration is a string, one of the kPortConfig\* constants

**Parameters**

<i>config</i>	configuration string, one of the kPortConfig* constants
<i>forPort</i>	slave port number
<i>recreateConnection</i>	if true and device is connected on this port, disconnect and connect events will be fired making the sdk read and use the new settings
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.34.2.7 iHUBSetUSBCharge:forPort:error:()**

```
- (BOOL) iHUBSetUSBCharge:
    (BOOL) charge
    forPort:(int) forPort
    error:(NSError **) error
```

Enables/disables some of the usb ports to act like charging station only.

No try to connect on this port will be made

**Parameters**

<i>charge</i>	usb charge mode
<i>forPort</i>	slave port number
<i>error</i>	returns error information, you can pass nil if you don't want it

**Returns**

TRUE upon success, FALSE otherwise

**2.34.3 Variable Documentation****2.34.3.1 kPortConfigBarcodeHID**

- (NSString\*) kPortConfigBarcodeHID

HID barcode, supported by universal sdk.

**2.34.3.2 kPortConfigBarcodeSerial**

- (NSString\*) kPortConfigBarcodeSerial

Serial port barcode, supported by universal sdk.

**2.34.3.3 kPortConfigBarcodeUSB**

- (NSString\*) kPortConfigBarcodeUSB

USB barcode, providing usb to serial capability, supported by universal sdk.

**2.34.3.4 kPortConfigKeyboardHID**

- (NSString\*) kPortConfigKeyboardHID

**2.34.3.5 kPortConfigLineaOldUSBSE**

- (NSString\*) kPortConfigLineaOldUSBSE

Linea 4 and older 30-pin lineas, supported by the universal sdk.



#### 2.34.3.6 kPortConfigLineaUSB

- (NSString\*) kPortConfigLineaUSB

Linea with USB port access.

#### 2.34.3.7 kPortConfigLineaUSBSEr

- (NSString\*) kPortConfigLineaUSBSEr

Linea 5, 6, mini and all lightning connector lineas, supported by the universal sdk.

#### 2.34.3.8 kPortConfigMagtekMSR

- (NSString\*) kPortConfigMagtekMSR

#### 2.34.3.9 kPortConfigMSRHID

- (NSString\*) kPortConfigMSRHID

HID magnetic stripe reader, needs to be set up as keyboard emulation, supported by universal sdk.

#### 2.34.3.10 kPortConfigNone

- (NSString\*) kPortConfigNone

Empty configuration, use when you want to manually control the device.

#### 2.34.3.11 kPortConfigPinpadUSB

- (NSString\*) kPortConfigPinpadUSB

All pinpads set as usb device, connected via normal mini-usb cable, supported by the universal sdk.

#### 2.34.3.12 kPortConfigPinpadUSBSEr

- (NSString\*) kPortConfigPinpadUSBSEr

All pinpads, connected via usb-to-serial cable, supported by the universal sdk.

#### 2.34.3.13 kPortConfigPrinterESCPOSSerial

- (NSString\*) kPortConfigPrinterESCPOSSerial

All esc/pos printers set as RS232 device, connected via serial cable, supported by the universal sdk.

#### 2.34.3.14 kPortConfigPrinterESCPOSUSB

- (NSString\*) kPortConfigPrinterESCPOSUSB

All esc/pos printers set as usb device, connected via normal usb cable, supported by the universal sdk.

#### 2.34.3.15 kPortConfigPrinterFiscalOldUSB

- (NSString\*) kPortConfigPrinterFiscalOldUSB

All old fiscal printers set as usb device, connected via normal usb cable, supported by the fiscal sdk.

#### 2.34.3.16 kPortConfigPrinterFiscalUSB

- (NSString\*) kPortConfigPrinterFiscalUSB

All new fiscal printers (FMP-350 and later) set as usb device, connected via normal usb cable, supported by the fiscal sdk.

#### 2.34.3.17 kPortConfigPrinterGenericESCPOSSerial

- (NSString\*) kPortConfigPrinterGenericESCPOSSerial

#### 2.34.3.18 kPortConfigPrinterGenericESCPOSUSB

- (NSString\*) kPortConfigPrinterGenericESCPOSUSB

#### 2.34.3.19 kPortConfigUSBCharge

- (NSString\*) kPortConfigUSBCharge

Port is used as charging station only.

## 2.35 PIN-On-Glass Functions

Functions to work with Pin On Glass solutions.

### Enumerations

- enum `DTDevices::POG_SOLUTIONS` {  
`DTDevices::POG_SOLUTION_GENERAL` =0, `DTDevices::POG_SOLUTION_MY_PINPAD` =1, `DTDevices::POG_SOLUTION_MAGIC_CUBE` =2, `DTDevices::POG_SOLUTION_DATECS` =3,  
`DTDevices::POG_SOLUTION_VIVAWALLET` =4, `DTDevices::POG_SOLUTION_HCE` =5 }

*Pin On Glass Solution type.*

### Functions

- (NSData \*) - `DTDevices::pogCommandForSolution:command:data:error:`

*Executes custom command to POG solution in the pinpad.*

### 2.35.1 Detailed Description

Functions to work with Pin On Glass solutions.

### 2.35.2 Enumeration Type Documentation

#### 2.35.2.1 POG\_SOLUTIONS

– (enum) `POG_SOLUTIONS`

Pin On Glass Solution type.

#### Enumerator

<code>POG_SOLUTION_GENERAL</code>	General.
<code>POG_SOLUTION_MY_PINPAD</code>	My Pinpad.
<code>POG_SOLUTION_MAGIC_CUBE</code>	Magic Cube.
<code>POG_SOLUTION_DATECS</code>	Datecs.
<code>POG_SOLUTION_VIVAWALLET</code>	VivaWallet.
<code>POG_SOLUTION_HCE</code>	VivaWallet.

### 2.35.3 Function Documentation

### 2.35.3.1 `pogCommandForSolution:command:data:error:()`

```
- (NSData *) pogCommandForSolution:
    (POG_SOLUTIONS) solution
    command:(int) command
    data:(NSData *) data
    error:(NSError **) error
```

Executes custom command to POG solution in the pinpad.

#### Parameters

<i>solution</i>	solution type
<i>command</i>	command id, specific to the selected solution
<i>data</i>	optional data, specific to the selected solution and command
<i>error</i>	returns error information, you can pass nil if you don't want it

#### Returns

command response upon success, nil if error occurred

## 2.36 TouchID Functions

Functions to scan fingerprints and.

### Enumerations

- enum `DTDevices::TOUCH_IMAGE_SIZE` { `DTDevices::TOUCH_IMAGE_SIZE_SMALL` = 0, `DTDevices::TOUCH_IMAGE_SIZE_LARGE` = 1 }
- Image sizes supported by the touchid fingerprint reader.*
- enum `DTDevices::TOUCH_IMAGE_FORMAT` { `DTDevices::TOUCH_IMAGE_FORMAT_ANSI` = 0, `DTDevices::TOUCH_IMAGE_FORMAT_ISO` = 1 }
- Image formats supported by the touchid fingerprint reader.*
- enum `DTDevices::TOUCH_IMAGE_COMPRESSION` { `DTDevices::TOUCH_IMAGE_COMPRESSION_NONE` = 0 }
- Image compressions supported by the touchid fingerprint reader.*
- enum `DTDevices::TOUCH_TEMPLATE_FORMAT` { `DTDevices::TOUCH_TEMPLATE_FORMAT_NATIVE` = 0, `DTDevices::TOUCH_TEMPLATE_FORMAT_ANSI` = 1, `DTDevices::TOUCH_TEMPLATE_FORMAT_ISO_FMR` = 2, `DTDevices::TOUCH_TEMPLATE_FORMAT_ISO_FMC_N` = 3, `DTDevices::TOUCH_TEMPLATE_FORMAT_ISO_FMC_C` = 4 }
- Template formats supported by the touchid fingerprint reader.*

### Properties

- id `DTDevices::delegate`  
*Adds delegate to the class.*
- NSArray< id > \* `DTDevices::delegates`  
*Provides a list of currently registered delegates.*
- SUPPORTED\_DEVICE\_TYPES `DTDevices::deviceType`  
*Returns current connection type.*
- DEVICE\_CONNECTION\_TYPE `DTDevices::connectionType`  
*Returns current connection type.*
- int `DTDevices::connstate`  
*Returns current connection state.*
- NSString \* `DTDevices::deviceName`  
*Returns connected device name.*
- NSString \* `DTDevices::deviceModel`  
*Returns connected device model.*
- NSString \* `DTDevices::firmwareRevision`  
*Returns connected device firmware version.*
- int `DTDevices::firmwareRevisionNumber`  
*Returns connected device firmware version in format MAJOR\*100+MINOR, i.e.*
- NSString \* `DTDevices::hardwareRevision`  
*Returns connected device hardware version.*
- NSString \* `DTDevices::serialNumber`  
*Returns connected device serial number.*
- int `DTDevices::sdkVersion`  
*SDK version number in format MAJOR\*100+MINOR, i.e.*
- NSDate \* `DTDevices::sdkBuildDate`  
*SDK build date.*
- short `DTDevices::emvLastStatus`  
*EMV last status, one of the EMV\_\* constants.*

## 2.36.1 Detailed Description

Functions to scan fingerprints and.

## 2.36.2 Enumeration Type Documentation

### 2.36.2.1 TOUCH\_IMAGE\_COMPRESSION

– (enum) `TOUCH_IMAGE_COMPRESSION`

Image compressions supported by the touchid fingerprint reader.

Enumerator

<code>TOUCH_IMAGE_COMPRESSION_NONE</code>	The image compression type.
---	-----------------------------

### 2.36.2.2 TOUCH\_IMAGE\_FORMAT

– (enum) `TOUCH_IMAGE_FORMAT`

Image formats supported by the touchid fingerprint reader.

Enumerator

<code>TOUCH_IMAGE_FORMAT_ANSI</code>	The image is in ANSI format.
<code>TOUCH_IMAGE_FORMAT_ISO</code>	The image is in ISO format.

### 2.36.2.3 TOUCH\_IMAGE\_SIZE

– (enum) `TOUCH_IMAGE_SIZE`

Image sizes supported by the touchid fingerprint reader.

Enumerator

<code>TOUCH_IMAGE_SIZE_SMALL</code>	The image size is 192x270 pixels.
<code>TOUCH_IMAGE_SIZE_LARGE</code>	The image size is 256x360 pixels.

### 2.36.2.4 TOUCH\_TEMPLATE\_FORMAT

– (enum) `TOUCH_TEMPLATE_FORMAT`

Template formats supported by the touchid fingerprint reader.

#### Enumerator

<code>TOUCH_TEMPLATE_FORMAT_NATIVE</code>	Template in NATIVE (AuthenTec legacy) format.
<code>TOUCH_TEMPLATE_FORMAT_ANSI</code>	Template in ANSI (ANSI INCITS 378-2004) format.
<code>TOUCH_TEMPLATE_FORMAT_ISO_FMR</code>	Template in ISO_FMR (ISO/IEC 19794-2-2005) format.
<code>TOUCH_TEMPLATE_FORMAT_ISO_FMC_N</code>	Template in ISO_FMC_N (ISO/IEC 19794-2-2005) card format.
<code>TOUCH_TEMPLATE_FORMAT_ISO_FMC_C</code>	Template in ISO_FMC_C (ISO/IEC 19794-2-2005) card format.

## 2.36.3 Properties

### 2.36.3.1 connectionType

– (DEVICE\_CONNECTION\_TYPE) `connectionType` [read], [atomic], [assign]

Returns current connection type.

### 2.36.3.2 connstate

– (int) `connstate` [read], [atomic], [assign]

Returns current connection state.

### 2.36.3.3 delegate

– (id) `delegate` [read], [write], [atomic], [assign]

Adds delegate to the class.

#### 2.36.3.4 delegates

```
- (NSArray<id>*) delegates [read], [atomic], [assign]
```

Provides a list of currently registered delegates.

#### 2.36.3.5 deviceModel

```
- (NSString*) deviceModel [read], [atomic], [assign]
```

Returns connected device model.

#### 2.36.3.6 deviceName

```
- (NSString*) deviceName [read], [atomic], [assign]
```

Returns connected device name.

#### 2.36.3.7 deviceType

```
- (SUPPORTED_DEVICE_TYPES) deviceType [read], [atomic], [assign]
```

Returns current connection type.

#### 2.36.3.8 emvLastStatus

```
- (short) emvLastStatus [read], [atomic], [assign]
```

EMV last status, one of the EMV\_\* constants.

#### 2.36.3.9 firmwareRevision

```
- (NSString*) firmwareRevision [read], [atomic], [assign]
```

Returns connected device firmware version.



#### 2.36.3.10 firmwareRevisionNumber

- (int) firmwareRevisionNumber [read], [atomic], [assign]

Returns connected device firmware version in format MAJOR\*100+MINOR, i.e.

version 1.15 will be returned as 115

#### 2.36.3.11 hardwareRevision

- (NSString\*) hardwareRevision [read], [atomic], [assign]

Returns connected device hardware version.

#### 2.36.3.12 sdkBuildDate

- (NSDate\*) sdkBuildDate [read], [atomic], [assign]

SDK build date.

#### 2.36.3.13 sdkVersion

- (int) sdkVersion [read], [atomic], [assign]

SDK version number in format MAJOR\*100+MINOR, i.e.

version 1.15 will be returned as 115

#### 2.36.3.14 serialNumber

- (NSString\*) serialNumber [read], [atomic], [assign]

Returns connected device serial number.

## 2.37 Delegate Notifications

Notifications sent by the sdk on various events - barcode scanned, magnetic card data, communication status, etc.

### Functions

- (void) - `<DTDeviceDelegate>::connectionState:`  
*Notifies about the current connection state.*
- (int) - `<DTDeviceDelegate>::getDeviceConnectionState:`  
*Return the connection state for a specific device type.*
- (void) - `<DTDeviceDelegate>::deviceButtonPressed:`  
*Notification sent when some of the device's buttons is pressed.*
- (void) - `<DTDeviceDelegate>::deviceButtonReleased:`  
*Notification sent when some of the device's buttons is released.*
- (void) - `<DTDeviceDelegate>::barcodeData:type:`  
*Notification sent when barcode is successfully read.*
- (void) - `<DTDeviceDelegate>::barcodeData:isotype:`  
*Notification sent when barcode is successfully read.*
- (void) - `<DTDeviceDelegate>::barcodeNSData:type:`  
*Notification sent when barcode is successfully read.*
- (void) - `<DTDeviceDelegate>::barcodeNSData:isotype:`  
*Notification sent when barcode is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticCardDetected`  
*Notification sent when magnetic card is swiped.*
- (void) - `<DTDeviceDelegate>::magneticCardData:track2:track3:`  
*Notification sent when magnetic card is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticPassbookData:`  
*Notification sent when magnetic pasbook is read.*
- (void) - `<DTDeviceDelegate>::magneticCTDOTData:`  
*Notification sent when magnetic CT-DOT ticket is read.*
- (void) - `<DTDeviceDelegate>::magneticCardData:track2:track3:source:`  
*Notification sent when magnetic card is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticCardEncryptedData:tracks:data:`  
*Notification sent when magnetic card is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticCardEncryptedData:tracks:data:track1masked:track2masked↵:track3:`  
*Notification sent when magnetic card is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticCardEncryptedData:tracks:data:track1masked:track2masked↵:track3:source:`  
*Notification sent when magnetic card is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticCardRawData:`  
*Notification sent when magnetic card is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticCardEncryptedRawData:data:`  
*Notification sent when magnetic card is successfully read.*
- (void) - `<DTDeviceDelegate>::magneticCardReadFailed:`  
*Notification sent when magnetic card failed to read.*
- (void) - `<DTDeviceDelegate>::magneticCardReadFailed:reason:`  
*Notification sent when magnetic card failed to read.*
- (void) - `<DTDeviceDelegate>::firmwareUpdateProgress:percent:`  
*Notification sent when firmware update process advances.*

- (void) - [<DTDeviceDelegate>::bluetoothDiscoverComplete:](#)  
*Notification sent when bluetooth discovery finds new bluetooth device.*
- (void) - [<DTDeviceDelegate>::bluetoothDeviceDiscovered:name:](#)  
*Notification sent when bluetooth discovery finds new bluetooth device.*
- (void) - [<DTDeviceDelegate>::bluetoothDeviceConnected:](#)  
*Notification sent when bluetooth device is connected.*
- (void) - [<DTDeviceDelegate>::bluetoothDeviceDisconnected:](#)  
*Notification sent when bluetooth connection is lost.*
- (BOOL) - [<DTDeviceDelegate>::bluetoothDeviceRequestedConnection:name:](#)  
*Notification sent when a bluetooth device requests.*
- (NSString \*) - [<DTDeviceDelegate>::bluetoothDevicePINCodeRequired:name:](#)  
*Notification sent when a bluetooth device requests.*
- (void) - [<DTDeviceDelegate>::bluetoothDevicePassKeySent:passKey:](#)  
*Notification sent when a bluetooth device requests confirmation of a passkey.*
- (void) - [<DTDeviceDelegate>::magneticJISCardData:](#)  
*Notification sent when JIS I & II magnetic card is successfully read.*
- (void) - [<DTDeviceDelegate>::magneticF2FCardData:](#)  
*Notification sent when F2F magnetic card is successfully read.*
- (void) - [<DTDeviceDelegate>::rfCardDetected:info:](#)  
*Notification sent when a new supported RFID card enters the field.*
- (void) - [<DTDeviceDelegate>::rfCardRemoved:](#)  
*Notification sent when the card leaves the field.*
- (void) - [<DTDeviceDelegate>::deviceFeatureSupported:value:](#)  
*Notification sent when some of the features gets enabled or disabled.*
- (void) - [<DTDeviceDelegate>::smartCardInserted:](#)  
*Notification sent when smartcard was inserted.*
- (void) - [<DTDeviceDelegate>::smartCardRemoved:](#)  
*Notification sent when smartcard was removed.*
- (void) - [<DTDeviceDelegate>::PINEntryCompleteWithError:](#)  
*Notification sent when PIN entry procedure have completed or was cancelled.*
- (void) - [<DTDeviceDelegate>::paperStatus:](#)  
*Notification sent when printer's paper sensor changes.*
- (void) - [<DTDeviceDelegate>::sdkDebug:source:](#)  
*Notification sent to display debug messages from the sdk or device.*
- (void) - [<DTDeviceDelegate>::emv2OnTransactionStarted](#)  
*Notification sent when EMV kernel detects a card and start processing it.*
- (void) - [<DTDeviceDelegate>::emv2OnUserInterfaceCode:status:holdTime:](#)  
*Notification sent when the EMV kernel wants to update the user interface.*
- (void) - [<DTDeviceDelegate>::emv2OnApplicationSelection:](#)  
*Notification sent when the card has multiple applications and one needs to be selected.*
- (void) - [<DTDeviceDelegate>::emv2OnOnlineProcessing:](#)  
*Notification sent when the kernel and the card require online processing.*
- (void) - [<DTDeviceDelegate>::emv2OnAppleVASProcessedWithResult:data:](#)  
*Notification sent when Apple VAS card was successfully processed.*
- (void) - [<DTDeviceDelegate>::emv2OnGoogleVASProcessedWithResult:data:](#)  
*Notification sent when Google VAS card was successfully processed.*
- (void) - [<DTDeviceDelegate>::emv2OnCardReadWithData:](#)  
*Notification sent when emv card is read, optionally returning emv tags if configured to do so.*
- (void) - [<DTDeviceDelegate>::emv2OnTransactionFinished:](#)  
*Notification sent when the transaction is complete.*
- (void) - [<DTDeviceDelegate>::emv2CardEventOnInterface:event:](#)

- Notification sent when card being presented, removed or error.*
- (void) - `<DTDeviceDelegate>::emv2TipEntryCompleWithAmount:`  
*Notification sent when TIP entry procedure completed successfully.*
- (void) - `<DTDeviceDelegate>::emv2TipEntryFailedWithError:`  
*Notification sent when TIP entry procedure completed with error.*
- (void) - `<DTDeviceDelegate>::bluetoothLEDeviceConnected:`  
*Notification sent when bluetooth low energy device is connected.*
- (void) - `<DTDeviceDelegate>::bluetoothLEDeviceDisconnected:`  
*Notification sent when bluetooth low energy connection is lost.*
- (bool) - `<DTDeviceDelegate>::bluetoothLEDeviceDiscovered:`
- (void) - `<DTDeviceDelegate>::bluetoothLEDiscoverCompletedWithError:`
- (void) - `<DTDeviceDelegate>::iHUBDeviceConnected:`  
*Notification sent when new device is connected to iHub.*
- (void) - `<DTDeviceDelegate>::iHUBDeviceDisconnected:`  
*Notification sent when new device is connected to iHub.*
- (void) - `<DTDeviceDelegate>::iHUBDataReceivedForDevice:data:`  
*Notification sent when new device is connected to iHub.*
- (void) - `<DTDeviceDelegate>::iHUBPortStatusChangedForDevice:newStatus:`  
*Notification sent when new device is connected to iHub.*
- (void) - `<DTDeviceDelegate>::keyboardButtonPressed:vk:character:modifiers:`  
*Notification sent when a key on the connected HID keyboard is pressed or released.*
- (void) - `<DTDeviceDelegate>::uhfTagDetected:epc:`  
*Notification sent when UHF tag is detected.*
- (void) - `<DTDeviceDelegate>::pogEventDataForSolution:command:data:`  
*Notification sent when POG data is available.*
- (void) - `<DTDeviceDelegate>::deviceConnectFailed:failedReason:`  
*Notification sent when device fails to connect with a reason.*

## 2.37.1 Detailed Description

Notifications sent by the sdk on various events - barcode scanned, magnetic card data, communication status, etc.

## 2.37.2 Function Documentation

### 2.37.2.1 `barcodeData:isotype:()`

```

- (void) barcodeData:
    (NSString *) barcode
    isotype:(NSString *) isotype

```

Notification sent when barcode is successfully read.

This notification is used when barcode type is set to `BARCODE_TYPE_ISO15424`

#### Parameters

<i>barcode</i>	- string containing barcode data
<i>isotype</i>	- barcode type, according to ISO 15424

### 2.37.2.2 `barcodeData:type:()`

```
- (void) barcodeData:
    (NSString *) barcode
    type:(int) type
```

Notification sent when barcode is successfully read.

This notification is used when barcode type is set to `BARCODE_TYPE_DEFAULT` or `BARCODE_TYPE_EXTENDED`.

#### Parameters

<i>barcode</i>	- string containing barcode data
<i>type</i>	- barcode type, one of the <code>BAR_*</code> constants

### 2.37.2.3 `barcodeNSData:isotype:()`

```
- (void) barcodeNSData:
    (NSData *) barcode
    isotype:(NSString *) isotype
```

Notification sent when barcode is successfully read.

This notification is used when barcode type is set to `BARCODE_TYPE_ISO15424`.

#### Parameters

<i>barcode</i>	- string containing barcode data
<i>isotype</i>	- barcode type, according to ISO 15424

### 2.37.2.4 `barcodeNSData:type:()`

```
- (void) barcodeNSData:
    (NSData *) barcode
    type:(int) type
```

Notification sent when barcode is successfully read.

This notification is used when barcode type is set to `BARCODE_TYPE_DEFAULT` or `BARCODE_TYPE_EXTENDED`.

## Parameters

<i>barcode</i>	- NSData containing barcode data
<i>type</i>	- barcode type, one of the BAR_* constants

**2.37.2.5 bluetoothDeviceConnected:()**

```
- (void) bluetoothDeviceConnected:
    (NSString *) address
```

Notification sent when bluetooth device is connected.

## Parameters

<i>address</i>	bluetooth address of the device
----------------	---------------------------------

**2.37.2.6 bluetoothDeviceDisconnected:()**

```
- (void) bluetoothDeviceDisconnected:
    (NSString *) address
```

Notification sent when bluetooth connection is lost.

## Parameters

<i>address</i>	bluetooth address of the device
----------------	---------------------------------

**2.37.2.7 bluetoothDeviceDiscovered:name:()**

```
- (void) bluetoothDeviceDiscovered:
    (NSString *) address
    name:(NSString *) name
```

Notification sent when bluetooth discovery finds new bluetooth device.

## Parameters

<i>address</i>	bluetooth address of the device
<i>name</i>	bluetooth name of the device

**2.37.2.8 bluetoothDevicePassKeySent:passKey:()**

```
- (void) bluetoothDevicePassKeySent:
    (NSString *) address
    passKey:(NSString *) passKey
```

Notification sent when a bluetooth device requests confirmation of a passkey.

**Parameters**

<i>address</i>	bluetooth address of the device
<i>passKey</i>	the generated passkey

**2.37.2.9 bluetoothDevicePINCodeRequired:name:()**

```
- (NSString *) bluetoothDevicePINCodeRequired:
    (NSString *) address
    name:(NSString *) name
```

Notification sent when a bluetooth device requests.

**Parameters**

<i>address</i>	bluetooth address of the device
<i>name</i>	bluetooth name of the device

**2.37.2.10 bluetoothDeviceRequestedConnection:name:()**

```
- (BOOL) bluetoothDeviceRequestedConnection:
    (NSString *) address
    name:(NSString *) name
```

Notification sent when a bluetooth device requests.

**Parameters**

<i>address</i>	bluetooth address of the device
<i>name</i>	bluetooth name of the device

**2.37.2.11 bluetoothDiscoverComplete:()**

```
- (void) bluetoothDiscoverComplete:
    (BOOL) success
```

Notification sent when bluetooth discovery finds new bluetooth device.

#### Parameters

<i>success</i>	true if the discovery complete successfully, even if it not resulted in any device found, false if there was an error communicating with the bluetooth module
----------------	---

#### 2.37.2.12 `bluetoothLEDeviceConnected:()`

```
- (void) bluetoothLEDeviceConnected:
    (CBPeripheral *) device
```

Notification sent when bluetooth low energy device is connected.

#### Parameters

<i>device</i>	bluetooth low energy device
---------------	-----------------------------

#### 2.37.2.13 `bluetoothLEDeviceDisconnected:()`

```
- (void) bluetoothLEDeviceDisconnected:
    (CBPeripheral *) device
```

Notification sent when bluetooth low energy connection is lost.

#### Parameters

<i>device</i>	bluetooth low energy device
---------------	-----------------------------

#### 2.37.2.14 `bluetoothLEDeviceDiscovered:()`

```
- (bool) bluetoothLEDeviceDiscovered:
    (CBPeripheral *) device
```

#### 2.37.2.15 `bluetoothLEDiscoverCompletedWithError:()`

```
- (void) bluetoothLEDiscoverCompletedWithError:
    (NSError *) error
```



**2.37.2.16** `connectionState:()`

```
- (void) connectionState:
    (int) state
```

Notifies about the current connection state.

**Parameters**

<i>state</i>	- connection state, one of:	
	CONN_DISCONNECTED	there is no connection to any device and the sdk will not try to make one even if the device is attached
	CONN_CONNECTING	no device is currently connected, but the sdk is actively trying to
	CONN_CONNECTED	One or more devices are connected

**2.37.2.17** `deviceButtonPressed:()`

```
- (void) deviceButtonPressed:
    (int) which
```

Notification sent when some of the device's buttons is pressed.

**Parameters**

<i>which</i>	button identifier, one of:	
	0	right scan button

**2.37.2.18** `deviceButtonReleased:()`

```
- (void) deviceButtonReleased:
    (int) which
```

Notification sent when some of the device's buttons is released.

**Parameters**

<i>which</i>	button identifier, one of:	
	0	right scan button

**2.37.2.19 deviceConnectFailed:failedReason:()**

```
- (void) deviceConnectFailed:
    (SUPPORTED_DEVICE_TYPES) device
    failedReason: (CONNECT_FAILED_REASON) failedReason
```

Notification sent when device fails to connect with a reason.

**Parameters**

<i>device</i>	the type of the device that failed
<i>failedReason</i>	the reason the connect failed

**2.37.2.20 deviceFeatureSupported:value:()**

```
- (void) deviceFeatureSupported:
    (int) feature
    value: (int) value
```

Notification sent when some of the features gets enabled or disabled.

**Parameters**

<i>feature</i>	feature type, one of the FEAT_* constants
<i>value</i>	FEAT_UNSUPPORTED if the feature is not supported on the connected device(s), FEAT_SUPPORTED or one of the specific constants for each feature otherwise

**2.37.2.21 emv2CardEventOnInterface:event:()**

```
- (void) emv2CardEventOnInterface:
    (int) interface
    event: (int) event
```

Notification sent when card being presented, removed or error.

**Parameters**

<i>interface</i>	one of EMV_INTERFACE_* constants
<i>event</i>	one of EMV_CARD_EVENT_* event

**2.37.2.22 emv2OnAppleVASProcessedWithResult:data:()**

```
- (void) emv2OnAppleVASProcessedWithResult:
```

```
(int) result
data:(NSData *) data
```

Notification sent when Apple VAS card was successfully processed.

Data consists of all the VAS data, wrapped inside one or more 0xE8 tags

#### Parameters

<i>result</i>	VAS processing result
<i>data</i>	TLV list

#### 2.37.2.23 emv2OnApplicationSelection:()

```
- (void) emv2OnApplicationSelection:
    (NSData *) applicationTags
```

Notification sent when the card has multiple applications and one needs to be selected.

This can only happen with smart cards, NFC cards automatically select the application. The program is expected to respond with either emv2SelectApplication or emv2ShowApplicationList when done with the selection

#### Parameters

<i>applicationTags</i>	an array of strings with application names, when ready call emv2SelectApplication with the correct application index
------------------------	--

#### 2.37.2.24 emv2OnCardReadWithData:()

```
- (void) emv2OnCardReadWithData:
    (NSData *) data
```

Notification sent when emv card is read, optionally returning emv tags if configured to do so.

#### Parameters

<i>data</i>	TLV list
-------------	----------

#### 2.37.2.25 emv2OnGoogleVASProcessedWithResult:data:()

```
- (void) emv2OnGoogleVASProcessedWithResult:
    (int) result
    data:(NSData *) data
```

Notification sent when Google VAS card was successfully processed.

Data consists of all the VAS data

#### Parameters

<i>result</i>	VAS processing result
<i>data</i>	TLV list

#### 2.37.2.26 emv2OnlineProcessing():

```
- (void) emv2OnlineProcessing:
    (NSData *) data
```

Notification sent when the kernel and the card require online processing.

Data consists of tags needed for online processing and should be processed by the financial institution. Call `emv2SetOnlineResult` when done with the online connection to notify the kernel of the result

#### Parameters

<i>data</i>	TLV list
-------------	----------

#### 2.37.2.27 emv2OnTransactionFinished():

```
- (void) emv2OnTransactionFinished:
    (NSData *) data
```

Notification sent when the transaction is complete.

Data consists of all the tags available, including plain text ones for display purposes and encrypted for sending over to the backend

#### Parameters

<i>data</i>	TLV list
-------------	----------

#### 2.37.2.28 emv2OnTransactionStarted():

```
- (void) emv2OnTransactionStarted
```

Notification sent when EMV kernel detects a card and start processing it.

**2.37.2.29 emv2OnUserInterfaceCode:status:holdTime:()**

```
- (void) emv2OnUserInterfaceCode:
    (int) code
    status:(int) status
    holdTime:(NSTimeInterval) holdTime
```

Notification sent when the EMV kernel wants to update the user interface.

**Parameters**

<i>code</i>	user interface code, one of the EMV_UI_* constants
<i>status</i>	user interface status or -1 if status is unavailable
<i>holdTime</i>	the time to display the message or -1 if time is unavailable

**2.37.2.30 emv2TipEntryCompleWithAmount:()**

```
- (void) emv2TipEntryCompleWithAmount:
    (uint32_t) amount
```

Notification sent when TIP entry procedure completed successfully.

**Parameters**

<i>amount</i>	amount value entered
---------------	----------------------

**2.37.2.31 emv2TipEntryFailedWithError:()**

```
- (void) emv2TipEntryFailedWithError:
    (NSError *) error
```

Notification sent when TIP entry procedure completed with error.

**Parameters**

<i>error</i>	NSError object if the entry failed
--------------	------------------------------------

**2.37.2.32 firmwareUpdateProgress:percent:()**

```
- (void) firmwareUpdateProgress:
    (int) phase
    percent:(int) percent
```

Notification sent when firmware update process advances.

Do not call any other functions until firmware update is complete! During the firmware update notifications will be posted.

#### Parameters

<i>phase</i>	update phase, one of:	
	UPDATE_INIT	Initializing firmware update
	UPDATE_ERASE	Erasing flash memory
	UPDATE_WRITE	Writing data
	UPDATE_FINISH	Update complete
<i>percent</i>	firmware update progress in percents	

#### 2.37.2.33 `getDeviceConnectionState:()`

```
- (int) getDeviceConnectionState:
    (SUPPORTED_DEVICE_TYPES) type
```

Return the connection state for a specific device type.

#### Parameters

<i>type</i>	- one of SUPPORTED_DEVICE_TYPES
-------------	---------------------------------

#### Returns

int - either CONN\_CONNECTED or CONN\_DISCONNECTED

#### 2.37.2.34 `iHUBDataReceivedForDevice:data:()`

```
- (void) iHUBDataReceivedForDevice:
    (iHUBDevice *) device
    data:(NSData *) data
```

Notification sent when new device is connected to iHub.

#### Parameters

<i>device</i>	iHUB device class
<i>data</i>	data received from the device

**2.37.2.35 iHUBDeviceConnected:()**

```
- (void) iHUBDeviceConnected:
    (iHUBDevice *) device
```

Notification sent when new device is connected to iHub.

**Parameters**

<i>device</i>	iHUB device class
---------------	-------------------

**2.37.2.36 iHUBDeviceDisconnected:()**

```
- (void) iHUBDeviceDisconnected:
    (iHUBDevice *) device
```

Notification sent when new device is connected to iHub.

**Parameters**

<i>device</i>	iHUB device class
---------------	-------------------

**2.37.2.37 iHUBPortStatusChangedForDevice:newStatus:()**

```
- (void) iHUBPortStatusChangedForDevice:
    (iHUBDevice *) device
    newStatus: (IHUB_PORT_STATUS) newStatus
```

Notification sent when new device is connected to iHub.

**Parameters**

<i>device</i>	iHUB device class
<i>newStatus</i>	the current status of the port

**2.37.2.38 keyboardButtonPressed:vk:character:modifiers:()**

```
- (void) keyboardButtonPressed:
    (BOOL) pressed
    vk: (int) vk
    character: (char) character
    modifiers: (int) modifiers
```

Notification sent when a key on the connected HID keyboard is pressed or released.

## Parameters

<i>pressed</i>	true if key is pressed, false if released
<i>vk</i>	virtual key code of the button, one of the VK_* constants
<i>character</i>	corresponding character code, according to the SHIFT state, if available, 0 if not
<i>modifiers</i>	any combination of the keyboard modifiers - KEY_MOD_* constants

2.37.2.39 `magneticCardData:track2:track3:()`

```
- (void) magneticCardData:
    (NSString *) track1
    track2:(NSString *) track2
    track3:(NSString *) track3
```

Notification sent when magnetic card is successfully read.

## Parameters

<i>track1</i>	- data contained in track 1 of the magnetic card or nil
<i>track2</i>	- data contained in track 2 of the magnetic card or nil
<i>track3</i>	- data contained in track 3 of the magnetic card or nil

2.37.2.40 `magneticCardData:track2:track3:source:()`

```
- (void) magneticCardData:
    (NSString *) track1
    track2:(NSString *) track2
    track3:(NSString *) track3
    source:(int) source
```

Notification sent when magnetic card is successfully read.

## Parameters

<i>track1</i>	- data contained in track 1 of the magnetic card or nil
<i>track2</i>	- data contained in track 2 of the magnetic card or nil
<i>track3</i>	- data contained in track 3 of the magnetic card or nil
<i>source</i>	the track data source, one of the CARD_* constants

2.37.2.41 `magneticCardDetected()`

```
- (void) magneticCardDetected
```



Notification sent when magnetic card is swiped.

The event is only sent if encryption algorithm is disabled via `emsrSetEncryption:-1` and the sdk is no longer automatically reading the card data. Note, that when this method is used, in order to resume card detection you have to call `msEnable` after you are done with the card, otherwise no new cards will be detected

#### 2.37.2.42 `magneticCardEncryptedData:tracks:data:()`

```
- (void) magneticCardEncryptedData:
    (int) encryption
    tracks:(int) tracks
    data:(NSData *) data
```

Notification sent when magnetic card is successfully read.

The data is being sent encrypted.

##### Parameters

<i>encryption</i>	encryption algorithm used, one of <code>ALG_*</code> constants
-------------------	--

For AES256, after decryption, the result data will be as follows:

- Random data (4 bytes)
- Device identification text (16 ASCII characters, unused bytes are 0)
- Processed track data in the format: 0xF1 (track1 data), 0xF2 (track2 data) 0xF3 (track3 data). It is possible some of the tracks will be empty, then the identifier will not be present too, for example 0xF1 (track1 data) 0xF3 (track3 data)
- End of track data (byte 0x00)
- CRC16 (2 bytes) - the CRC is performed from the start of the encrypted block (the Random Data block) to the end of the track data (including the 0x00 byte). The data block is rounded to 16 bytes

In the more secure way, where the decryption key resides in a server only, the card read process will look something like:

- (User) swipes the card
- (iOS program) receives the data via `magneticCardEncryptedData` and sends to the server
- (iOS program)[optional] sends current device serial number along with the data received from `magneticCardEncryptedData`. This can be used for data origin verification
- (Server) decrypts the data, extracts all the information from the fields
- (Server)[optional] if the ipod program have sent the device serial number before, the server compares the received serial number with the one that's inside the encrypted block
- (Server) checks if the card data is the correct one, i.e. all needed tracks are present, card is the same type as required, etc and sends back notification to the ipod program.

For IDTECH with DUKPT the data contains:

- DATA[0]: CARD TYPE: 0 - payment card
- DATA[1]: TRACK FLAGS
- DATA[2]: TRACK 1 LENGTH
- DATA[3]: TRACK 2 LENGTH
- DATA[4]: TRACK 3 LENGTH
- DATA[??]: TRACK 1 DATA MASKED
- DATA[??]: TRACK 2 DATA MASKED
- DATA[??]: TRACK 3 DATA
- DATA[??]: TRACK 1 AND TRACK 2 TDES ENCRYPTED
- DATA[??]: TRACK 1 SHA1 (0x14 BYTES)
- DATA[??]: TRACK 2 SHA1 (0x14 BYTES)
- DATA[??]: DUKPT SERIAL AND COUNTER (0x0A BYTES)

#### Parameters

<i>tracks</i>	contain information which tracks are successfully read and inside the encrypted data as bit fields, bit 1 corresponds to track 1, etc, so value of 7 means all tracks are read
<i>data</i>	contains the encrypted card data

#### 2.37.2.43 magneticCardEncryptedData:tracks:data:track1masked:track2masked:track3:()

```
- (void) magneticCardEncryptedData:
    (int) encryption
    tracks:(int) tracks
    data:(NSData *) data
    track1masked:(NSString *) track1masked
    track2masked:(NSString *) track2masked
    track3:(NSString *) track3
```

Notification sent when magnetic card is successfully read.

The data is being sent encrypted.

#### Parameters

<i>encryption</i>	encryption algorithm used, one of:
0	AES 256
1	IDTECH with DUKPT

For AES256, after decryption, the result data will be as follows:

- Random data (4 bytes)

- Device identification text (16 ASCII characters, unused bytes are 0)
- Processed track data in the format: 0xF1 (track1 data), 0xF2 (track2 data) 0xF3 (track3 data). It is possible some of the tracks will be empty, then the identifier will not be present too, for example 0xF1 (track1 data) 0xF3 (track3 data)
- End of track data (byte 0x00)
- CRC16 (2 bytes) - the CRC is performed from the start of the encrypted block (the Random Data block) to the end of the track data (including the 0x00 byte). The data block is rounded to 16 bytes

In the more secure way, where the decryption key resides in a server only, the card read process will look something like:

- (User) swipes the card
- (iOS program) receives the data via `magneticCardEncryptedData` and sends to the server
- (iOS program)[optional] sends current Linea serial number along with the data received from `magneticCardEncryptedData`. This can be used for data origin verification
- (Server) decrypts the data, extracts all the information from the fields
- (Server)[optional] if the ipod program have sent the Linea serial number before, the server compares the received serial number with the one that's inside the encrypted block
- (Server) checks if the card data is the correct one, i.e. all needed tracks are present, card is the same type as required, etc and sends back notification to the ipod program.

For IDTECH with DUKPT the data contains:

- DATA[0]: CARD TYPE: 0 - payment card
- DATA[1]: TRACK FLAGS
- DATA[2]: TRACK 1 LENGTH
- DATA[3]: TRACK 2 LENGTH
- DATA[4]: TRACK 3 LENGTH
- DATA[?]: TRACK 1 DATA MASKED
- DATA[?]: TRACK 2 DATA MASKED
- DATA[?]: TRACK 3 DATA
- DATA[?]: TRACK 1 AND TRACK 2 TDES ENCRYPTED
- DATA[?]: TRACK 1 SHA1 (0x14 BYTES)
- DATA[?]: TRACK 2 SHA1 (0x14 BYTES)
- DATA[?]: DUKPT SERIAL AND COUNTER (0x0A BYTES)

#### Parameters

<i>tracks</i>	contain information which tracks are successfully read and inside the encrypted data as bit fields, bit 1 corresponds to track 1, etc, so value of 7 means all tracks are read
<i>data</i>	contains the encrypted card data
<i>track1masked</i>	when possible, track1 data will be masked and returned here
<i>track2masked</i>	when possible, track2 data will be masked and returned here
<i>track3</i>	when possible, track3 data will be returned here

### 2.37.2.44 magneticCardEncryptedData:tracks:data:track1masked:track2masked:track3:source:()

```

- (void) magneticCardEncryptedData:
    (int) encryption
    tracks:(int) tracks
    data:(NSData *) data
    track1masked:(NSString *) track1masked
    track2masked:(NSString *) track2masked
    track3:(NSString *) track3
    source:(int) source

```

Notification sent when magnetic card is successfully read.

The data is being sent encrypted.

#### Parameters

<i>encryption</i>	encryption algorithm used, one of:	
0		AES 256
1		IDTECH with DUKPT

For AES256, after decryption, the result data will be as follows:

- Random data (4 bytes)
- Device identification text (16 ASCII characters, unused bytes are 0)
- Processed track data in the format: 0xF1 (track1 data), 0xF2 (track2 data) 0xF3 (track3 data). It is possible some of the tracks will be empty, then the identifier will not be present too, for example 0xF1 (track1 data) 0xF3 (track3 data)
- End of track data (byte 0x00)
- CRC16 (2 bytes) - the CRC is performed from the start of the encrypted block (the Random Data block) to the end of the track data (including the 0x00 byte). The data block is rounded to 16 bytes

In the more secure way, where the decryption key resides in a server only, the card read process will look something like:

- (User) swipes the card
- (iOS program) receives the data via magneticCardEncryptedData and sends to the server
- (iOS program)[optional] sends current Linea serial number along with the data received from magneticCardEncryptedData. This can be used for data origin verification
- (Server) decrypts the data, extracts all the information from the fields
- (Server)[optional] if the ipod program have sent the Linea serial number before, the server compares the received serial number with the one that's inside the encrypted block
- (Server) checks if the card data is the correct one, i.e. all needed tracks are present, card is the same type as required, etc and sends back notification to the ipod program.

For IDTECH with DUKPT the data contains:

- DATA[0]: CARD TYPE: 0 - payment card
- DATA[1]: TRACK FLAGS
- DATA[2]: TRACK 1 LENGTH
- DATA[3]: TRACK 2 LENGTH
- DATA[4]: TRACK 3 LENGTH
- DATA[?]: TRACK 1 DATA MASKED
- DATA[?]: TRACK 2 DATA MASKED
- DATA[?]: TRACK 3 DATA
- DATA[?]: TRACK 1 AND TRACK 2 TDES ENCRYPTED
- DATA[?]: TRACK 1 SHA1 (0x14 BYTES)
- DATA[?]: TRACK 2 SHA1 (0x14 BYTES)
- DATA[?]: DUKPT SERIAL AND COUNTER (0x0A BYTES)

#### Parameters

<i>tracks</i>	contain information which tracks are successfully read and inside the encrypted data as bit fields, bit 1 corresponds to track 1, etc, so value of 7 means all tracks are read
<i>data</i>	contains the encrypted card data
<i>track1masked</i>	when possible, track1 data will be masked and returned here
<i>track2masked</i>	when possible, track2 data will be masked and returned here
<i>track3</i>	when possible, track3 data will be returned here
<i>source</i>	the track data source, one of the CARD_* constants

#### 2.37.2.45 magneticCardEncryptedRawData:data:()

```
- (void) magneticCardEncryptedRawData:
    (int) encryption
    data:(NSData *) data
```

Notification sent when magnetic card is successfully read.

The raw card data is encrypted via the selected encryption algorithm. After decryption, the result data will be as follows:

- Random data (4 bytes)
- Device identification text (16 ASCII characters, unused bytes are 0)
- Track data: the maximum length of a single track is 704 bits (88 bytes), so track data contains 3x88 bytes
- CRC16 (2 bytes) - the CRC is performed from the start of the encrypted block (the Random Data block) to the end of the track data. The data block is rounded to 16 bytes

## Parameters

<i>encryption</i>	encryption algorithm used, one of ALG_* constants
<i>data</i>	- Contains the encrypted raw card data

2.37.2.46 `magneticCardRawData:()`

```
- (void) magneticCardRawData:
    (NSData *) tracks
```

Notification sent when magnetic card is successfully read.

## Parameters

<i>tracks</i>	contains the raw magnetic card data. These are the bits directly from the magnetic head. The maximum length of a single track is 704 bits (88 bytes), so the command returns the 3 tracks as 3x88 bytes block
---------------	---

2.37.2.47 `magneticCardReadFailed:()`

```
- (void) magneticCardReadFailed:
    (int) source
```

Notification sent when magnetic card failed to read.

## Parameters

<i>source</i>	the track data source, one of the CARD_* constants
---------------	--

2.37.2.48 `magneticCardReadFailed:reason:()`

```
- (void) magneticCardReadFailed:
    (int) source
    reason:(int) reason
```

Notification sent when magnetic card failed to read.

## Parameters

<i>source</i>	the track data source, one of the CARD_* constants
<i>reason</i>	card failed reason, one of the REASON_* constants

**2.37.2.49 magneticCTDOTData:()**

```
- (void) magneticCTDOTData:
    (NSData *) data
```

Notification sent when magnetic CT-DOT ticket is read.

**Parameters**

<i>data</i>	- first CT-DOT data from the first start sentinel (0x0B) to last end sentinel (0xA8), not including leading or trailing zeroes, but including the middle zeroes
-------------	---

**2.37.2.50 magneticF2FCardData:()**

```
- (void) magneticF2FCardData:
    (NSString *) data
```

Notification sent when F2F magnetic card is successfully read.

**Parameters**

<i>data</i>	- data contained in the magnetic card
-------------	---------------------------------------

**2.37.2.51 magneticJISCardData:()**

```
- (void) magneticJISCardData:
    (NSString *) data
```

Notification sent when JIS I & II magnetic card is successfully read.

**Parameters**

<i>data</i>	- data contained in the magnetic card
-------------	---------------------------------------

**2.37.2.52 magneticPassbookData:()**

```
- (void) magneticPassbookData:
    (NSData *) data
```

Notification sent when magnetic pasbook is read.

## Parameters

<i>data</i>	- passbook data in EBCDIC format
-------------	----------------------------------

2.37.2.53 `paperStatus:()`

```
- (void) paperStatus:
    (BOOL) present
```

Notification sent when printer's paper sensor changes.

## Parameters

<i>present</i>	TRUE if paper is present, FALSE if printer is out of paper or cover is open
----------------	---

2.37.2.54 `PINEntryCompleteWithError:()`

```
- (void) PINEntryCompleteWithError:
    (NSError *) error
```

Notification sent when PIN entry procedure have completed or was cancelled.

## Parameters

<i>error</i>	nil if no error occurred, or NSError object if the generation failed
--------------	--

2.37.2.55 `pogEventDataForSolution:command:data:()`

```
- (void) pogEventDataForSolution:
    (POG_SOLUTIONS) solution
    command:(int) command
    data:(NSData *) data
```

Notification sent when POG data is available.

## Parameters

<i>solution</i>	POG solution type
<i>command</i>	command code specific to the solution type
<i>data</i>	data specific to the solution and command or nil if there is no data



**2.37.2.56 rfCardDetected:info:()**

```
- (void) rfCardDetected:
    (int) cardIndex
    info: (DTRFCardInfo *) info
```

Notification sent when a new supported RFID card enters the field.

**Parameters**

<i>cardIndex</i>	the index of the card, use this index with all subsequent commands to the card
<i>info</i>	information about the card

**2.37.2.57 rfCardRemoved:()**

```
- (void) rfCardRemoved:
    (int) cardIndex
```

Notification sent when the card leaves the field.

**Parameters**

<i>cardIndex</i>	the index of the card, use this index with all subsequent commands to the card
------------------	--

**2.37.2.58 sdkDebug:source:()**

```
- (void) sdkDebug:
    (NSString *) logText
    source: (int) source
```

Notification sent to display debug messages from the sdk or device.

**Parameters**

<i>logText</i>	debug message
<i>source</i>	source device type, 0 means the connected device, 1 is the sdk

**2.37.2.59 smartCardInserted:()**

```
- (void) smartCardInserted:
```

```
(SC_SLOTS) slot
```

Notification sent when smartcard was inserted.

#### Parameters

<i>slot</i>	smart card slot number
-------------	------------------------

#### 2.37.2.60 smartCardRemoved:()

```
- (void) smartCardRemoved:
    (SC_SLOTS) slot
```

Notification sent when smartcard was removed.

#### Parameters

<i>slot</i>	smart card slot number
-------------	------------------------

#### 2.37.2.61 uhfTagDetected:epc:()

```
- (void) uhfTagDetected:
    (uint16_t) pc
    epc:(NSData *) epc
```

Notification sent when UHF tag is detected.

#### Parameters

<i>pc</i>	PC
<i>epc</i>	EPC

## Chapter 3

# Class Documentation

### 3.1 DTBatteryInfo Class Reference

Battery information.

Inherits NSObject.

#### Properties

- float [voltage](#)  
*Battery voltage.*
- int [capacity](#)  
*Battery capacity in percents.*
- int [health](#)  
*Battery health in percents or 0 if unsupported.*
- int [maximumCapacity](#)  
*Battery maximum capacity in MA/H or 0 if unsupported.*
- bool [charging](#)  
*Charging state.*
- BATTERY\_CHIPS [batteryChipType](#)  
*Battery chip type.*
- NSDictionary \* [extendedInfo](#)  
*Extended battery information specific to the chip used.*

#### 3.1.1 Detailed Description

Battery information.

#### 3.1.2 Property Documentation

### 3.1.2.1 batteryChipType

- (BATTERY\_CHIPS) batteryChipType [read], [write], [atomic], [assign]

Battery chip type.

### 3.1.2.2 capacity

- (int) capacity [read], [write], [atomic], [assign]

Battery capacity in percents.

### 3.1.2.3 charging

- (bool) charging [read], [write], [atomic], [assign]

Charging state.

### 3.1.2.4 extendedInfo

- (NSDictionary\*) extendedInfo [read], [write], [atomic], [copy]

Extended battery information specific to the chip used.

### 3.1.2.5 health

- (int) health [read], [write], [atomic], [assign]

Battery health in percents or 0 if unsupported.

### 3.1.2.6 maximumCapacity

- (int) maximumCapacity [read], [write], [atomic], [assign]

Battery maximum capacity in MA/H or 0 if unsupported.

### 3.1.2.7 voltage

– (float) voltage [read], [write], [atomic], [assign]

Battery voltage.

## 3.2 DTCAKeyInfo Class Reference

Information about Certification Authority keys.

Inherits NSObject.

### Properties

- int [keyIndex](#)  
*Key index.*
- NSData \* [RIDI](#)  
*RIDI.*
- int [moduleLength](#)  
*Length of the key module.*

### 3.2.1 Detailed Description

Information about Certification Authority keys.

### 3.2.2 Property Documentation

#### 3.2.2.1 keyIndex

– (int) keyIndex [read], [write], [atomic], [assign]

Key index.

#### 3.2.2.2 moduleLength

– (int) moduleLength [read], [write], [atomic], [assign]

Length of the key module.

### 3.2.2.3 RIDI

- (NSData\*) RIDI [read], [write], [atomic], [copy]

RIDI.

## 3.3 DTCertificateInfo Class Reference

Inherits NSObject.

### Properties

- int [slot](#)
- uint32\_t [version](#)
- uint32\_t [usage](#)

### 3.3.1 Property Documentation

#### 3.3.1.1 slot

- (int) slot [read], [write], [atomic], [assign]

#### 3.3.1.2 usage

- (uint32\_t) usage [read], [write], [atomic], [assign]

#### 3.3.1.3 version

- (uint32\_t) version [read], [write], [atomic], [assign]

## 3.4 <DTDeviceDelegate> Protocol Reference

Protocol describing various notifications that [DTDevices](#) SDK can send.

## Instance Methods

- (void) - [connectionState:](#)  
*Notifies about the current connection state.*
- (int) - [getDeviceConnectionState:](#)  
*Return the connection state for a specific device type.*
- (void) - [deviceButtonPressed:](#)  
*Notification sent when some of the device's buttons is pressed.*
- (void) - [deviceButtonReleased:](#)  
*Notification sent when some of the device's buttons is released.*
- (void) - [barcodeData:type:](#)  
*Notification sent when barcode is successfully read.*
- (void) - [barcodeData:isotype:](#)  
*Notification sent when barcode is successfully read.*
- (void) - [barcodeNSData:type:](#)  
*Notification sent when barcode is successfully read.*
- (void) - [barcodeNSData:isotype:](#)  
*Notification sent when barcode is successfully read.*
- (void) - [magneticCardDetected](#)  
*Notification sent when magnetic card is swiped.*
- (void) - [magneticCardData:track2:track3:](#)  
*Notification sent when magnetic card is successfully read.*
- (void) - [magneticPassbookData:](#)  
*Notification sent when magnetic pasbook is read.*
- (void) - [magneticCTDOTData:](#)  
*Notification sent when magnetic CT-DOT ticket is read.*
- (void) - [magneticCardData:track2:track3:source:](#)  
*Notification sent when magnetic card is successfully read.*
- (void) - [magneticCardEncryptedData:tracks:data:](#)  
*Notification sent when magnetic card is successfully read.*
- (void) - [magneticCardEncryptedData:tracks:data:track1masked:track2masked:track3:](#)  
*Notification sent when magnetic card is successfully read.*
- (void) - [magneticCardEncryptedData:tracks:data:track1masked:track2masked:track3:source:](#)  
*Notification sent when magnetic card is successfully read.*
- (void) - [magneticCardRawData:](#)  
*Notification sent when magnetic card is successfully read.*
- (void) - [magneticCardEncryptedRawData:data:](#)  
*Notification sent when magnetic card is successfully read.*
- (void) - [magneticCardReadFailed:](#)  
*Notification sent when magnetic card failed to read.*
- (void) - [magneticCardReadFailed:reason:](#)  
*Notification sent when magnetic card failed to read.*
- (void) - [firmwareUpdateProgress:percent:](#)  
*Notification sent when firmware update process advances.*
- (void) - [bluetoothDiscoverComplete:](#)  
*Notification sent when bluetooth discovery finds new bluetooth device.*
- (void) - [bluetoothDeviceDiscovered:name:](#)  
*Notification sent when bluetooth discovery finds new bluetooth device.*
- (void) - [bluetoothDeviceConnected:](#)  
*Notification sent when bluetooth device is connected.*
- (void) - [bluetoothDeviceDisconnected:](#)

- Notification sent when bluetooth connection is lost.*

  - (BOOL) - [bluetoothDeviceRequestedConnection:name:](#)
- Notification sent when a bluetooth device requests.*

  - (NSString \*) - [bluetoothDevicePINCodeRequired:name:](#)
- Notification sent when a bluetooth device requests.*

  - (void) - [bluetoothDevicePassKeySent:passKey:](#)
- Notification sent when a bluetooth device requests confirmation of a passkey.*

  - (void) - [magneticJISCardData:](#)
- Notification sent when JIS I & II magnetic card is successfully read.*

  - (void) - [magneticF2FCardData:](#)
- Notification sent when F2F magnetic card is successfully read.*

  - (void) - [rfCardDetected:info:](#)
- Notification sent when a new supported RFID card enters the field.*

  - (void) - [rfCardRemoved:](#)
- Notification sent when the card leaves the field.*

  - (void) - [deviceFeatureSupported:value:](#)
- Notification sent when some of the features gets enabled or disabled.*

  - (void) - [smartCardInserted:](#)
- Notification sent when smartcard was inserted.*

  - (void) - [smartCardRemoved:](#)
- Notification sent when smartcard was removed.*

  - (void) - [PINEntryCompleteWithError:](#)
- Notification sent when PIN entry procedure have completed or was cancelled.*

  - (void) - [paperStatus:](#)
- Notification sent when printer's paper sensor changes.*

  - (void) - [sdkDebug:source:](#)
- Notification sent to display debug messages from the sdk or device.*

  - (void) - [emv2OnTransactionStarted](#)
- Notification sent when EMV kernel detects a card and start processing it.*

  - (void) - [emv2OnUserInterfaceCode:status:holdTime:](#)
- Notification sent when the EMV kernel wants to update the user interface.*

  - (void) - [emv2OnApplicationSelection:](#)
- Notification sent when the card has multiple applications and one needs to be selected.*

  - (void) - [emv2OnlineProcessing:](#)
- Notification sent when the kernel and the card require online processing.*

  - (void) - [emv2OnAppleVASProcessedWithResult:data:](#)
- Notification sent when Apple VAS card was successfully processed.*

  - (void) - [emv2OnGoogleVASProcessedWithResult:data:](#)
- Notification sent when Google VAS card was successfully processed.*

  - (void) - [emv2OnCardReadWithData:](#)
- Notification sent when emv card is read, optionally returning emv tags if configured to do so.*

  - (void) - [emv2OnTransactionFinished:](#)
- Notification sent when the transaction is complete.*

  - (void) - [emv2CardEventOnInterface:event:](#)
- Notification sent when card being presented, removed or error.*

  - (void) - [emv2TipEntryCompleWithAmount:](#)
- Notification sent when TIP entry procedure completed successfully.*

  - (void) - [emv2TipEntryFailedWithError:](#)
- Notification sent when TIP entry procedure completed with error.*

  - (void) - [bluetoothLEDeviceConnected:](#)
- Notification sent when bluetooth low energy device is connected.*



- (void) - [bluetoothLEDeviceDisconnected:](#)  
*Notification sent when bluetooth low energy connection is lost.*
- (bool) - [bluetoothLEDeviceDiscovered:](#)
- (void) - [bluetoothLEDiscoverCompletedWithError:](#)
- (void) - [iHUBDeviceConnected:](#)  
*Notification sent when new device is connected to iHub.*
- (void) - [iHUBDeviceDisconnected:](#)  
*Notification sent when new device is connected to iHub.*
- (void) - [iHUBDataReceivedForDevice:data:](#)  
*Notification sent when new device is connected to iHub.*
- (void) - [iHUBPortStatusChangedForDevice:newStatus:](#)  
*Notification sent when new device is connected to iHub.*
- (void) - [keyboardButtonPressed:vk:character:modifiers:](#)  
*Notification sent when a key on the connected HID keyboard is pressed or released.*
- (void) - [uhfTagDetected:epc:](#)  
*Notification sent when UHF tag is detected.*
- (void) - [pogEventDataForSolution:command:data:](#)  
*Notification sent when POG data is available.*
- (void) - [deviceConnectFailed:failedReason:](#)  
*Notification sent when device fails to connect with a reason.*

### 3.4.1 Detailed Description

Protocol describing various notifications that [DTDevices](#) SDK can send.

## 3.5 DTDeviceInfo Class Reference

The class that represents information about a connected device.

Inherits NSObject.

### Properties

- SUPPORTED\_DEVICE\_TYPES [deviceType](#)  
*Device type.*
- SUPPORTED\_DEVICE\_MODELS [deviceModel](#)  
*Device model.*
- DEVICE\_CONNECTION\_TYPE [connectionType](#)
- NSString \* [name](#)  
*Returns connected device name.*
- NSString \* [model](#)  
*Returns connected device model.*
- NSString \* [firmwareRevision](#)  
*Returns connected device firmware version.*
- NSString \* [hardwareRevision](#)  
*Returns connected device hardware version.*
- NSString \* [serialNumber](#)  
*Returns connected device serial number.*
- NSData \* [serialNumberCPU](#)  
*Returns connected device unique CPU serial number (if present)*

### 3.5.1 Detailed Description

The class that represents information about a connected device.

### 3.5.2 Property Documentation

#### 3.5.2.1 connectionType

- (DEVICE\_CONNECTION\_TYPE) connectionType [read], [write], [nonatomic], [assign]

#### 3.5.2.2 deviceModel

- (SUPPORTED\_DEVICE\_MODELS) deviceModel [read], [write], [nonatomic], [assign]

Device model.

#### 3.5.2.3 deviceType

- (SUPPORTED\_DEVICE\_TYPES) deviceType [read], [write], [nonatomic], [assign]

Device type.

#### 3.5.2.4 firmwareRevision

- (NSString\*) firmwareRevision [read], [write], [nonatomic], [copy]

Returns connected device firmware version.

#### 3.5.2.5 hardwareRevision

- (NSString\*) hardwareRevision [read], [write], [nonatomic], [copy]

Returns connected device hardware version.

### 3.5.2.6 model

- (NSString\*) model [read], [write], [nonatomic], [copy]

Returns connected device model.

### 3.5.2.7 name

- (NSString\*) name [read], [write], [nonatomic], [copy]

Returns connected device name.

### 3.5.2.8 serialNumber

- (NSString\*) serialNumber [read], [write], [nonatomic], [copy]

Returns connected device serial number.

### 3.5.2.9 serialNumberCPU

- (NSData\*) serialNumberCPU [read], [write], [nonatomic], [copy]

Returns connected device unique CPU serial number (if present)

## 3.6 DTDevices Class Reference

Provides universal access to all supported devices' functions.

Inherits NSObject.

## Public Types

- enum `UHF_COUNTRY` {  
`UHF_COUNTRY_KOREA` = 0, `UHF_COUNTRY_NORTH_AMERICA`, `UHF_COUNTRY_US`, `UHF_COUNTRY_EUROPE`,  
`UHF_COUNTRY_JAPAN`, `UHF_COUNTRY_CHINA1`, `UHF_COUNTRY_CHINA2`, `UHF_COUNTRY_BRAZIL` }  
*UHF Country.*
- enum `DUKPT_KEY_VARIANTS` { `DUKPT_KEY_VARIANT_GENERATE_VERIFY` =2, `DUKPT_KEY_VARIANT_VERIFY` =3, `DUKPT_KEY_VARIANT_ENCRYPT` =4, `DUKPT_KEY_VARIANT_DECRYPT` =5 }  
*DUKPT key variant.*
- enum `EMV_CL_CARD_SCHEME` {  
`EMV_CL_CARD_SCHEME_VISA_AP` =0x01, `EMV_CL_CARD_SCHEME_PAYPASS` =0x02, `EMV_CL_CARD_SCHEME_VISA` =0x03, `EMV_CL_CARD_SCHEME_AMEX` =0x04,  
`EMV_CL_CARD_SCHEME_JCB` =0x05, `EMV_CL_CARD_SCHEME_DISCOVER` =0x06 }  
*EMV contactless card scheme, found in C5 tag upon transaction completion, first byte.*
- enum `EMV_CARD_READ_TYPES` { `EMV_CARD_READ_TYPE_DISABLED` =0, `EMV_CARD_READ_TYPE_QIBIC` =0x12 }
- enum `APP_SELECTION_METHODS` { `SELECTION_PSE` =0, `SELECTION_AIDLIST` }
- enum `APP_MATCH_CRITERIAS` { `MATCH_FULL` =1, `MATCH_PARTIAL_VISA`, `MATCH_PARTIAL_EUROPAY` }
- enum `AUTH_RESULTS` { `AUTH_RESULT_SUCCESS` =1, `AUTH_RESULT_FAILURE`, `AUTH_FAIL_PIN_ENTRY_NOT_DONE`, `AUTH_FAIL_USER_CANCELLATION` }
- enum `BYPASS_MODES` { `BYPASS_CURRENT_METHOD_MODE` =0, `BYPASS_ALL_METHODS_MODE` }
- enum `CERTIFICATE_AC_TYPES` { `CERTIFICATE_AAC` =0, `CERTIFICATE_TC`, `CERTIFICATE_ARQC` }
- enum `CARD_RISK_TYPES` { `CDOL_1` =1, `CDOL_2` }
- enum `TAG_TYPES` { `TAG_TYPE_BINARY` =0, `TAG_TYPE_BCD`, `TAG_TYPE_STRING` }
- enum `POG_SOLUTIONS` {  
`POG_SOLUTION_GENERAL` =0, `POG_SOLUTION_MY_PINPAD` =1, `POG_SOLUTION_MAGIC_CUBE` =2, `POG_SOLUTION_DATECS` =3,  
`POG_SOLUTION_VIVAWALLET` =4, `POG_SOLUTION_HCE` =5 }  
*Pin On Glass Solution type.*
- enum `TOUCH_IMAGE_SIZE` { `TOUCH_IMAGE_SIZE_SMALL` = 0, `TOUCH_IMAGE_SIZE_LARGE` = 1 }  
*Image sizes supported by the touchid fingerprint reader.*
- enum `TOUCH_IMAGE_FORMAT` { `TOUCH_IMAGE_FORMAT_ANSI` = 0, `TOUCH_IMAGE_FORMAT_ISO` = 1 }  
*Image formats supported by the touchid fingerprint reader.*
- enum `TOUCH_IMAGE_COMPRESSION` { `TOUCH_IMAGE_COMPRESSION_NONE` = 0 }  
*Image compressions supported by the touchid fingerprint reader.*
- enum `TOUCH_TEMPLATE_FORMAT` {  
`TOUCH_TEMPLATE_FORMAT_NATIVE` = 0, `TOUCH_TEMPLATE_FORMAT_ANSI` = 1, `TOUCH_TEMPLATE_FORMAT_ISO_FMR` = 2, `TOUCH_TEMPLATE_FORMAT_ISO_FMC_N` = 3,  
`TOUCH_TEMPLATE_FORMAT_ISO_FMC_C` = 4 }  
*Template formats supported by the touchid fingerprint reader.*

## Instance Methods

- (void) - `addDelegate:`  
*Allows unlimited delegates to be added to a single class instance.*
- (void) - `removeDelegate:`  
*Removes delegate, previously added with addDelegate.*
- (void) - `connect`

*Tries to connect to supported devices in the background, connection status notifications will be passed through the delegate.*

- (void) - [disconnect](#)

*Stops the sdk from trying to connect to supported devices and breaks existing connections.*

- (BOOL) - [isPresent:](#)

- (BOOL) - [setActiveDeviceType:error:](#)

*The sdk can work with many devices at the same time, but some functions can be executed on a single device at a time (for example barcodeStartScan), this function sets the preferred device to execute the function by type.*

- (BOOL) - [setActiveDeviceIndexForType:deviceIndex:error:](#)

*The sdk can work with many devices at the same time, including several of the same type (like 2 printers).*

- (BOOL) - [setAutoOffWhenIdle:whenDisconnected:error:](#)

*Sets the time in seconds, after which Linea will shut down to conserve battery.*

- (BOOL) - [getAutoOffWhenIdle:whenDisconnected:error:](#)

*Gets the time in seconds, after which Linea will shut down to conserve battery.*

- (BOOL) - [getBatteryCapacity:voltage:error:](#)

*Returns active device's battery capacity.*

- (DTBatteryInfo \*) - [getBatteryInfo:](#)

*Returns complete information about device's battery.*

- (DTBatteryInfo \*) - [getConnectedDeviceBatteryInfo:error:](#)

*Returns complete information about a connected device's battery.*

- (BOOL) - [setBatteryMaxCapacity:error:](#)

*On Infineo X, 2 battery capacities are supported, this function allows you to set the currently used battery capacity in order to receive correct battery info.*

- (BOOL) - [setInternalBatteryChargeCurrentMode:error:](#)

*Switches between high and low current charging mode for internal battery.*

- (BOOL) - [getInternalBatteryChargeCurrentMode:error:](#)

*Returns current charging mode for internal battery.*

- (NSArray< DTDeviceInfo \* > \*) - [getConnectedDevicesInfo:](#)

*Returns an array of connected devices to the sdk.*

- (DTDeviceInfo \*) - [getConnectedDeviceInfo:error:](#)

*Returns information about connected device, based on type.*

- (BOOL) - [playSound:beepData:length:error:](#)

*Plays a sound using the built-in speaker on the active device.*

- (BOOL) - [setKioskMode:error:](#)

*Enables or disables kiosk mode.*

- (BOOL) - [getKioskMode:error:](#)

*Returns if the kiosk mode is enabled, refer to setKioskMode description for details.*

- (BOOL) - [getCharging:error:](#)

*Returns if the connected device is charging the iOS device from it's own battery.*

- (BOOL) - [setCharging:error:](#)

*Enables or disables Linea's capability to charge the handheld from it's own battery.*

- (BOOL) - [getPassThroughSync:error:](#)

*Returns the current state of the pass-through synchronization.*

- (BOOL) - [setPassThroughSync:error:](#)

*Enables or disables pass-through synchronization when you plug usb cable.*

- (BOOL) - [getUSBChargeCurrent:error:](#)

*Gets the charge current that lightning connector based Lineas will allow the iPod/iPhone/iPad to be charged with when connected via USB port.*

- (BOOL) - [setUSBChargeCurrent:error:](#)

*Sets the charge current that lightning connector based Lineas will allow the iPod/iPhone/iPad to be charged with when connected via USB port.*

- (NSDictionary \*) - [getFirmwareFileInformation:error:](#)

- Returns information about the specified firmware data.*

  - (BOOL) - [updateFirmwareData:error:](#)

*Updates connected device's firmware with specified firmware data.*

  - (BOOL) - [updateFirmwareData:validate:error:](#)

*Updates connected device's firmware with specified firmware data.*

  - (int) - [getSupportedFeature:error:](#)

*Returns if a feature is supported on connected device(s) and what type it is.*

  - (BOOL) - [getTimeRemainingToPowerOff:error:](#)
  - (BOOL) - [sysSaveSettingsToFlash:](#)

*In Lineas, all of the permanent settings are saved initially in RAM memory, then moved to flash upon program closing, device going to sleep, etc.*

  - (BOOL) - [sysPowerOff:](#)

*Powers the device off.*

  - (BOOL) - [sysEnterPassThrough:](#)

*Initiates pass-through sync if a usb cable is connected.*

  - (BOOL) - [sysIsDevelopmentUnit](#)

*Returns if the connected unit is development one.*

  - (BOOL) - [sysSetBatteryWarningLevelPercent:error:](#)

*Sets a specific battery level below which the device emits a charge needed warning.*

  - (BOOL) - [sysEnableEvents:error:](#)

*Use this to enable/disable specific events that are generated by the device.*

  - (NSDate \*) - [rtcGetDeviceDate:](#)

*Returns current device date/time.*

  - (BOOL) - [rtcSetDeviceDate:error:](#)

*Sets current device date/time.*

  - (BOOL) - [msEnable:](#)

*Enables reading of magnetic cards.*

  - (BOOL) - [msDisable:](#)

*Disables magnetic card reading.*

  - (NSDictionary< NSString \*, NSObject \* > \*) - [msProcessFinancialCard:track2:](#)

*Helper function to parse financial card and extract the data - name, number, expiration date.*

  - (NSDictionary< NSString \*, NSObject \* > \*) - [msGetLastCardMaskedData:](#)

*Retrieves masked card data (configurable by `emsrConfigMaskedDataShowExpiration` function), if the last swiped/scanned/tapped card was valid.*

  - (DTFinancialCardInfo \*) - [msExtractFinancialCard:track2:](#)

*Helper function to parse financial card and extract the data - name, number, expiration date.*

  - (BOOL) - [msSetCardDataMode:error:](#)

*Sets Linea's magnetic card data mode.*

  - (BOOL) - [msSimulateCardDataTrack1:track2:track3:error:](#)

*Send card data to be encrypted and returned via the currently selected encryption algorithm.*

  - (NSString \*) - [msGetLoyaltyDataForID:error:](#)

*Retrieves loyalty card data, if the last swiped magnetic card was a recognized loyalty one.*

  - (NSData \*) - [msGetCardTracksEncryptedWithFormat:keyID:additionalData:error:](#)

*After card is swiped or transaction is finished, you can get the card data in magnetic-stripe format by using one of the available Encrypted Head formats.*

  - (BOOL) - [msSetBINRangesEx:error:](#)

*Needed Structure: F0 C0 - pan min length C1 - pan max length F1 C0 - BIN.*

  - (NSString \*) - [barcodeType2Text:](#)

*Helper function to return string name of barcode type.*

  - (BOOL) - [barcodeStartScan:](#)

*Starts barcode engine.*

- (BOOL) - [barcodeStopScan:](#)  
*Stops ongoing scan started with startScan.*
- (BOOL) - [barcodeGetScanButtonMode:error:](#)  
*Returns the current scan button mode.*
- (BOOL) - [barcodeSetScanButtonMode:error:](#)  
*Sets scan button mode.*
- (BOOL) - [barcodeSetUVLights:error:](#)  
*Enable or disable UV lights when scanning.*
- (BOOL) - [barcodeGetUVLights:error:](#)  
*Returns if the UV lights upon scanning are enabled This setting is not persistent and is best to configure it upon connect.*
- (BOOL) - [barcodeSetBeepOnReady:error:](#)  
*Enable or disable short double sound when barcode engine becomes operational and is ready to scan.*
- (BOOL) - [barcodeGetBeepOnReady:error:](#)  
*Returns if beeping upon barcode engine start is enabled This setting is persistent and can be set only once.*
- (BOOL) - [barcodeSetScanBeep:volume:beepData:length:error:](#)  
*Sets the sound, which is used upon successful barcode scan.*
- (BOOL) - [barcodeGetScanMode:error:](#)  
*Returns the current scan mode.*
- (BOOL) - [barcodeSetScanMode:error:](#)  
*Sets barcode engine scan mode.*
- (BOOL) - [barcodeGetTypeMode:error:](#)  
*Returns the current barcode type mode.*
- (BOOL) - [barcodeSetTypeMode:error:](#)  
*Sets barcode type mode.*
- (BOOL) - [barcodeSetUPCZeroStrip:error:](#)  
*Enables/disables UPC-A front 0 (USA country code) trimming.*
- (BOOL) - [barcodeEngineResetToDefaults:](#)  
*Performs factory reset of the barcode module.*
- (BOOL) - [barcodeEngineCheckReady:error:](#)  
*Performs a check if the barcode engine is ready to operate.*
- (BOOL) - [barcodeOpticonSetInitString:error:](#)  
*Allows for a custom initialization string to be sent to the Opticon barcode engine.*
- (BOOL) - [barcodeOpticonSetParams:saveToFlash:error:](#)  
*Sends configuration parameters directly to the opticon barcode engine.*
- (NSString \*) - [barcodeOpticonGetIdent:](#)  
*Reads barcode engine's identification.*
- (BOOL) - [barcodeOpticonUpdateFirmware:bootLoader:error:](#)  
*Performs firmware update on the optiocon 2D barcode engines.*
- (BOOL) - [barcodeHoneywellSetInitString:error:](#)  
*Allows for a custom initialization data to be sent to the Honeywell barcode engine.*
- (BOOL) - [barcodeCodeSetParam:value:error:](#)  
*Sends configuration parameters directly to the code barcode engine.*
- (BOOL) - [barcodeCodeGetParam:value:error:](#)  
*Reads configuration parameters directly from the code barcode engine.*
- (BOOL) - [barcodeCodeUpdateFirmware:data:error:](#)  
*Performs firmware update on the Code 2D barcode engines.*
- (NSDictionary \*) - [barcodeCodeGetInformation:](#)
- (BOOL) - [barcodeZebraSetParam:value:permanent:error:](#)
- (NSString \*) - [barcodeZebraGetVersion:](#)
- (BOOL) - [barcodeZebraUpdateFirmware:error:](#)

- Performs firmware update on zebra barcode engines.*

  - (BOOL) - [barcodeIntermecSetInitData:error:](#)

*Allows for a custom initialization string to be sent to the Intermec barcode engine.*
- (NSData \*) - [barcodeIntermecQuery:error:](#)

*Sends a custom command to the barcode engine and receives a reply.*
- (BOOL) - [barcodeIntermecUpdateFirmware:error:](#)

*Performs firmware update on Intermec barcode engines.*
- (BOOL) - [barcodeZebraSetInitData:error:](#)

*Allows for a custom initialization data to be sent to the zebra barcode engine.*
- (NSData \*) - [barcodeNewlandQuery:error:](#)

*Sends a custom command to the barcode engine and receives a reply.*
- (BOOL) - [barcodeNewlandSetInitString:error:](#)

*Allows for a custom initialization string to be sent to the Newland barcode engine.*
- (BOOL) - [barcodeNewlandUpdateFirmware:error:](#)

*Performs firmware update on the newland barcode engines.*
- (BOOL) - [btDiscoverSupportedDevicesInBackground:maxTime:filter:error:](#)

*Performs background discovery of nearby supported bluetooth devices.*
- (BOOL) - [btDiscoverDevicesInBackground:maxTime:codTypes:error:](#)

*Performs background discovery of the nearby bluetooth devices.*
- (BOOL) - [btDiscoverPrintersInBackground:maxTime:error:](#)

*Performs background discovery of supported printers.*
- (BOOL) - [btDiscoverPrintersInBackground:](#)

*Performs background discovery of supported printers.*
- (BOOL) - [btDiscoverPinpadsInBackground:maxTime:error:](#)

*Performs background discovery of supported printers.*
- (BOOL) - [btDiscoverPinpadsInBackground:](#)

*Performs background discovery of supported printers.*
- (BOOL) - [btConnect:pin:error:](#)

*Tries to connect to remote device.*
- (BOOL) - [btDisconnect:error:](#)

*Disconnects from remote device.*
- (BOOL) - [btConnectSupportedDevice:pin:error:](#)

*Tries to connect to supported bluetooth device.*
- (BOOL) - [btWrite:length:error:](#)

*Sends data to the connected remote device.*
- (BOOL) - [btWrite:error:](#)

*Sends data to the connected remote device.*
- (int) - [btRead:length:timeout:error:](#)

*Tries to read data from the connected remote device for specified timeout.*
- (NSString \*) - [btReadLine:error:](#)

*Tries to read string data, ending with CR/LF up to specified timeout.*
- (BOOL) - [btEnableWriteCaching:error:](#)

*Enables or disables write caching on the bluetooth stream.*
- (NSArray< NSString \* > \*) - [btDiscoverDevices:maxTime:codTypes:error:](#)

*Performs synchronous discovery of the nearby bluetooth devices.*
- (NSString \*) - [btGetDeviceName:error:](#)

*Queries device name given the address.*
- (BOOL) - [btSetDataNotificationMaxTime:maxLength:sequenceData:error:](#)

*Sets the conditions to fire the NSSstreamEventHasBytesAvailable event on bluetooth streams.*
- (BOOL) - [btSetInitData:error:](#)

*Sets initialization data for the bluetooth module.*



- (BOOL) - [btListenForDevices:discoverable:localName:cod:error:](#)  
*Initiates/kills listen for incoming bluetooth connections.*
- (NSString \*) - [btGetLocalAddress:](#)  
*Retrieves local bluetooth address, this is the address that Linea will report to bluetooth discovery requests.*
- (BOOL) - [btConfirmPassKey:error:](#)  
*Confirms a passkey request sent upon connection.*
- (BOOL) - [btFirmwareUpdate:additionalData:error:](#)
- (NSString \*) - [btGetFirmwareVersion:](#)  
*Returns bluetooth module firmware version as string.*
- (NSArray< CBPeripheral \* > \*) - [btleDiscoverSupportedDevices:stopOnFound:error:](#)  
*Performs synchronous bluetooth LE device discovery, filtering only devices that the SDK supports - printers, pinpads, lineas, etc.*
- (BOOL) - [btleDiscoverStop](#)  
*Cancels running bluetooth LE discovery process.*
- (BOOL) - [btleConnectToDevice:error:](#)  
*Connects to supported bluetooth LE device and lets the SDK handle it.*
- (BOOL) - [btleConnectToDeviceAndGetStreams:error:](#)  
*Connects to generic bluetooth LE device and gets communication streams to it so you can directly control it.*
- (BOOL) - [btleDisconnect:error:](#)  
*Disconnects from a connected bluetooth LE device.*
- (CBPeripheral \*) - [btleGetKnownDeviceWithUUID:error:](#)  
*Searches through paired bluetooth LE devices and return the one matching the UUID provided.*
- (BOOL) - [extOpenSerialPort:baudRate:parity:dataBits:stopBits:flowControl:error:](#)  
*Opens the external serial port with specified settings.*
- (BOOL) - [extCloseSerialPort:error:](#)  
*Closes the external serial port opened with extOpenSerialPort.*
- (BOOL) - [extWriteSerialPort:data:error:](#)  
*Sends data to the connected remote device via serial port.*
- (NSData \*) - [extReadSerialPort:length:timeout:error:](#)  
*Reads data from the connected remote device via serial port.*
- (BOOL) - [tcpConnectSupportedDevice:error:](#)  
*Tries to connect to supported device over the network.*
- (BOOL) - [tcpDisconnect:error:](#)  
*Disconnects from remote device.*
- (NSData \*) - [cryptoRawGenerateRandomData:](#)  
*Generates 16 byte block of random numbers, required for some of the other crypto functions.*
- (BOOL) - [cryptoRawSetKey:encryptedData:keyVersion:keyFlags:error:](#)
- (BOOL) - [cryptoSetKey:key:oldKey:keyVersion:keyFlags:error:](#)  
*Used to store AES256 keys into Linea internal memory.*
- (BOOL) - [cryptoGetKeyVersion:keyVersion:error:](#)  
*Returns key version.*
- (NSData \*) - [cryptoRawAuthenticateDevice:error:](#)
- (BOOL) - [cryptoAuthenticateDevice:error:](#)
- (BOOL) - [cryptoRawAuthenticateHost:error:](#)
- (BOOL) - [cryptoAuthenticateHost:error:](#)
- (NSArray< DTCertificateInfo \* > \*) - [cryptoGetCertificatesInfo:](#)  
*Returns information about currently loaded certificates.*
- (BOOL) - [cryptoLoadCertificate:version:position:rootPosition:error:](#)  
*Loads PEM X509 certificate at specified slot.*
- (BOOL) - [taSetMerchantID:error:](#)  
*Sets TransArmor Merchant ID to be used in card data encryption.*

- (NSString \*) - [taEncryptData:error:](#)  
*Encrypts data string in TransArmor RSA packet.*
- (BOOL) - [taSetBINRanges:error:](#)  
*Sets what cards to be encrypted, rejected or sent in plain.*
- (BOOL) - [taSetBINRangesEx:error:](#)
- (BOOL) - [taSetEncryptionModeForCard:forManual:includeSentinels:error:](#)  
*Defines how and what tracks will be encrypted.*
- (BOOL) - [emsrSetActiveHead:error:](#)  
*In case there are multiple encrypted heads on the device, sets the active one.*
- (NSDictionary \*) - [emsrGetFirmwareInformation:error:](#)  
*Returns information about the specified head firmware data.*
- (BOOL) - [emsrIsTampered:error:](#)  
*Checks if the head was tampered or not.*
- (BOOL) - [emsrGetKeyVersion:keyVersion:error:](#)  
*Retrieves the key version (if any) of a loaded key.*
- (BOOL) - [emsrLoadInitialKey:error:](#)  
*Loads Terminal Master Key (TMK) or reenables after tampering.*
- (BOOL) - [emsrLoadKey:error:](#)  
*Loads new key, in plain or encrypted with already loaded AES256 Key Encryption Key (KEK).*
- (NSData \*) - [emsrGetDUKPTSerial:](#)  
*Returns DUKPT serial number, if DUKPT key is set.*
- (NSData \*) - [emsrGetDUKPTSerialForKeyID:error:](#)  
*Returns DUKPT serial number (KSN), if DUKPT key is set.*
- (NSString \*) - [emsrGetDeviceModel:](#)  
*Returns head's model.*
- (BOOL) - [emsrGetFirmwareVersion:error:](#)  
*Returns head's firmware version as number MAJOR\*100+MINOR, i.e.*
- (BOOL) - [emsrGetSecurityVersion:error:](#)  
*Returns head's security version as number MAJOR\*100+MINOR, i.e.*
- (NSData \*) - [emsrGetSerialNumber:](#)  
*Return head's unique serial number as byte array.*
- (BOOL) - [emsrUpdateFirmware:error:](#)  
*Performs firmware update on the encrypted head.*
- (NSArray< NSNumber \* > \*) - [emsrGetSupportedEncryptions:](#)  
*Returns supported encryption algorithms by the encrypted head.*
- (BOOL) - [emsrSetEncryption:params:error:](#)  
*Selects the preferred encryption algorithm.*
- (BOOL) - [emsrSetEncryption:keyID:params:error:](#)  
*Selects the preferred encryption algorithm.*
- (BOOL) - [emsrConfigMaskedDataShowExpiration:showServiceCode:showTrack3:unmaskedDigitsAtStart:↵:unmaskedDigitsAtEnd:unmaskedDigitsAfter:error:](#)  
*Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [emsrConfigMaskedDataShowExpiration:showServiceCode:unmaskedDigitsAtStart:unmasked↵DigitsAtEnd:unmaskedDigitsAfter:error:](#)  
*Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [emsrConfigMaskedDataShowExpiration:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:error:](#)  
*Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [emsrConfigMaskedDataShowExpiration:unmaskedDigitsAtStart:unmaskedDigitsAtEnd:unmasked↵DigitsAfter:error:](#)  
*Fine-tunes which part of the card data will be masked, and which will be sent in clear text for display/print purposes.*
- (BOOL) - [emsrLoadRSAKeyPEM:version:error:](#)

- (EMSRDeviceInfo \*) - [emsrGetDeviceInfo:](#)  
*Returns general information about the encrypted head - firmware version, ident, serial number.*
- (EMSRKeysInfo \*) - [emsrGetKeysInfo:](#)  
*Returns information about the loaded keys in the encrypted head and tampered status.*
- (BOOL) - [emsrSetCardDataMode:tracks:trackIdentifiers:error:](#)  
*Sets encrypted magnetic head card data mode.*
- (NSData \*) - [samPowerOn:](#)  
*Powers on the SAM module and returns Answer To Reset (ATR)*
- (BOOL) - [samPowerOff:](#)  
*Powers off the SAM module.*
- (BOOL) - [samAPDU:ins:p1:p2:inData:apduStatus:error:](#)  
*Sends smartcard APDU command in the smartcard put in the SAM slot.*
- (NSData \*) - [samCAPDU:ins:p1:p2:inData:outLength:apduStatus:error:](#)  
*Executes combined read/write smartcard APDU command in the smartcard put in the SAM slot.*
- (NSData \*) - [samRawAPDU:apduStatus:error:](#)  
*Executes combined read/write smartcard APDU command in the smartcard put in the SAM slot.*
- (DTVoltageInfo \*) - [voltageGetInfo:](#)  
*Returns various information about Voltage state.*
- (BOOL) - [voltageLoadConfiguration:error:](#)  
*Loads new configuration.*
- (BOOL) - [voltageGenerateNewKey:](#)  
*Forces generation of a new key.*
- (BOOL) - [voltageSetMerchantID:error:](#)  
*Sets merchant ID.*
- (BOOL) - [voltageSetPublicParameters:error:](#)  
*Sets public parameters to be used with ETB generation.*
- (BOOL) - [voltageSetIdentityString:error:](#)  
*Sets identity string to be used with ETB generation.*
- (BOOL) - [voltageSetEncryptionType:error:](#)  
*Sets encryption type.*
- (BOOL) - [voltageSetSettingsVersion:error:](#)  
*Sets settings version.*
- (BOOL) - [voltageSetKeyRolloverDays:numberOfTransactions:error:](#)  
*Sets how often a new key will be generated.*
- (NSData \*) - [uhfCommand:length:error:](#)
- (BOOL) - [uhfInit:error:](#)
- (BOOL) - [uhfClose:](#)
- (BOOL) - [uhfStartAutoReadForTagType:maximumNumberOfTags:maximumTimeForTagging:repeatCycleCount:error:](#)
- (BOOL) - [uhfStopAutoRead:](#)
- (BOOL) - [rfInit:error:](#)  
*Initializes and powers on the RF card reader module.*
- (BOOL) - [rfInit:fieldGain:error:](#)  
*Initializes and powers on the RF card reader module.*
- (BOOL) - [rfInitWithPreferredReader:supportedCards:fieldGain:sleepTimeout:error:](#)  
*Initializes and powers on the RF card reader module.*
- (BOOL) - [rfClose:](#)  
*Powers down RF card reader module.*
- (BOOL) - [rfFieldControlOnChannel:enabled:error:](#)  
*Allows enabling/disabling the field with specific card type settings.*
- (BOOL) - [rfRemoveCard:error:](#)

Call this function once you are done with the card, a delegate call `rfCardRemoved` will be called when the card leaves the RF field and new card is ready to be detected.

- (DTRFCardInfo \*) - `rfDetectCardOnChannel:additionalData:error:`  
*Call this function to manually detect a card on specific channel.*
- (DTRFCardInfo \*) - `rfDetectCardOnChannel:additionalData:timeout:error:`  
*Call this function to manually detect a card on specific channel.*
- (BOOL) - `rfSetCustomSettings:settings:error:`  
*Call this function to alter specific settings of the supported chips.*
- (NSData \*) - `rfReadPaymentCardTracks:tagList:error:`  
*Call this function to read a payment card via the RF channel.*
- (BOOL) - `mfAuthByKey:type:address:key:error:`  
*Authenticate mifare card block with direct key data.*
- (BOOL) - `mfStoreKeyIndex:type:key:error:`  
*Store key in the internal module memory for later use.*
- (BOOL) - `mfAuthByStoredKey:type:address:keyIndex:error:`  
*Authenticate mifare card block with previously stored key.*
- (NSData \*) - `mfRead:address:length:error:`  
*Reads one more more blocks of data from Mifare Classic/Ultralight cards.*
- (int) - `mfWrite:address:data:error:`  
*Writes one more more blocks of data to Mifare Classic/Ultralight cards.*
- (BOOL) - `mfWrite:address:data:bytesWritten:error:`  
*Swift version: Writes one more more blocks of data to Mifare Classic/Ultralight cards.*
- (BOOL) - `mfUlcSetKey:key:error:`  
*Sets the 3DES key of Mifare Ultralight C cards.*
- (BOOL) - `mfUlcAuthByKey:key:error:`  
*Performs 3DES authentication of Mifare Ultralight C card using the given key.*
- (NSData \*) - `iso15693Read:startBlock:length:error:`  
*Reads one more more blocks of data from ISO 15693 card.*
- (int) - `iso15693Write:startBlock:data:error:`  
*Writes one more more blocks of data to ISO 15693 card.*
- (BOOL) - `iso15693Write:startBlock:data:bytesWritten:error:`  
*Swift version: Writes one more more blocks of data to ISO 15693 card.*
- (NSData \*) - `iso15693GetBlocksSecurityStatus:startBlock:nBlocks:error:`  
*Reads the security status of one more more blocks from ISO 15693 card.*
- (BOOL) - `iso15693LockBlock:block:error:`  
*Locks a single ISO 15693 card block.*
- (BOOL) - `iso15693WriteAFI:afi:error:`  
*Changes ISO 15693 card AFI.*
- (BOOL) - `iso15693LockAFI:error:`  
*Locks ISO 15693 AFI preventing further changes.*
- (BOOL) - `iso15693WriteDSFID:dsfid:error:`  
*Changes ISO 15693 card DSFID.*
- (BOOL) - `iso15693LockDSFID:error:`  
*Locks ISO 15693 card DSFID preventing further changes.*
- (NSData \*) - `iso14GetATS:error:`  
*Initializes ISO1443B card and returns Answer To Select.*
- (NSData \*) - `iso14APDU:cla:ins:p1:p2:data:apduResult:error:`  
*Executes APDU command on ISO1443B compatible card.*
- (NSData \*) - `iso14APDU:cla:ins:p1:p2:data:apduResult:maxOutLength:error:`  
*Executes APDU command on ISO1443B compatible card.*
- (NSData \*) - `iso14Transceive:data:error:`

- Executes APDU command on ISO1443 compatible card.*

  - (NSData \*) - [iso14Transceive:data:status:error:](#)

*Executes APDU command on ISO1443 compatible card.*
- (BOOL) - [iso14Halt:error:](#)

*Halts connected ISO1443 card.*
- (BOOL) - [felicaSetPollingParamsRequestCode:systemCode:timeSlot:detectionTimeMS:intervalTimeMS:error:](#)

*Sets polling parameters of FeliCa card.*
- (NSData \*) - [felicaSendCommand:command:data:error:](#)

*Executes a raw command on FeliCa card.*
- (NSData \*) - [felicaTransieve:data:error:](#)

*Sends raw data to FeliCa card and returns the response.*
- (NSData \*) - [felicaRead:serviceCode:startBlock:length:error:](#)

*Reads one more more blocks of data from FeliCa card.*
- (int) - [felicaWrite:serviceCode:startBlock:data:error:](#)

*Writes one more more blocks of data to FeliCa card.*
- (BOOL) - [felicaWrite:serviceCode:startBlock:data:bytesWritten:error:](#)

*Swift version: Writes one more more blocks of data to FeliCa card.*
- (BOOL) - [felicaSmartTagGetBatteryStatus:status:error:](#)

*Returns FeliCa SmartTag battery status.*
- (BOOL) - [felicaSmartTagClearScreen:error:](#)

*Clears the screen of FeliCa SmartTag.*
- (BOOL) - [felicaSmartTagDrawImage:image:topLeftX:topLeftY:drawMode:layout:error:](#)

*Draws image on FeliCa SmartTag's screen.*
- (BOOL) - [felicaSmartTagSaveLayout:layout:error:](#)

*Saves the current display as layout number.*
- (BOOL) - [felicaSmartTagDisplayLayout:layout:error:](#)

*Displays previously stored layout.*
- (int) - [felicaSmartTagWrite:address:data:error:](#)

*Writes data in FeliCa SmartTag.*
- (BOOL) - [felicaSmartTagWrite:address:data:bytesWritten:error:](#)

*Swift version: Writes data in FeliCa SmartTag.*
- (NSData \*) - [felicaSmartTagRead:address:length:error:](#)

*Writes data in FeliCa SmartTag.*
- (BOOL) - [felicaSmartTagWaitCompletion:error:](#)

*Waits for FeliCa SmartTag to complete current operation.*
- (NSData \*) - [stSRIRead:address:length:error:](#)

*Reads one more more blocks of data from ST SRI card.*
- (int) - [stSRIWrite:address:data:error:](#)

*Writes one more more blocks of data to ST SRI card.*
- (BOOL) - [stSRIWrite:address:data:bytesWritten:error:](#)

*Writes one more more blocks of data to ST SRI card.*
- (NSData \*) - [dfAESAuthByFixedKey:key:keyIndex:error:](#)

*Performs desfire three step AES128 authentication with a key and returns session key as a result.*
- (BOOL) - [df3DESAuthByFixedKey:key:keyIndex:error:](#)

*Performs desfire three step 3DES authentication with a direct key.*
- (BOOL) - [dfCreateFile:fileID:type:permissions:size:isoID:error:](#)

*Creates file in desfire card, refer to desfire documentation for te parameters.*
- (BOOL) - [dfWriteFile:fileID:data:error:](#)

*Writes data to a desfire file, an application needs to be selected.*
- (NSData \*) - [dfReadFile:fileID:length:error:](#)

- Reads data from a desfire file, an application needs to be selected.*
- (BOOL) - [dfSelectApplication:app:error:](#)  
*Selects desfire application.*
- (NSString \*) - [hidReadPACSKeyboardWedge:error:](#)  
*HID RF Module: Extracts PACS bits from the card in the field using the loaded keyboard wedge configuration.*
- (NSData \*) - [hidExecuteAPDU:apdu:error:](#)  
*HID RF Module: Executes custom APDU command.*
- (BOOL) - [hidUpdateConfig:error:](#)  
*HID RF Module: Loads configuration file into the module.*
- (BOOL) - [hidUpdateMainFirmware:error:](#)  
*HID RF Module: Updates main firmware, can take up to 10 minutes, do NOT interrupt the procedure!*
- (BOOL) - [hidUpdateSAMFirmware:apdu:error:](#)
- (NSData \*) - [hidGetVersionInfo:](#)
- (NSData \*) - [hidGetSerialNumber:](#)
- (NSData \*) - [hidGetContentElement:pin:rootSoOID:error:](#)
- (BOOL) - [sclnit:error:](#)  
*Initializes SmartCard module.*
- (NSData \*) - [scCardPowerOn:error:](#)  
*Powers on the SmartCard, resets it and returns ATR (Answer To Reset).*
- (BOOL) - [scCardPowerOff:error:](#)  
*Powers off SmartCard, call this function when you are done with the card.*
- (BOOL) - [sclsCardPresent:error:](#)  
*Manually checks if there is a card in the reader.*
- (NSData \*) - [scCAPDU:apdu:error:](#)  
*Performs APDU command in the card.*
- (NSData \*) - [scEncryptedCAPDU:encryption:keyID:apdu:error:](#)  
*Performs APDU command in the card and returns response encrypted.*
- (BOOL) - [scClose:error:](#)  
*Shuts down SmartCard module.*
- (BOOL) - [ppadPINEntry:startY:timeout:echoChar:message:error:](#)  
*Initiates synchronous PIN entry procedure.*
- (BOOL) - [ppadPINEntry:startY:timeout:echoChar:message:font:error:](#)
- (BOOL) - [ppadStartPINEntry:startY:timeout:echoChar:message:error:](#)  
*Initiates asynchronous PIN entry procedure.*
- (BOOL) - [ppadStartPINEntry:startY:timeout:echoChar:minPin:maxPin:message:font:error:](#)
- (BOOL) - [ppadCancelPINEntry:](#)  
*Tries to cancel asynchronous PIN entry procedure.*
- (BOOL) - [ppadMagneticCardEntry:timeout:error:](#)  
*Initiates synchronous magnetic card entry procedure.*
- (NSData \*) - [ppadGetPINBlockUsingFixedKey:keyVariant:pinFormat:error:](#)  
*Gets encrypted pin data using pre-loaded 3DES key  
The returned data consists of:*
- (NSData \*) - [ppadGetPINBlockUsingDUKPT:keyVariant:pinFormat:error:](#)  
*Gets encrypted pin data using DUKPT.*
- (NSData \*) - [ppadGetPINBlockUsingMasterSession:fixedKeyID:pinFormat:error:](#)  
*Gets encrypted pin data using pre-loaded 3DES key via master/session key way.*
- (BOOL) - [ppadVerifyPINOffline:cardStatus:error:](#)  
*Offline PIN verification.*
- (NSData \*) - [ppadVerifyPINOfflinePlainAndEncryptResponse:keyID:error:](#)  
*Offline plain PIN verification and returns the response encrypted.*
- (NSData \*) - [ppadVerifyPINOfflineEncryptedAndEncryptResponse:keyID:error:](#)

- Offline encrypted PIN verification and returns the response encrypted.*
- (DTKeyInfo \*) - [ppadGetKeyInfo:error:](#)  
*Gets information about some of the keys loaded in the pinpad.*
- (NSArray< DTKeyInfo \* > \*) - [ppadGetKeysInfo:](#)  
*Gets information about the keys loaded in the pinpad.*
- (NSData \*) - [ppadGetDUKPTKeyKSN:error:](#)  
*Generates next dukpt key and increment the counter in the KSN by 1.*
- (NSData \*) - [ppadCryptoExchangeKeyID:kekID:usage:version:data:cbc:error:](#)  
*Loads/changes 3DES key into the pinpad.*
- (NSData \*) - [ppadCryptoTR31ExchangeKeyID:kekID:tr31:error:](#)  
*Loads/changes 3DES key into the pinpad.*
- (NSData \*) - [ppadCrypto3DESGeneratePANMACWithKeyID:error:](#)  
*Generates HMAC256 of a last card's PAN and returns it.*
- (NSData \*) - [ppadCrypto3DESECBEncryptKeyID:inData:error:](#)  
*Encrypts a data on the pinpad using 3DES ECB.*
- (NSData \*) - [ppadCrypto3DESECBDecryptKeyID:inData:error:](#)  
*Decrypts a data on the pinpad using 3DES ECB.*
- (NSData \*) - [ppadCrypto3DESCBCEncryptKeyID:initVector:inData:error:](#)  
*Encrypts a data on the pinpad using 3DES CBC.*
- (NSData \*) - [ppadCrypto3DESCBCDecryptKeyID:initVector:inData:error:](#)  
*Decrypts a data on the pinpad using 3DES CBC.*
- (NSData \*) - [ppadCrypto3DESCBCMACWithMode:keyID:initVector:keyVariant:inData:error:](#)  
*Generate 3DES CBC MAC.*
- (NSData \*) - [ppadCryptoDUKPTMACWithMode:initVector:keyVariant:inData:error:](#)  
*Generate DUKPT CBC MAC using last generated dukpt key.*
- (BOOL) - [ppadCryptoDelete3DESKeyID:error:](#)  
*Deletes already loaded 3DES key.*
- (NSData \*) - [ppadCryptoDUKPTGenerateKeyWithID:error:](#)  
*Generates new DUKPT key and returns the KSN.*
- (BOOL) - [ppadCryptoDUKPTCopyGeneratedKeyToID:keyVariant:error:](#)  
*Generates new DUKPT key and returns the KSN.*
- (BOOL) - [ppadSetButtonCaption:caption:error:](#)  
*Sets the text that is drawn above functional buttons in MPED400.*
- (DTPinpadInfo \*) - [ppadGetSystemInfo:](#)  
*Returns pinpad specific information.*
- (BOOL) - [ppadKeyboardControl:error:](#)  
*Captures or releases keyboard.*
- (BOOL) - [ppadReadKey:error:](#)  
*Reads key from the pinpad.*
- (BOOL) - [ppadEnableStatusLine:error:](#)  
*Enables or disables the status line (showing clock and battery)*
- (NSData \*) - [ppadCustomCommand:data:timeout:error:](#)  
*Executes custom command on a connected pinpad.*
- (BOOL) - [ppadEnableDebug:modules:error:](#)
- (BOOL) - [caImportKeyNumber:RID:module:exponent:error:](#)  
*Import CA key.*
- (BOOL) - [caWriteKeysToFlash:](#)  
*Writes CA keys to flash.*
- (NSArray< DTCAKeyInfo \* > \*) - [caGetKeysData:](#)  
*Returns keys data.*
- (NSData \*) - [calImportIssuerKeyNumber:exponent:remainder:certificate:error:](#)



- Import issuer key.*

  - (NSData \*) - [caImportICCKeyType:exponent:remainder:certificate:error:](#)

*Import ICC key.*
- (NSData \*) - [caRSAVerify:inData:error:](#)

*RSA verify.*
- (BOOL) - [emv2Initialise:](#)

*This command initializes the emv kernel, call it before calling any other EMV function.*
- (BOOL) - [emv2Deinitialise:](#)

*This command deinitializes the emv kernel and frees the allocated resources, call it after you are done with the EMV transaction.*
- (BOOL) - [emv2EnableDebug:error:](#)
- (BOOL) - [emv2GoogleVASLoadECCPrivateKeyAtSlot:keyDataInPEM:version:error:](#)

*Loads the required ECC private key for secure Google VAS transactions.*
- (BOOL) - [emv2GoogleVASLoadECCPrivateKeyAtSlot:keyData:version:error:](#)

*Loads the required ECC private key for secure Google VAS transactions.*
- (BOOL) - [emv2GoogleVASGetECCPrivateKeyVersionAtSlot:version:error:](#)

*Reads the currently loaded ECC private key version at specified slot.*
- (BOOL) - [emv2GoogleVASSetActiveECCPrivateKeyAtSlot:error:](#)

*Sets which key to be active for Google VAS transactions.*
- (BOOL) - [emv2GoogleVASSetCollectorID:error:](#)

*Sets merchant collector ID (assigned by Google) to be used in Google VAS transactions.*
- (BOOL) - [emv2SetCardEmulationMode:encryption:keyID:error:](#)

*Activates magnetic card emulation mode for the EMV.*
- (BOOL) - [emv2LoadContactlessConfiguration:error:](#)

*Loads EMV kernel contactless configuration data.*
- (BOOL) - [emv2LoadContactlessConfiguration:configurationIndex:error:](#)

*Loads EMV kernel contactless configuration data.*
- (NSData \*) - [emv2CreatePANConfiguration:error:](#)

*Process existing configuration data and alters/adds/removes some tags to always deny the transaction after the first cryptogram, but return the track/pan data.*
- (BOOL) - [emv2LoadContactConfiguration:error:](#)

*Loads EMV kernel contact/chip configuration data.*
- (BOOL) - [emv2LoadContactConfiguration:configurationIndex:error:](#)

*Loads EMV kernel contact/chip configuration data.*
- (BOOL) - [emv2LoadContactlessCAPK:error:](#)

*Loads EMV kernel contactless Certification Authority Public Keys.*
- (BOOL) - [emv2LoadContactCAPK:error:](#)

*Loads EMV kernel contact/chip Certification Authority Public Keys.*
- (BOOL) - [emv2LoadGenericConfiguration:error:](#)

*Loads EMV kernel generic configuration data, currently used for messages.*
- (BOOL) - [emv2ClearConfigurations:](#)

*Removes all loaded EMV configurations.*
- (DTEMV2Info \*) - [emv2GetInfo:](#)

*Returns information about loaded configuration.*
- (BOOL) - [emv2SetTransactionType:amount:currencyCode:error:](#)

*Sets EMV transaction parameters, this function must be called before starting EMV transaction.*
- (BOOL) - [emv2StartTransactionOnInterface:flags:initData:timeout:error:](#)

*Starts EMV transaction.*
- (BOOL) - [emv2StartTransactionOnInterface:flags:initData:usingConfiguration:timeout:error:](#)

*Starts EMV transaction.*
- (BOOL) - [emv2StartTransactionWithFlags:initData:error:](#)



- Starts EMV transaction.*

  - (BOOL) - [emv2SetOnlineResult:error:](#)  
*Responds to the EMV kernel after an online request was sent to the card and the communication with the financial institution is complete.*
  - (BOOL) - [emv2SelectApplication:error:](#)  
*Selects application to be used by EMV kernel.*
  - (BOOL) - [emv2ShowApplicationList:error:](#)  
*Given the list of applications presented in application selection, rearrange, filter and then use this function to show the final list for the customer to chose from.*
  - (BOOL) - [emv2CancelTransaction:](#)  
*Cancels an active EMV operation and clears all data.*
  - (NSData \*) - [emv2GetCardTracksEncryptedWithFormat:keyID:error:](#)  
*After transaction is finished, you can get the card data in magnetic-stripe format by using one of the available Encrypted Head formats.*
  - (NSData \*) - [emv2GetCardTracksEncryptedWithFormat:keyID:additionalData:error:](#)  
*After transaction is finished, you can get the card data in magnetic-stripe format by using one of the available Encrypted Head formats.*
  - (NSData \*) - [emv2GetTagsEncrypted:format:keyType:keyIndex:packetID:error:](#)  
*At online processing or transaction complete phase, you can get the tags, encrypted and in a specified format.*
  - (NSData \*) - [emv2GetTagsPlain:error:](#)  
*After transaction is finished, you can get the tags in plain.*
  - (BOOL) - [emv2SetPINOptions:error:](#)  
*Sets various options fort the pin entry portion of the EMV transaction.*
  - (BOOL) - [emv2SetPINOptions:forInterface:error:](#)  
*Sets various options fort the pin entry portion of the EMV transaction.*
  - (BOOL) - [emv2SetOnCardReadOptions:sendEventType:keyID:error:](#)  
*Controls what to happen when EMV transaction reaches the phase to read card data.*
  - (BOOL) - [emv2SetManualEntryOptionsEnableCVV:enableExpiration:error:](#)  
*Sets various options to be used for manual card entry part of the transaction.*
  - (BOOL) - [emv2SetMessageForID:font:message:error:](#)  
*Allows temporal changing of the messages used in the universal EMV engine.*
  - (BOOL) - [emv2SetMessageSoundForID:sound:error:](#)  
*Allows temporal changing of the message sound used in the universal EMV engine.*
  - (BOOL) - [emv2StartMagneticEmulationTransactionOnInterface:initData:timeout:error:](#)  
*Performs complete EMV transaction but returns magnetic card data as if card was swiped.*
  - (BOOL) - [emv2StartMagneticEmulationTransactionOnInterface:initData:usingConfiguration:timeout:error:](#)  
*Performs complete EMV transaction but returns magnetic card data as if card was swiped.*
  - (NSData \*) - [emv2CustomCommand:data:error:](#)  
*Allows sending custom EMV2 command to the device.*
  - (BOOL) - [emv2EnterTipWithAmount:defaultTip:timeout:currencyCode:error:](#)  
*Starts enter tip procedure and notifies about the result via `emv2TipEntryCompleatWithAmount` or `emv2TipEntryFailedWithError` notification.*
  - (BOOL) - [emv2EnterTipCancel:](#)  
*Cancels running tip entry and sends `emv2TipEntryFailedWithError` notification.*
  - (BOOL) - [emvInitialise:](#)  
*This command initializes the emv kernel, call it before calling any other EMV function.*
  - (BOOL) - [emvDeinitialise:](#)  
*This command deinitializes the emv kernel and frees the allocated resources, call it after you are done with the EMV transaction.*
  - (BOOL) - [emvATRValidation:warmReset:error:](#)  
*The command is in charge of validating the ATR sequence got from the card to ensure that is fully EMV compliant and that obeys the rules stated in the specification.*

- (BOOL) - [emvLoadAppList:selectionMethod:includeBlockedAIDs:error:](#)  
*The command initiates the application selection process, loading the application list supported by the terminal.*
- (NSArray< [DTEMVApplication](#) \* > \*) - [emvGetCommonAppList:error:](#)  
*The command gets back the list of common applications supported by the terminal and the card, actually this commands will end or resume the selection procedure.*
- (BOOL) - [emvInitialAppProcessing:error:](#)  
*Once an application has been selected, the next phase is to start the transaction with it by issuing the GET PROCESSING command and analyzing the information got.*
- (BOOL) - [emvReadAppData:error:](#)  
*The command reads and validates the data informed in the AFL and that will be used along the transaction.*
- (BOOL) - [emvAuthentication:error:](#)  
*Through this command the card data is authenticated depending on the capabilities of the card and the kernel.*
- (BOOL) - [emvProcessRestrictions:](#)  
*The command performs the restrictions processing related to application version, application usage control and effective and expiry dates.*
- (BOOL) - [emvTerminalRisk:error:](#)  
*The application risk control is done by this command, including Floorlimit checking, Random selection (only if offline is enabled) and Velocity checking.*
- (BOOL) - [emvGetAuthenticationMethod:](#)  
*The command starts or resumes the cardholder authentication procedure, the current verification method is communicated to the application.*
- (BOOL) - [emvSetAuthenticationResult:error:](#)  
*Using this command the kernel gets the result of the previously informed verification method.*
- (BOOL) - [emvVerifyPinOffline:](#)  
*The command allows the application to apply the offline PIN verification (plaintext or encrypted) method.*
- (BOOL) - [emvGenerateCertificate:risk:error:](#)  
*Using this command the application will be able to generate an application cryptogram, the first or the second one, as required by the transaction.*
- (BOOL) - [emvMakeTransactionDecision:](#)  
*The command checks the action codes (provided by the application and read from the card), the TVR and will determine how the transaction is resolved.*
- (BOOL) - [emvMakeDefaultDecision:](#)  
*The command checks the default action code (provided by the application and read from the card), the TVR and will determine how the transaction is resolved by default.*
- (BOOL) - [emvAuthenticateIssuer:](#)  
*The command is used to validate the cryptogram got from the issuer.*
- (BOOL) - [emvScriptProcessing:error:](#)  
*The script processing retrieved in the online authorization is handled by this command.*
- (BOOL) - [emvUpdateTVRByte:bit:value:error:](#)  
*The command allows modifying the TVR directly, setting or unsetting the desired bits.*
- (BOOL) - [emvUpdateTSIByte:bit:value:error:](#)  
*The command allows modifying the TSI directly, setting or unsetting the desired bits.*
- (BOOL) - [emvCheckTVRByte:bit:error:](#)  
*The command is intended to verify an individual bit within the TVR.*
- (BOOL) - [emvCheckTSIByte:bit:error:](#)  
*The command is intended to verify an individual bit within the TSI.*
- (BOOL) - [emvRemovePublicKey:RID:error:](#)  
*The command is intended to delete a given CA public key.*
- (BOOL) - [emvSetDataAsBinary:data:error:](#)  
*The command sets a data item with data in binary format (raw data).*
- (BOOL) - [emvSetDataAsString:data:error:](#)  
*The command sets a data item with data in string format.*

- (NSData \*) - [emvGetDataAsBinary:error:](#)  
*The command gets a data item in binary format (raw data).*
- (NSString \*) - [emvGetDataAsString:error:](#)  
*The command gets a data item in string format.*
- (BOOL) - [emvGetDataDetails:tagType:maxLength:currentLen:error:](#)  
*The command allows the application direct access to the data of a given item.*
- (BOOL) - [emvSetBypassMode:error:](#)  
*With this command is possible to setup the behavior of the KERNEL regarding the PIN based method bypass, so that only the current method will be bypassed or any other found later in the CVM list will be considered so as well.*
- (BOOL) - [emvSetTags:error:](#)  
*Loads multiple tags at the same time, this is much faster than calling them 1 by 1.*
- (NSData \*) - [emvGetTags:error:](#)  
*Reads multiple tags at the same time, this is much faster than calling them 1 by 1.*
- (NSData \*) - [emvGetTagsEncrypted3DES:keyID:uniqueID:error:](#)  
*Reads multiple tags at the same time and sends them encrypted, this is much faster than calling them 1 by 1.*
- (NSData \*) - [emvGetTagsEncryptedDUKPT:keyID:uniqueID:error:](#)  
*Reads multiple tags at the same time and sends them encrypted, this is much faster than calling them 1 by 1.*
- (BOOL) - [uiGetScreenInfoWidth:height:colorMode:error:](#)  
*Returns screen properties.*
- (BOOL) - [uiDrawText:topLeftX:topLeftY:font:error:](#)  
*Display some text, starting at a specified position.*
- (int) - [uiDisplayMenu:choices:font:timeout:error:](#)  
*Display a menu with choices.*
- (BOOL) - [uiCancelMenu:](#)  
*Cancels running menu.*
- (NSString \*) - [uiDisplayDataPromptWithID:language:maxLength:initialValue:font:timeout:error:](#)  
*Display data prompt from predefined prompt ID.*
- (BOOL) - [uiCancelDataPrompt:](#)  
*Cancels running data prompt.*
- (BOOL) - [uiFillRectangle:topLeftY:width:height:color:error:](#)  
*Fills rectangle on the screen with specified color.*
- (BOOL) - [uiSetContrast:error:](#)  
*Set display contrast.*
- (BOOL) - [uiPutPixel:y:color:error:](#)  
*Draws pixel on the screen with specified color.*
- (BOOL) - [uiDisplayImage:topLeftY:image:error:](#)  
*Displays image on the screen.*
- (BOOL) - [uiStartAnimation:topLeftX:topLeftY:animated:error:](#)  
*Draws predefined animation on the screen.*
- (BOOL) - [uiStopAnimation:error:](#)  
*Stops animation playback started with ppUiStartAnimation.*
- (BOOL) - [uiControlLEDsWithBitMask:error:](#)  
*Enables or disables controllable LEDs on the device based on bit mask.*
- (BOOL) - [uiControlLEDsEx:numLeds:error:](#)  
*Controls the pinpad's leds.*
- (BOOL) - [uiEnableVibrationForTime:error:](#)  
*Activates vibration motor (if available) for a specific time.*
- (BOOL) - [uiEnableSpeaker:error:](#)  
*Enables or disables external speaker.*
- (BOOL) - [uiIsSpeakerEnabled:error:](#)  
*Returns the state of external speaker.*

- (BOOL) - [uiEnableSpeakerButton:error:](#)  
*Enables or disables external speaker button switch.*
- (BOOL) - [uiIsSpeakerButtonEnabled:error:](#)  
*Returns if external speaker control button is enabled.*
- (BOOL) - [uiEnableSpeakerAutoControl:error:](#)  
*Enables or disables external speaker automatic control.*
- (BOOL) - [uiIsSpeakerAutoControlEnabled:error:](#)  
*Returns if external speaker automatic control is enabled.*
- (BOOL) - [uiLoadLogo:align:error:](#)  
*Loads logo into device's memory.*
- (BOOL) - [uiShowInitScreen:](#)  
*Shows the init screen with logo, same as when you turn on the pinpad.*
- (BOOL) - [uiEnablePowerButton:error:](#)  
*Enables or disables the power button.*
- (BOOL) - [uiEnableCancelButton:error:](#)  
*Enables or disables the cancel button during various operations like enter pin or EMV transaction.*
- (BOOL) - [uiGetSettingsMenuMode:error:](#)  
*Gets how hardware settings menu button operates.*
- (BOOL) - [uiSetSettingsMenuMode:error:](#)  
*Sets how hardware settings menu button operates.*
- (BOOL) - [uiGetSettingsGlobalVolume:error:](#)  
*Returns the current global device volume in percents.*
- (BOOL) - [uiSetSettingsGlobalVolume:error:](#)  
*Sets the global device volume in percents.*
- (BOOL) - [uiGetSettingsBacklightEnabled:error:](#)  
*Gets current default backlight mode.*
- (BOOL) - [uiSetSettingsBacklightEnabled:error:](#)  
*Sets current default backlight mode.*
- (BOOL) - [uiGetSettingsInvertDisplay:error:](#)  
*Gets current default display color invert mode.*
- (BOOL) - [uiSetSettingsInvertDisplay:error:](#)  
*Sets current default display color inversion mode.*
- (BOOL) - [prnSetGenericPrinterSettingsPageWidth:feedLines:error:](#)  
*Configures some settings needed by the sdk to operate with unknown ESC/POS printer.*
- (DTPrinterInfo \*) - [prnGetPrinterInfo:](#)  
*Returns information about the connected printer.*
- (BOOL) - [prnFlushCache:](#)  
*Forces data still in the sdk buffers to be sent directly to the printer.*
- (BOOL) - [prnWriteDataToChannel:data:error:](#)  
*Sends data to the connected printer no matter the connection type.*
- (NSData \*) - [prnReadDataFromChannel:length:timeout:error:](#)  
*Tries to read data from the connected remote device for specified timeout.*
- (NSData \*) - [prnReadDataFromChannel:length:stopByte:timeout:error:](#)  
*Tries to read data from the connected remote device for specified timeout and until specified byte is received.*
- (BOOL) - [prnWaitPrintJob:error:](#)  
*Waits specified timeout for the printout to complete.*
- (BOOL) - [prnWaitPrintJob:failOnNoPaper:failOnOverheat:failOnLowBattery:error:](#)  
*Waits specified timeout for the printout to complete.*
- (BOOL) - [prnGetPrinterStatus:error:](#)  
*Retrieves current printer status.*
- (BOOL) - [prnSelfTest:error:](#)

- Prints selftest.*
- (BOOL) - [prnTurnOff:](#)  
*Forces printer to turn off.*
- (BOOL) - [prnFeedPaper:error:](#)  
*Feeds the paper X lines (1/203 of the inch) or as needed (different length based on the printer model) so it allows paper to be teared.*
- (BOOL) - [prnFeedPaperTemporary:error:](#)
- (BOOL) - [prnRetractPaper:](#)
- (BOOL) - [prnPrintBarcode:barcode:error:](#)  
*Prints barcode.*
- (BOOL) - [prnPrintBarcodePDF417:truncated:autoEncoding:eccl:size:error:](#)  
*Prints PDF-417 barcode.*
- (BOOL) - [prnPrintBarcodeQRCode:eccl:size:error:](#)  
*Prints QR CODE barcode.*
- (BOOL) - [prnPrintLogo:error:](#)  
*Prints the stored logo.*
- (BOOL) - [prnSetBarcodeSettings:height:hriPosition:align:error:](#)  
*Set various barcode parameters.*
- (BOOL) - [prnSetBarcodeSettings:height:hriPosition:hriFont:align:error:](#)  
*Set various barcode parameters.*
- (BOOL) - [prnSetDensity:error:](#)  
*Sets printer density level.*
- (BOOL) - [prnSetLineSpace:error:](#)  
*Sets the line "height" in pixels If the characters are 16 pixelx high for example, setting the linespace to 20 will make the printer leave 4 blank lines before next line of text starts.*
- (BOOL) - [prnSetLeftMargin:error:](#)  
*Sets left margin.*
- (BOOL) - [prnPrintText:usingEncoding:error:](#)  
*Prints text with specified font/styles.*
- (BOOL) - [prnPrintText:error:](#)  
*Prints text with specified font/styles.*
- (BOOL) - [prnSetCodepage:error:](#)  
*Changes active code page if possible.*
- (BOOL) - [prnPrintDelimiter:error:](#)  
*Prints the delimiter character at the whole width of the paper, adjusting itself to the paper width.*
- (BOOL) - [prnGetBlackMarkTreshold:error:](#)  
*Returns blackmark sensor treshold or UnsupportedOperationException if printer is not in blackmark mode.*
- (BOOL) - [prnSetBlackMarkTreshold:error:](#)  
*Sets blackmark sensor treshold or UnsupportedOperationException if printer is not in blackmark mode.*
- (BOOL) - [prnCalibrateBlackMark:error:](#)  
*Provides blackmark sensor calibration by scanning 200mm of paper for possible black marks and adjust the sensor treshold.*
- (BOOL) - [prnPrintImage:align:error:](#)  
*Prints Bitmap object using specified alignment.*
- (int) - [prnGetMaxLabelLength:](#)  
*Returns max label length or 0 if unsupported.*
- (BOOL) - [prnSetMaxLabelLength:error:](#)  
*Can set max label length in MM on printers that support it.*
- (BOOL) - [prnStartTransaction:](#)
- (BOOL) - [prnEndTransaction:](#)
- (BOOL) - [pagelsSupported](#)  
*Returns TRUE if page mode is supported on the connected device.*

- (BOOL) - [pageSetCoordinatesTranslation:error:](#)  
*Enables or disables coordinate translation.*
- (BOOL) - [pageSetLabelHeight:error:](#)  
*Sets virtual page mode label height.*
- (BOOL) - [pageStart:](#)  
*Creates a new virtual page using the maximum supported page height.*
- (BOOL) - [pagePrint:](#)  
*Prints the content of the virtual page.*
- (BOOL) - [pageEnd:](#)  
*Exits page mode.*
- (BOOL) - [pageSetWorkingArea:top:width:height:error:](#)  
*Sets a working area and orientation inside the virtual page.*
- (BOOL) - [pageSetWorkingArea:top:width:height:orientation:error:](#)  
*Sets a working area and orientation inside the virtual page.*
- (BOOL) - [pageFillRectangle:error:](#)  
*Fills the current working area (or whole page if none is set) with the specified color.*
- (BOOL) - [pageFillRectangle:top:width:height:color:error:](#)  
*Fills a rectangle inside the current working area with specified color.*
- (BOOL) - [pageRectangleFrame:top:width:height:framewidth:color:error:](#)  
*Draws a rectangle frame inside the current working area with specified color.*
- (BOOL) - [pageSetRelativePositionLeft:top:error:](#)  
*Sets the cursor position relative to the start of the page working area.*
- (BOOL) - [tablesSupported](#)  
*Checks if the currently connected printer supports tables.*
- (BOOL) - [tableCreate:error:](#)  
*Create a new table using custom flags.*
- (BOOL) - [tableCreate:](#)  
*Create a new table using default settings - both horizontal and vertical borders around it.*
- (BOOL) - [tableAddColumn:](#)  
*Adds a new column using default settings - 12x24 font, plain, vertical border between the cells, left aligning.*
- (BOOL) - [tableAddColumn:error:](#)  
*Adds a new column using default settings - plain text, vertical border between the cells, left aligning.*
- (BOOL) - [tableAddColumn:style:alignment:error:](#)  
*Adds a new column using custom font and vertical border between the cells.*
- (BOOL) - [tableAddColumn:style:alignment:flags:error:](#)  
*Adds a new column.*
- (BOOL) - [tableAddCell:error:](#)  
*Adds a new cell using the font size and style and aligning of the column that cell belongs to.*
- (BOOL) - [tableAddCell:font:error:](#)  
*Adds a new cell using the font style and aligning of the column that cell belongs to.*
- (BOOL) - [tableAddCell:font:style:error:](#)  
*Adds a new cell using custom font size and style and aligning of the column that cell belongs to.*
- (BOOL) - [tableAddCell:font:style:alignment:error:](#)  
*Adds a new cell using custom font size and style and aligning.*
- (BOOL) - [tableAddDelimiter:](#)  
*Adds a horizontal black line to the entire row that separates it from the next.*
- (BOOL) - [tableSetRowHeight:error:](#)  
*Sets the row height that will be used by default for new cells added.*
- (BOOL) - [tablePrint:](#)  
*Prints current table or returns FALSE if cell data cannot be fit into paper.*
- (iHUBDevice \*) - [iHUBGetDeviceFormPort:error:](#)

- (NSArray< iHUBPortInfo \* > \*) - iHUBGetPortsInfo:  
*Returns information about available ports on iHUB.*
- (BOOL) - iHUBSetPortConfig:forPort:error:  
*Reads configuration of the specific port.*
- (BOOL) - iHUBSetPortConfig:forPort:recreateConnection:error:  
*Reads configuration of the specific port.*
- (BOOL) - iHUBSetUSBCharge:forPort:error:  
*Enables/disables some of the usb ports to act like charging station only.*
- (BOOL) - iHUBSetAppleChargingCurrent:error:  
*Sets the maximum charging current given to the connected iOS device.*
- (BOOL) - iHUBGetAppleChargingCurrent:error:  
*Returns current maximum charging current given to the connected iOS device.*
- (NSData \*) - pogCommandForSolution:command:data:error:  
*Executes custom command to POG solution in the pinpad.*

## Class Methods

- (id) + sharedDevice  
*Creates and initializes new class instance or returns already initialized one.*

## Public Attributes

- NSString \* kPortConfigNone  
*Empty configuration, use when you want to manually control the device.*
- NSString \* kPortConfigUSBCharge  
*Port is used as charging station only.*
- NSString \* kPortConfigLineaOldUSBSEI  
*Linea 4 and older 30-pin lineas, supported by the universal sdk.*
- NSString \* kPortConfigLineaUSBSEI  
*Linea 5, 6, mini and all lightning connector lineas, supported by the universal sdk.*
- NSString \* kPortConfigLineaUSB  
*Linea with USB port access.*
- NSString \* kPortConfigPinpadUSB  
*All pinpads set as usb device, connected via normal mini-usb cable, supported by the universal sdk.*
- NSString \* kPortConfigPinpadUSBSEI  
*All pinpads, connected via usb-to-serial cable, supported by the universal sdk.*
- NSString \* kPortConfigPrinterESCPOSUSB  
*All esc/pos printers set as usb device, connected via normal usb cable, supported by the universal sdk.*
- NSString \* kPortConfigPrinterESCPOSSerial  
*All esc/pos printers set as RS232 device, connected via serial cable, supported by the universal sdk.*
- NSString \* kPortConfigPrinterFiscalUSB  
*All new fiscal printers (FMP-350 and later) set as usb device, connected via normal usb cable, supported by the fiscal sdk.*
- NSString \* kPortConfigPrinterFiscalOldUSB  
*All old fiscal printers set as usb device, connected via normal usb cable, supported by the fiscal sdk.*
- NSString \* kPortConfigBarcodeHID  
*HID barcode, supported by universal sdk.*
- NSString \* kPortConfigBarcodeUSB  
*USB barcode, providing usb to serial capability, supported by universal sdk.*



- NSString \* [kPortConfigBarcodeSerial](#)  
*Serial port barcode, supported by universal sdk.*
- NSString \* [kPortConfigMSRHID](#)  
*HID magnetic stripe reader, needs to be set up as keyboard emulation, supported by universal sdk.*
- NSString \* [kPortConfigMagtekMSR](#)
- NSString \* [kPortConfigKeyboardHID](#)
- NSString \* [kPortConfigPrinterGenericESCPOSUSB](#)
- NSString \* [kPortConfigPrinterGenericESCPOSSerial](#)

## Properties

- NSInputStream \* [btInputStream](#)  
*Bluetooth input stream, you can use it after connecting with btConnect.*
- NSOutputStream \* [btOutputStream](#)  
*Bluetooth output stream, you can use it after connecting with btConnect.*
- NSArray< NSString \* > \* [btConnectedDevices](#)  
*Contains bluetooth addresses of the currently connected bluetooth devices or empty array if no connected devices are found.*
- NSInputStream \* [btleInputStream](#)  
*BluetoothLE input stream, you can use it after connecting with btleConnectToDeviceAndGetStreams.*
- NSOutputStream \* [btleOutputStream](#)  
*Bluetooth output stream, you can use it after connecting with btleConnectToDeviceAndGetStreams.*
- NSArray< CBPeripheral \* > \* [btleConnectedDevices](#)  
*Contains currently connected bluetooth LE devices or empty array if no connected devices are found.*
- NSArray< NSString \* > \* [tcpConnectedDevices](#)  
*Contains tcp addresses of the currently connected network devices or empty array if no connected devices are found.*
- int [uiDisplayWidth](#)  
*Contains display width in pixels.*
- int [uiDisplayHeight](#)  
*Contains display height in pixels.*
- BOOL [uiDisplayAtBottom](#)  
*Contains display height in pixels.*
- id [delegate](#)  
*Adds delegate to the class.*
- NSArray< id > \* [delegates](#)  
*Provides a list of currently registered delegates.*
- SUPPORTED\_DEVICE\_TYPES [deviceType](#)  
*Returns current connection type.*
- DEVICE\_CONNECTION\_TYPE [connectionType](#)  
*Returns current connection type.*
- int [connstate](#)  
*Returns current connection state.*
- NSString \* [deviceName](#)  
*Returns connected device name.*
- NSString \* [deviceModel](#)  
*Returns connected device model.*
- NSString \* [firmwareRevision](#)  
*Returns connected device firmware version.*
- int [firmwareRevisionNumber](#)  
*Returns connected device firmware version in format MAJOR\*100+MINOR, i.e.*



- NSString \* [hardwareRevision](#)  
*Returns connected device hardware version.*
- NSString \* [serialNumber](#)  
*Returns connected device serial number.*
- int [sdkVersion](#)  
*SDK version number in format MAJOR\*100+MINOR, i.e.*
- NSDate \* [sdkBuildDate](#)  
*SDK build date.*
- short [emvLastStatus](#)  
*EMV last status, one of the EMV\_\* constants.*

### 3.6.1 Detailed Description

Provides universal access to all supported devices' functions.

In order to use one of the supported accessories in your program, several steps have to be performed:

- Include DTDevices.h and libdtdev.a in your project.
- Go to Frameworks and add ExternalAccessory framework
- Edit your program plist file, add new element and select "Supported external accessory protocols" from the list, then add the protocol names of the accessories you want to connect to:  
For Linea series: com.datecs.linea.pro.msr and com.datecs.linea.pro.bar  
For Pinpad: com.datecs.pinpad  
For iHub: com.datecs.iserial.communication  
For ESC/POS printers: com.datecs.printer.escpos

Since this SDK is based on features, the specific device is not that important, for example, if your program relies on barcode scanning, then Linea, Pinpad or the ESC/POS printers can provide that functionality, so you can include all their protocols.

### 3.6.2 Member Enumeration Documentation

#### 3.6.2.1 EMV\_CARD\_READ\_TYPES

– (enum) [EMV\\_CARD\\_READ\\_TYPES](#)

Enumerator

EMV_CARD_READ_TYPE_DISABLED	
EMV_CARD_READ_TYPE_QIBIC	

### 3.6.2.2 EMV\_CL\_CARD\_SCHEME

– (enum) [EMV\\_CL\\_CARD\\_SCHEME](#)

EMV contactless card scheme, found in C5 tag upon transaction completion, first byte.

#### Enumerator

EMV_CL_CARD_SCHEME_VISA_AP	Contactless scheme: Visa AP.
EMV_CL_CARD_SCHEME_PAYPASS	Contactless scheme: Mastercard Paypass.
EMV_CL_CARD_SCHEME_VISA	Contactless scheme: Visa.
EMV_CL_CARD_SCHEME_AMEX	Contactless scheme: American Express.
EMV_CL_CARD_SCHEME_JCB	Contactless scheme: JCB.
EMV_CL_CARD_SCHEME_DISCOVER	Contactless scheme: Discover.

### 3.6.3 Method Documentation

#### 3.6.3.1 emv2CancelTransaction:()

```
– (BOOL) emv2CancelTransaction:
    (NSError **) error
```

Cancels an active EMV operation and clears all data.

Using this function is not required if the emv transaction completed.

#### Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 3.6.3.2 emv2ClearConfigurations:()

```
– (BOOL) emv2ClearConfigurations:
    (NSError **) error
```

Removes all loaded EMV configurations.

## Parameters

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.3 emv2CreatePANConfiguration:error:()**

```
- (NSData *) emv2CreatePANConfiguration:
    (NSData *) configuration
    error:(NSError **) error
```

Process existing configuration data and alters/adds/removes some tags to always deny the transaction after the first cryptogram, but return the track/pan data.

It can be used for refund/void transactions when you don't want to perform the full EMV transaction.

## Parameters

<i>configuration</i>	TLV list of configuration tags.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

processed configuration data if function succeeded, nil otherwise

**3.6.3.4 emv2CustomCommand:data:error:()**

```
- (NSData *) emv2CustomCommand:
    (int) command
    data:(NSData *) data
    error:(NSError **) error
```

Allows sending custom EMV2 command to the device.

## Parameters

<i>command</i>	command code, contact us if you want to use this feature
<i>data</i>	optional command data, contact us if you want to use this feature
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

response data or nil if error occurred

**3.6.3.5 emv2Deinitialise:()**

```
- (BOOL) emv2Deinitialise:
    (NSError **) error
```

This command deinitializes the emv kernel and frees the allocated resources, call it after you are done with the EMV transaction.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

**3.6.3.6 emv2EnableDebug:error:()**

```
- (BOOL) emv2EnableDebug:
    (BOOL) enabled
    error:(NSError **) error
```

**3.6.3.7 emv2EnterTipCancel:()**

```
- (BOOL) emv2EnterTipCancel:
    (NSError **) error
```

Cancels running tip entry and sends emv2TipEntryFailedWithError notification.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

TRUE if function succeeded, FALSE otherwise

### 3.6.3.8 emv2EnterTipWithAmount:defaultTip:timeout:currencyCode:error:()

```
- (BOOL) emv2EnterTipWithAmount:
    (uint32_t) amount
    defaultTip:(uint32_t) defaultTip
    timeout:(NSTimeInterval) timeout
    currencyCode:(uint16_t) currencyCode
    error:(NSError **) error
```

Starts enter tip procedure and notifies about the result via `emv2TipEntryCompletedWithAmount` or `emv2TipEntryFailedWithError` notification.

#### Parameters

<i>amount</i>	transaction amount that will be displayed on the screen
<i>defaultTip</i>	default tip or 0
<i>timeout</i>	tip entry timeout in seconds
<i>currencyCode</i>	currency code from ISO 4217, or 0 to use the default one in the configuration
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

### 3.6.3.9 emv2GetCardTracksEncryptedWithFormat:keyID:additionalData:error:()

```
- (NSData *) emv2GetCardTracksEncryptedWithFormat:
    (int) format
    keyID:(int) keyID
    additionalData:(NSDictionary *) additionalData
    error:(NSError **) error
```

After transaction is finished, you can get the card data in magnetic-stripe format by using one of the available Encrypted Head formats.

#### Parameters

<i>format</i>	encryption algorithm used, one of the ALG_* constants
<i>keyID</i>	key ID, one of KEY_* constants. Passing 0 will use the default key for the specified algorithm
<i>additionalData</i>	a dictionary object containing algorithm specific values. Currently supported: <ul style="list-style-type: none"><li>• "RandomNumber" an NSInteger containing random number, that is going to be sent back in the packet in case of ALG_PPAD_DUKPT encryption format. If not specified, the command will generate one.</li></ul>
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.10 emv2GetCardTracksEncryptedWithFormat:keyID:error:()**

```
- (NSData *) emv2GetCardTracksEncryptedWithFormat:
    (int) format
    keyID:(int) keyID
    error:(NSError **) error
```

After transaction is finished, you can get the card data in magnetic-stripe format by using one of the available Encrypted Head formats.

**Parameters**

<i>format</i>	encryption algorithm used, one of the ALG_* constants
<i>keyID</i>	key ID, one of KEY_* constants. Passing 0 will use the default key for the specified algorithm
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.11 emv2GetInfo:()**

```
- (DTEMV2Info *) emv2GetInfo:
    (NSError **) error
```

Returns information about loaded configuration.

**Parameters**

<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
--------------	--

**Returns**

configuration information or nil if function failed

### 3.6.3.12 emv2GetTagsEncrypted:format:keyType:keyIndex:packetID:error:()

```
- (NSData *) emv2GetTagsEncrypted:
    (NSData *) tagList
    format:(int) format
    keyType:(int) keyType
    keyIndex:(int) keyIndex
    packetID:(uint32_t) packetID
    error:(NSError **) error
```

At online processing or transaction complete phase, you can get the tags, encrypted and in a specified format.

This function can be used to get the tags, that are unavailable as plain, such as PAN, track data

#### Parameters

<i>tagList</i>	a list of tags to get. The format is like TLV list without length and value, i.e. every tag takes as many bytes as needed
<i>format</i>	one of the TAGS_FORMAT_* constants
<i>keyType</i>	key type, one of KEY_TYPE_* constants
<i>keyIndex</i>	the index of the key to use, in case there are multiple keys of the same type
<i>packetID</i>	an user-defined packet ID that will be returned back in encrypted packet
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

encrypted packet if function succeeded, nil otherwise

### 3.6.3.13 emv2GetTagsPlain:error:()

```
- (NSData *) emv2GetTagsPlain:
    (NSData *) tagList
    error:(NSError **) error
```

After transaction is finished, you can get the tags in plain.

Only non-sensitive tags can be retrieved in plain, no pan/discretionary data will be returned. If the card is in the whitelist bin ranges to return in clear, you can get that card's tags in clear

#### Parameters

<i>tagList</i>	a list of tags to get. The format is like TLV list without length and value, i.e. every tag takes as many bytes as needed
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

plain TLV data if function succeeded, nil otherwise

**3.6.3.14 emv2GoogleVASGetECCPrivateKeyVersionAtSlot:version:error:()**

```
- (BOOL) emv2GoogleVASGetECCPrivateKeyVersionAtSlot:
    (int) slot
    version:(uint32_t *) version
    error:(NSError **) error
```

Reads the currently loaded ECC private key version at specified slot.

**Parameters**

<i>slot</i>	key slot, the number of ECC keys that are supported depends on device's memory, but 3 are guaranteed
<i>version</i>	the key is returned here if function succeeds
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.15 emv2GoogleVASLoadECCPrivateKeyAtSlot:keyData:version:error:()**

```
- (BOOL) emv2GoogleVASLoadECCPrivateKeyAtSlot:
    (int) slot
    keyData:(NSData *) key
    version:(uint32_t) version
    error:(NSError **) error
```

Loads the required ECC private key for secure Google VAS transactions.

It is recommended this key to be changed at least once per month to keep the data safe.

**Parameters**

<i>slot</i>	key slot, the number of ECC keys that are supported depends on device's memory, but 3 are guaranteed
<i>key</i>	key data in raw format (32 bytes)
<i>version</i>	the key version, should be different than 0
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information



**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.16 emv2GoogleVASLoadECCPrivateKeyAtSlot:keyDataInPEM:version:error:()**

```
- (BOOL) emv2GoogleVASLoadECCPrivateKeyAtSlot:
    (int) slot
    keyDataInPEM: (NSString *) keyPEM
    version: (uint32_t) version
    error: (NSError **) error
```

Loads the required ECC private key for secure Google VAS transactions.

It is recommended this key to be changed at least once per month to keep the data safe.

**Parameters**

<i>slot</i>	key slot, the number of ECC keys that are supported depends on device's memory, but 3 are guaranteed
<i>keyPEM</i>	key data in PEM format
<i>version</i>	the key version, should be different than 0
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.17 emv2GoogleVASSetActiveECCPrivateKeyAtSlot:error:()**

```
- (BOOL) emv2GoogleVASSetActiveECCPrivateKeyAtSlot:
    (int) slot
    error: (NSError **) error
```

Sets which key to be active for Google VAS transactions.

**Parameters**

<i>slot</i>	key slot, the number of ECC keys that are supported depends on device's memory, but 3 are guaranteed
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.18 emv2GoogleVASSetCollectorID:error:()**

```
- (BOOL) emv2GoogleVASSetCollectorID:
    (uint32_t) collectorID
    error:(NSError **) error
```

Sets merchant collector ID (assigned by Google) to be used in Google VAS transactions.

**Parameters**

<i>collectorID</i>	Google assigned collector ID
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.19 emv2Initialise:()**

```
- (BOOL) emv2Initialise:
    (NSError **) error
```

This command initializes the emv kernel, call it before calling any other EMV function.

**Parameters**

<i>error</i>	returns error information, you can pass nil if you don't want it
--------------	--

**Returns**

TRUE upon success, FALSE otherwise

**3.6.3.20 emv2LoadContactCAPK:error:()**

```
- (BOOL) emv2LoadContactCAPK:
    (NSData *) capk
    error:(NSError **) error
```

Loads EMV kernel contact/chip Certification Authority Public Keys.

## Parameters

<i>capk</i>	TLV list of configuration tags containing public keys parameters.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.21 emv2LoadContactConfiguration:configurationIndex:error:()**

```
- (BOOL) emv2LoadContactConfiguration:
    (NSData *) configuration
    configurationIndex:(int) configurationIndex
    error:(NSError **) error
```

Loads EMV kernel contact/chip configuration data.

Configuration consists of custom tags setting various terminal capabilities and specific application parameters. Check attached pdf document for the specific tags used

## Note

if configuration version (tag E4/C1) is 0, then automatic checksum calculation is performed and the configuration data is actually loaded only if it differs than the one in the device, meaning you can spam load configuration function without any slowdown in the transaction start

## Parameters

<i>configuration</i>	TLV list of configuration tags. If the configuration is loaded for the first time, or there is no configuration encryption key tag set, then it is possible to load it in plain
<i>configurationIndex</i>	the index of the configuration, 0 is the default. You can load multiple configurations in the pinpad (currently 2 are supported) and the common use case is one of them is PAN configuration made with emv2CreatePANConfiguration
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.22 emv2LoadContactConfiguration:error:()**

```
- (BOOL) emv2LoadContactConfiguration:
    (NSData *) configuration
    error:(NSError **) error
```

Loads EMV kernel contact/chip configuration data.

Configuration consists of custom tags setting various terminal capabilities and specific application parameters. Check attached pdf document for the specific tags used

#### Parameters

<i>configuration</i>	TLV list of configuration tags. If the configuration is loaded for the first time, or there is no configuration encryption key tag set, then it is possible to load it in plain
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 3.6.3.23 emv2LoadContactlessCAPK:error:()

```
- (BOOL) emv2LoadContactlessCAPK:
    (NSData *) capk
    error:(NSError **) error
```

Loads EMV kernel contactless Certification Authority Public Keys.

#### Parameters

<i>capk</i>	TLV list of configuration tags containing public keys parameters.
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

#### 3.6.3.24 emv2LoadContactlessConfiguration:configurationIndex:error:()

```
- (BOOL) emv2LoadContactlessConfiguration:
    (NSData *) configuration
    configurationIndex:(int) configurationIndex
    error:(NSError **) error
```

Loads EMV kernel contactless configuration data.

Configuration consists of custom tags setting various terminal capabilities and specific application parameters. Check attached pdf document for the specific tags used

## Parameters

<i>configuration</i>	TLV list of configuration tags. If the configuration is loaded for the first time, or there is no configuration encryption key tag set, then it is possible to load it in plain
<i>configurationIndex</i>	the index of the configuration, 0 is the default. You can load multiple configurations in the pinpad (currently 2 are supported) and the common use case is one of them is PAN configuration made with <code>emv2CreatePANConfiguration</code>
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.25 emv2LoadContactlessConfiguration:error:()**

```
- (BOOL) emv2LoadContactlessConfiguration:
    (NSData *) configuration
    error:(NSError **) error
```

Loads EMV kernel contactless configuration data.

Configuration consists of custom tags setting various terminal capabilities and specific application parameters. Check attached pdf document for the specific tags used

## Parameters

<i>configuration</i>	TLV list of configuration tags. If the configuration is loaded for the first time, or there is no configuration encryption key tag set, then it is possible to load it in plain
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.26 emv2LoadGenericConfiguration:error:()**

```
- (BOOL) emv2LoadGenericConfiguration:
    (NSData *) configuration
    error:(NSError **) error
```

Loads EMV kernel generic configuration data, currently used for messages.

The actualy format of the messages (tag E6) can be obtained upon request, for easy use check out messages.xml and provided sample code to create message configuration from xml

**Note**

if configuration version (tag E4/C1) is 0, then automatic checksum calculation is performed and the configuration data is actually loaded only if it differs than the one in the device, meaning you can spam load configuration function without any slowdown in the transaction start

**Parameters**

<i>configuration</i>	TLV list of configuration tags. case is one of them is PAN configuration made with <code>emv2CreatePANConfiguration</code>
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.27 emv2SelectApplication:error:()**

```
- (BOOL) emv2SelectApplication:
    (int) application
    error:(NSError **) error
```

Selects application to be used by EMV kernel.

Call this function only after being notified by available applications.

**Parameters**

<i>application</i>	selected application index
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.28 emv2SetCardEmulationMode:encryption:keyID:error:()**

```
- (BOOL) emv2SetCardEmulationMode:
    (BOOL) enabled
    encryption:(int) encryption
    keyID:(int) keyID
    error:(NSError **) error
```

Activates magnetic card emulation mode for the EMV.

In this mode when a card is read, it will be encrypted by it and sent via `magneticCardEncryptedData` delegate. You still need to start the emv transaction, but providing `emv2OnOnlineProcessing` function or `emv2OnTransactionFinished` is not needed. The `emv2Deinitialise` will be automatically called once the track data is dispatched.

## Parameters

<i>enabled</i>	activates or deactivates card emulation mode
<i>encryption</i>	encryption algorithm used, one of the ALG_* constants
<i>keyID</i>	key identifier, one of the KEY_* constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.29 emv2SetManualEntryOptionsEnableCVV:enableExpiration:error:()**

```
- (BOOL) emv2SetManualEntryOptionsEnableCVV:
    (bool) enableCVV
    enableExpiration:(bool) enableExpiration
    error:(NSError **) error
```

Sets various options to be used for manual card entry part of the transaction.

## Parameters

<i>enableCVV</i>	enables or disables CVV entry
<i>enableExpiration</i>	enables or disables card expiration entry
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.30 emv2SetMessageForID:font:message:error:()**

```
- (BOOL) emv2SetMessageForID:
    (int) messageID
    font:(int) font
    message:(NSString *) message
    error:(NSError **) error
```

Allows temporal changing of the messages used in the universal EMV engine.

You can disable each message by sending nil for text. Use this function before starting transaction, the messages are valid for the next transaction only

## Parameters

<i>messageID</i>	one of the message constants, EMV_UI_*
<i>font</i>	the font used, one of the FONT_* constants
<i>message</i>	the message text to be displayed
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

3.6.3.31 `emv2SetMessageSoundForID:sound:error:()`

```
- (BOOL) emv2SetMessageSoundForID:
    (int) messageID
    sound:(NSData *) sound
    error:(NSError **) error
```

Allows temporal changing of the message sound used in the universal EMV engine.

You can disable each message's sound by sending nil for sound or use empty array. Use this function before starting transaction, the data is valid for the next transaction only

## Parameters

<i>messageID</i>	one of the message constants, EMV_UI_*
<i>sound</i>	sound in format
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

3.6.3.32 `emv2SetOnCardReadOptions:sendEventType:keyID:error:()`

```
- (BOOL) emv2SetOnCardReadOptions:
    (BOOL) cancelTransaction
    sendEventType:(EMV_CARD_READ_TYPES) sendEventType
    keyID:(int) keyID
    error:(NSError **) error
```

Controls what to happen when EMV transaction reaches the phase to read card data.

Usually transaction just continues, but with this function you can intercept it.



## Parameters

<i>cancelTransaction</i>	if true, cancels the transactiona after card read
<i>sendEventType</i>	controls weither to send an event during the stage and what data to send with it. EMV_CARD_READ_TYPE_DISABLED disables the event or any of the EMV_CARD_READ_TYPE_* constants
<i>keyID</i>	if sendEventType refers to data format requiring key, pass the key id here
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 3.6.3.33 emv2SetOnlineResult:error:()

```
- (BOOL) emv2SetOnlineResult:
    (NSData *) result
    error:(NSError **) error
```

Responds to the EMV kernel after an online request was sent to the card and the communication with the financial institution is complete.

## Parameters

<i>result</i>	TLV structure with response tags
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

## Returns

TRUE if function succeeded, FALSE otherwise

## 3.6.3.34 emv2SetPINOptions:error:()

```
- (BOOL) emv2SetPINOptions:
    (EMV_PIN_ENTRY) pinEntry
    error:(NSError **) error
```

Sets various options fort the pin entry portion of the EMV transaction.

## Parameters

<i>pinEntry</i>	controls if you will be asked for pin during the transaction, one of the PIN_ENTRY_* constants. Defaults to automatic, based on the card
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.35 emv2SetPINOptions:forInterface:error:()**

```
- (BOOL) emv2SetPINOptions:
    (EMV_PIN_ENTRY) pinEntry
    forInterface:(int) interface
    error:(NSError **) error
```

Sets various options for the pin entry portion of the EMV transaction.

This function allows changing options per interface, requires firmware support. On older firmwares only the "contact" option will be used for all interfaces.

**Parameters**

<i>pinEntry</i>	controls if you will be asked for pin during the transaction, one of the PIN_ENTRY_* constants. Defaults to automatic, based on the card
<i>interface</i>	EMV interface, one of the EMV_INTERFACE_* constants
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.36 emv2SetTransactionType:amount:currencyCode:error:()**

```
- (BOOL) emv2SetTransactionType:
    (int) type
    amount:(int) amount
    currencyCode:(int) currencyCode
    error:(NSError **) error
```

Sets EMV transaction parameters, this function must be called before starting EMV transaction.

**Parameters**

<i>type</i>	transaction type, tag 9C, the value depends on the payment institution, use 00 if you are unsure
<i>amount</i>	transaction amount as integer, i.e. for USD, \$12.50 will be sent as 1250
<i>currencyCode</i>	currency code, according to ISO 4217
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.37 emv2ShowApplicationList:error:()**

```
- (BOOL) emv2ShowApplicationList:
    (NSArray< NSNumber * > *) applications
    error:(NSError **) error
```

Given the list of applications presented in application selection, rearrange, filter and then use this function to show the final list for the customer to chose from.

Note that you can have even a single application and it will be shown for confirmation.

**Parameters**

<i>applications</i>	list of application indexes
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.38 emv2StartMagneticEmulationTransactionOnInterface:initData:timeout:error:()**

```
- (BOOL) emv2StartMagneticEmulationTransactionOnInterface:
    (int) interfaces
    initData:(NSData *) initData
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

Performs complete EMV transaction but returns magnetic card data as if card was swiped.

The result goes to either magneticCardData(if plain), magneticCardEncryptedData(encrypted) or magneticCardReadFailed if operation failed. The function waits for payment card to be available, then processes it and notifies of completion. You can cancel the transaction at any time. The algorithm used to encrypt the card data and the key are set via emsrSetEncryption function

**Parameters**

<i>interfaces</i>	transaction interface like contactless/contact or magnetic. One of hte EMV_INTERFACE_* constants, only works on universal EMV kernel
<i>initData</i>	optional TLV structure with additional parameters to be sent to the kernel
<i>timeout</i>	transaction timeout in seconds, only works on universal EMV kernel
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.39 emv2StartMagneticEmulationTransactionOnInterface:initData:usingConfiguration:timeout:error:()**

```
- (BOOL) emv2StartMagneticEmulationTransactionOnInterface:
    (int) interfaces
    NSData * initData
    (int) configuration
    (NSTimeInterval) timeout
    (NSError **) error
```

Performs complete EMV transaction but returns magnetic card data as if card was swiped.

The result goes to either `magneticCardData` (if plain), `magneticCardEncryptedData` (encrypted) or `magneticCardReadFailed` if operation failed. The function waits for payment card to be available, then processes it and notifies of completion. You can cancel the transaction at any time. The algorithm used to encrypt the card data and the key are set via `emsrSetEncryption` function

**Parameters**

<i>interfaces</i>	transaction interface like contactless/contact or magnetic. One of the EMV_INTERFACE_* constants, only works on universal EMV kernel
<i>initData</i>	optional TLV structure with additional parameters to be sent to the kernel
<i>configuration</i>	configuration index to use, 0 means the default one
<i>timeout</i>	transaction timeout in seconds, only works on universal EMV kernel
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

**Returns**

TRUE if function succeeded, FALSE otherwise

**3.6.3.40 emv2StartTransactionOnInterface:flags:initData:timeout:error:()**

```
- (BOOL) emv2StartTransactionOnInterface:
    (int) interfaces
    (int) flags
    NSData * initData
    (NSTimeInterval) timeout
    (NSError **) error
```

Starts EMV transaction.

The function waits for payment card to be available, then processes it and notifies of completion. You can cancel the transaction at any time.

## Parameters

<i>interfaces</i>	transaction interface like contactless/contact or magnetic. One of hte EMV_INTERFACE_* constants, only works on universal EMV kernel
<i>flags</i>	controls the EMV transaction, use 0 for now
<i>initData</i>	optional TLV structure with additional parameters to be sent to the kernel
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
<i>timeout</i>	transaction timeout in seconds, only works on universal EMV kernel

## Returns

TRUE if function succeeded, FALSE otherwise

**3.6.3.41 emv2StartTransactionOnInterface:flags:initData:usingConfiguration:timeout:error:()**

```
- (BOOL) emv2StartTransactionOnInterface:
    (int) interfaces
    flags:(int) flags
    initData:(NSData *) initData
    usingConfiguration:(int) configuration
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

Starts EMV transaction.

The function waits for payment card to be available, then processes it and notifies of completion. You can cancel the transaction at any time.

## Parameters

<i>interfaces</i>	transaction interface like contactless/contact or magnetic. One of hte EMV_INTERFACE_* constants, only works on universal EMV kernel
<i>flags</i>	controls the EMV transaction, use 0 for now
<i>initData</i>	optional TLV structure with additional parameters to be sent to the kernel
<i>configuration</i>	configuration index to use, 0 means the default one
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information
<i>timeout</i>	transaction timeout in seconds, only works on universal EMV kernel

## Returns

TRUE if function succeeded, FALSE otherwise

### 3.6.3.42 emv2StartTransactionWithFlags:initData:error:()

```
- (BOOL) emv2StartTransactionWithFlags:
    (int) flags
    initData:(NSData *) initData
    error:(NSError **) error
```

Starts EMV transaction.

The function waits for payment card to be available, then processes it and notifies of completion. You can cancel the transaction at any time.

#### Parameters

<i>flags</i>	controls the EMV transaction, use 0 for now
<i>initData</i>	optional TLV structure with additional parameters to be sent to the kernel
<i>error</i>	pointer to NSError object, where error information is stored in case function fails. You can pass nil if you don't want that information

#### Returns

TRUE if function succeeded, FALSE otherwise

## 3.7 DTEMV2Info Class Reference

Information about EMV L2 configuration.

Inherits NSObject.

### Properties

- int [contactlessConfigurationVersion](#)  
*Version number of the contactless configuration.*
- int [contactConfigurationVersion](#)  
*Version number of the contact/chip configuration.*
- int [contactlessCAPKVersion](#)  
*Version number of the contactless CAPK.*
- int [contactCAPKVersion](#)  
*Version number of the contact/chip CAPK.*
- int [messagesVersion](#)  
*Version number of the messages configuration.*
- int configurationVersion [DEPRECATED\\_ATTRIBUTE](#)  
*Version number of the contactless configuration.*
- int [emvKernelVersion](#)  
*Version number of the EMV L2 engine.*

### 3.7.1 Detailed Description

Information about EMV L2 configuration.

## 3.7.2 Property Documentation

### 3.7.2.1 contactCAPKVersion

- (int) contactCAPKVersion [read], [write], [atomic], [assign]

Version number of the contact/chip CAPK.

### 3.7.2.2 contactConfigurationVersion

- (int) contactConfigurationVersion [read], [write], [atomic], [assign]

Version number of the contact/chip configuration.

### 3.7.2.3 contactlessCAPKVersion

- (int) contactlessCAPKVersion [read], [write], [atomic], [assign]

Version number of the contactless CAPK.

### 3.7.2.4 contactlessConfigurationVersion

- (int) contactlessConfigurationVersion [read], [write], [atomic], [assign]

Version number of the contactless configuration.

### 3.7.2.5 DEPRECATED\_ATTRIBUTE

- (int configurationVersion) DEPRECATED\_ATTRIBUTE [read], [write], [atomic], [assign]

Version number of the contactless configuration.

**Deprecated** use contactlessConfigurationVersion instead

### 3.7.2.6 emvKernelVersion

- (int) emvKernelVersion [read], [write], [atomic], [assign]

Version number of the EMV L2 engine.

### 3.7.2.7 messagesVersion

- (int) messagesVersion [read], [write], [atomic], [assign]

Version number of the messages configuration.

## 3.8 DTEMVApplication Class Reference

Provides information about EMV application.

Inherits NSObject.

### Properties

- NSData \* [aid](#)  
*Application AID.*
- NSString \* [label](#)  
*Application label.*
- int [matchCriteria](#)  
*How the application is matched to the ones in the card:*

### 3.8.1 Detailed Description

Provides information about EMV application.

### 3.8.2 Property Documentation

#### 3.8.2.1 aid

- (NSData\*) aid [read], [write], [atomic], [copy]

Application AID.

#### 3.8.2.2 label

- (NSString\*) label [read], [write], [atomic], [copy]

Application label.

#### 3.8.2.3 matchCriteria

- (int) matchCriteria [read], [write], [atomic], [assign]

How the application is matched to the ones in the card:



MATCH_FULL	Complete match
MATCH_PARTIAL_VISA	Partial Visa match
MATCH_PARTIAL_EUROPAY	Partial Europay match

## 3.9 DTFinancialCardInfo Class Reference

Information about financial card.

Inherits NSObject.

### Properties

- NSString \* [cardholderName](#)  
*Cardholder name or empty if unavailable.*
- NSString \* [cardholderFirstName](#)  
*Cardholder first name or empty if unavailable.*
- NSString \* [cardholderLastName](#)  
*Cardholder last name or empty if unavailable.*
- NSString \* [accountNumber](#)  
*Primary account number.*
- NSString \* [serviceCode](#)  
*Service code or empty if unavailable.*
- NSString \* [discretionaryData](#)  
*Discretionary data or empty if unavailable.*
- int [expirationMonth](#)  
*Expiration date: month.*
- int [expirationYear](#)  
*Expiration date: year.*

### 3.9.1 Detailed Description

Information about financial card.

### 3.9.2 Property Documentation

#### 3.9.2.1 accountNumber

– (NSString\*) accountNumber [read], [write], [atomic], [copy]

Primary account number.

### 3.9.2.2 cardholderFirstName

- (NSString\*) cardholderFirstName [read], [write], [atomic], [copy]

Cardholder first name or empty if unavailable.

### 3.9.2.3 cardholderLastName

- (NSString\*) cardholderLastName [read], [write], [atomic], [copy]

Cardholder last name or empty if unavailable.

### 3.9.2.4 cardholderName

- (NSString\*) cardholderName [read], [write], [atomic], [copy]

Cardholder name or empty if unavailable.

### 3.9.2.5 discretionaryData

- (NSString\*) discretionaryData [read], [write], [atomic], [copy]

Discretionary data or empty if unavailable.

### 3.9.2.6 expirationMonth

- (int) expirationMonth [read], [write], [atomic], [assign]

Expiration date: month.

### 3.9.2.7 expirationYear

- (int) expirationYear [read], [write], [atomic], [assign]

Expiration date: year.

### 3.9.2.8 serviceCode

– (NSString\*) serviceCode [read], [write], [atomic], [copy]

Service code or empty if unavailable.

## 3.10 DTKeyInfo Class Reference

Pinpad key information.

Inherits NSObject.

### Properties

- int [position](#)  
*Key position/slot.*
- NSData \* [checkValue](#)  
*Key check value.*
- NSData \* [ksn](#)  
*KSN in case of DUKPT key.*
- DT\_KEY\_TYPES [type](#)  
*Key type.*
- NSString \* [typeString](#)  
*Key type.*
- NSString \* [usage](#)  
*Key usage, according to TR31: Usage/Mode:*
- char [mode](#)  
*Key mode, according to TR31.*
- int [version](#)  
*Key version.*
- BOOL [isDUKPTKey](#)

### 3.10.1 Detailed Description

Pinpad key information.

### 3.10.2 Property Documentation

#### 3.10.2.1 checkValue

– (NSData\*) checkValue [read], [write], [atomic], [copy]

Key check value.

### 3.10.2.2 isDUKPTKey

- (BOOL) isDUKPTKey [read], [atomic], [assign]

### 3.10.2.3 ksn

- (NSData\*) ksn [read], [write], [atomic], [copy]

KSN in case of DUKPT key.

### 3.10.2.4 mode

- (char) mode [read], [write], [atomic], [assign]

Key mode, according to TR31.

### 3.10.2.5 position

- (int) position [read], [write], [atomic], [assign]

Key position/slot.

### 3.10.2.6 type

- (DT\_KEY\_TYPES) type [read], [write], [atomic], [assign]

Key type.

### 3.10.2.7 typeString

- (NSString\*) typeString [read], [atomic], [assign]

Key type.

## 3.10.2.8 usage

```
- (NSString*) usage [read], [write], [atomic], [copy]
```

Key usage, according to TR31: Usage/Mode:

'B0' 'N' Base Derivation Key

'P0' 'E' pin key 'M1' 'C' key for ISO 9797-1 MAC Algorithm 1 'M3' 'C' key for ISO 9797-1 MAC Algorithm 3 'M0' 'C' key for ISO 16609 MAC algorithm 1 'D0' 'E' key for data encrypting 'D0' 'D' key for data decrypting

Custom method usage vaules:

'01' transport key for pin key '02' transport key for ISO 9797-1 MAC Algorithm 1 key '03' transport key for ISO 9797-1 MAC Algorithm 3 key '04' transport key for ISO 16609 MAC algorithm 1 key '05' transport key for data encrypting key '06' transport key for data decrypting key

## 3.10.2.9 version

```
- (int) version [read], [write], [atomic], [assign]
```

Key version.

## 3.11 DTPinpadInfo Class Reference

Information about connected Pinpad.

Inherits NSObject.

## Properties

- NSData \* [cpuSerial](#)  
*Unique CPU serial number.*
- NSString \* [cpuSerialString](#)  
*Unique CPU serial number string.*
- uint32\_t [cpuVersion](#)  
*CPU version.*
- uint32\_t [cpuLoaderVersion](#)  
*CPU loader version.*
- uint32\_t [cpuHALVersion](#)  
*HAL version.*
- NSData \* [pinpadSerial](#)  
*PinPad serial number.*
- NSString \* [pinpadSerialString](#)  
*PinPad serial number.*
- NSString \* [loaderName](#)  
*Loader name.*
- uint32\_t [loaderVersion](#)  
*Loader version.*
- NSString \* [fwName](#)  
*Firmware name.*
- uint32\_t [fwVersion](#)  
*Firmware version.*

### 3.11.1 Detailed Description

Information about connected Pinpad.

### 3.11.2 Property Documentation

#### 3.11.2.1 cpuHALVersion

- (uint32\_t) cpuHALVersion [read], [write], [atomic], [assign]

HAL version.

#### 3.11.2.2 cpuLoaderVersion

- (uint32\_t) cpuLoaderVersion [read], [write], [atomic], [assign]

CPU loader version.

#### 3.11.2.3 cpuSerial

- (NSData\*) cpuSerial [read], [write], [atomic], [copy]

Unique CPU serial number.

#### 3.11.2.4 cpuSerialString

- (NSString\*) cpuSerialString [read], [write], [atomic], [copy]

Unique CPU serial number string.

#### 3.11.2.5 cpuVersion

- (uint32\_t) cpuVersion [read], [write], [atomic], [assign]

CPU version.

#### 3.11.2.6 fwName

- (NSString\*) fwName [read], [write], [atomic], [copy]

Firmware name.

#### 3.11.2.7 fwVersion

- (uint32\_t) fwVersion [read], [write], [atomic], [assign]

Firmware version.

#### 3.11.2.8 loaderName

- (NSString\*) loaderName [read], [write], [atomic], [copy]

Loader name.

#### 3.11.2.9 loaderVersion

- (uint32\_t) loaderVersion [read], [write], [atomic], [assign]

Loader version.

#### 3.11.2.10 pinpadSerial

- (NSData\*) pinpadSerial [read], [write], [atomic], [copy]

PinPad serial number.

#### 3.11.2.11 pinpadSerialString

- (NSString\*) pinpadSerialString [read], [write], [atomic], [copy]

PinPad serial number.

## 3.12 DTPrinterInfo Class Reference

Information about connected Printer.

Inherits NSObject.

### Properties

- int [resolutionDPI](#)  
*Printer resolution in Dots Per Inch.*
- int [paperWidthPx](#)  
*Current paper width in pixels.*
- int [paperWidthInch](#)  
*Current paper width in inches.*
- int [maxPageModeWidthPx](#)  
*Maximum page mode page width in pixels.*
- int [maxPageModeHeightPx](#)  
*Maximum page mode page width in pixels.*
- BOOL [pageModeSupported](#)  
*Page mode supported.*
- BOOL [labelModeSupported](#)  
*Label mode supported.*
- BOOL [labelModeActive](#)  
*Label mode active.*
- BOOL [paperPresent](#)  
*Paper present, only available in protocol mode.*
- BOOL [isOverheated](#)  
*Printer head overheated, only available in protocol mode.*
- BOOL [batteryLow](#)  
*Battery low, only available in protocol mode.*
- BOOL [printerBusy](#)  
*Printer busy (printing), only available in protocol mode.*
- NSTimeInterval [autoOffTime](#)  
*Auto-off time in seconds.*

### 3.12.1 Detailed Description

Information about connected Printer.

### 3.12.2 Property Documentation

#### 3.12.2.1 autoOffTime

– (NSTimeInterval) autoOffTime [read], [write], [atomic], [assign]

Auto-off time in seconds.



### 3.12.2.2 batteryLow

- (BOOL) batteryLow [read], [write], [atomic], [assign]

Battery low, only available in protocol mode.

### 3.12.2.3 isOverheated

- (BOOL) isOverheated [read], [write], [atomic], [assign]

Printer head overheated, only available in protocol mode.

### 3.12.2.4 labelModeActive

- (BOOL) labelModeActive [read], [write], [atomic], [assign]

Label mode active.

### 3.12.2.5 labelModeSupported

- (BOOL) labelModeSupported [read], [write], [atomic], [assign]

Label mode supported.

### 3.12.2.6 maxPageModeHeightPx

- (int) maxPageModeHeightPx [read], [write], [atomic], [assign]

Maximum page mode page width in pixels.

### 3.12.2.7 maxPageModeWidthPx

- (int) maxPageModeWidthPx [read], [write], [atomic], [assign]

Maximum page mode page width in pixels.

### 3.12.2.8 pageModeSupported

- (BOOL) pageModeSupported [read], [write], [atomic], [assign]

Page mode supported.

### 3.12.2.9 paperPresent

- (BOOL) paperPresent [read], [write], [atomic], [assign]

Paper present, only available in protocol mode.

### 3.12.2.10 paperWidthInch

- (int) paperWidthInch [read], [write], [atomic], [assign]

Current paper width in inches.

### 3.12.2.11 paperWidthPx

- (int) paperWidthPx [read], [write], [atomic], [assign]

Current paper width in pixels.

### 3.12.2.12 printerBusy

- (BOOL) printerBusy [read], [write], [atomic], [assign]

Printer busy (printing), only available in protocol mode.

### 3.12.2.13 resolutionDPI

- (int) resolutionDPI [read], [write], [atomic], [assign]

Printer resolution in Dots Per Inch.

## 3.13 DTRFCardInfo Class Reference

Information about RF card.

Inherits NSObject.

### Properties

- FEAT\_RF\_READERS [readerType](#)  
*RF reader type, one of the RF\_READER\_\* constants.*
- RF\_CARD\_TYPES [type](#)  
*RF card type, one of the CARD\_\* constants.*
- NSString \* [typeStr](#)  
*RF card type as string, useful for display purposes.*
- NSData \* [UID](#)  
*RF card unique identifier, if any.*
- int [ATQA](#)  
*Mifare card ATQA.*
- int [SAK](#)  
*Mifare card SAK.*
- int [AFI](#)  
*ISO15693 card AFI.*
- int [DSFID](#)  
*ISO15693 card DSFID.*
- int [blockSize](#)  
*ISO15693 card block size.*
- int [nBlocks](#)  
*ISO15693 card number of blocks.*
- NSData \* [felicaPMm](#)  
*FeliCa PMm.*
- NSData \* [felicaRequestData](#)  
*FeliCa Request Data.*
- int [cardIndex](#)  
*Card index used to access the card from the SDK API.*

### 3.13.1 Detailed Description

Information about RF card.

### 3.13.2 Property Documentation

#### 3.13.2.1 AFI

```
– (int) AFI [read], [write], [atomic], [assign]
```

ISO15693 card AFI.

### 3.13.2.2 ATQA

- (int) ATQA [read], [write], [atomic], [assign]

Mifare card ATQA.

### 3.13.2.3 blockSize

- (int) blockSize [read], [write], [atomic], [assign]

ISO15693 card block size.

### 3.13.2.4 cardIndex

- (int) cardIndex [read], [write], [atomic], [assign]

Card index used to access the card from the SDK API.

### 3.13.2.5 DSFID

- (int) DSFID [read], [write], [atomic], [assign]

ISO15693 card DSFID.

### 3.13.2.6 felicaPMm

- (NSData\*) felicaPMm [read], [write], [atomic], [copy]

FeliCa PMm.

### 3.13.2.7 felicaRequestData

- (NSData\*) felicaRequestData [read], [write], [atomic], [copy]

FeliCa Request Data.

#### 3.13.2.8 nBlocks

- (int) nBlocks [read], [write], [atomic], [assign]

ISO15693 card number of blocks.

#### 3.13.2.9 readerType

- (FEAT\_RF\_READERS) readerType [read], [write], [atomic], [assign]

RF reader type, one of the RF\_READER\_\* constants.

#### 3.13.2.10 SAK

- (int) SAK [read], [write], [atomic], [assign]

Mifare card SAK.

#### 3.13.2.11 type

- (RF\_CARD\_TYPES) type [read], [write], [atomic], [assign]

RF card type, one of the CARD\_\* constants.

#### 3.13.2.12 typeStr

- (NSString\*) typeStr [read], [write], [atomic], [copy]

RF card type as string, useful for display purposes.

#### 3.13.2.13 UID

- (NSData\*) UID [read], [write], [atomic], [copy]

RF card unique identifier, if any.

### 3.14 DTTouchFormatAnsilso Class Reference

Finger Image-Based Data Interchange Format parser.

Inherits NSObject.

#### Instance Methods

- (NSData \*) - [getData](#)  
*Get finger image record data.*
- (NSData \*) - [getHeader](#)  
*Get finger image record header data.*
- (NSString \*) - [getHeaderAsHexString](#)  
*Get finger image record header data as HEX string.*
- (NSString \*) - [getFormatIdentifierAsString](#)  
*Get format identifier as String.*
- (NSData \*) - [getFormatIdentifier](#)  
*Get format identifier.*
- (NSString \*) - [getVersionNumberAsString](#)  
*Get version number as String.*
- (NSData \*) - [getVersionNumber](#)  
*Get version number.*
- (int) - [getRecordLength](#)  
*Get record length.*
- (NSData \*) - [getProductIdentifier](#)  
*Get product identifier.*
- (NSString \*) - [getProductIdentifierAsHexString](#)  
*Get product identifier as HEX string.*
- (NSData \*) - [getCaptureDeviceID](#)  
*Get capture device ID.*
- (NSString \*) - [getCaptureDeviceIDAsHexString](#)  
*Get capture device ID as HEX String.*
- (int) - [getImageAsquisitionLevel](#)  
*Get acquisition level.*
- (int) - [getNumberOfFingers](#)  
*Get number of finger/palm.*
- (int) - [getScaleUnits](#)  
*Get scale units.*
- (int) - [getScanResolutionHorz](#)  
*Get scan resolution (horizontal).*
- (int) - [getScanResolutionVert](#)  
*Get scan resolution (vertical).*
- (int) - [getImageResolutionHorz](#)  
*Get image resolution (horizontal).*
- (int) - [getImageResolutionVert](#)  
*Get image resolution (vertical).*
- (int) - [getPixelDepth](#)  
*Get pixel depth.*
- (int) - [getImageCompressionAlgorithm](#)  
*Get compression algorithm.*

- (int) - [getFingerDataBlockLength](#)  
*Get finger data block length.*
- (int) - [getFingerPosition](#)  
*Get finger position.*
- (int) - [getCountOfViews](#)  
*Get count of views.*
- (int) - [getViewNumber](#)  
*Get view number.*
- (int) - [getFingerImageQuality](#)  
*Get finger/palm image quality.*
- (int) - [getImpressionType](#)  
*Get impression type.*
- (int) - [getHorizontalLineLength](#)  
*Get horizontal line length (image width).*

### 3.14.1 Detailed Description

Finger Image-Based Data Interchange Format parser.

Supported formats:

- ISO/IEC 19794-4-2005
- ANSI INCITS 381-2004

### 3.14.2 Method Documentation

#### 3.14.2.1 `getCaptureDeviceID()`

- (NSData \*) `getCaptureDeviceID`

Get capture device ID.

This field specify the capture device ID recorded. A value of all zeros will be acceptable and will indicated that the capture device ID is unreported. The vendor determines the value for this field. Applications developers may obtain the values for these codes from the vendor.

#### Returns

capture device id.

#### 3.14.2.2 `getCaptureDeviceIDAsHexString()`

- (NSString \*) getCaptureDeviceIDAsHexString

Get capture device ID as HEX String.

The capture device ID recorded in two bytes. A value of all zeros will be acceptable and will indicate that the capture device ID is unreported. The vendor determines the value for this field. Applications developers may obtain the values for these codes from the vendor.

##### Returns

capture device id.

#### 3.14.2.3 `getCountOfViews()`

- (int) getCountOfViews

Get count of views.

This field contains the total number of specific views available for this finger.

##### Returns

count of views.

#### 3.14.2.4 `getData()`

- (NSData \*) getData

Get finger image record data.

##### Returns

the data.

#### 3.14.2.5 `getFingerDataBlockLength()`

- (int) getFingerDataBlockLength

Get finger data block length.

This field contains the length in bytes of finger segment. It specifies the total number of bytes including the length of the header and the size of compressed or uncompressed image data.

##### Returns

length.



#### 3.14.2.6 getFingerImageQuality()

- (int) getFingerImageQuality

Get finger/palm image quality.

##### Returns

finger/palm image quality.

#### 3.14.2.7 getFingerPosition()

- (int) getFingerPosition

Get finger position.

##### Returns

finger position.

#### 3.14.2.8 getFormatIdentifier()

- (NSData \*) getFormatIdentifier

Get format identifier.

The Finger Image Record that begin with the three ASCII characters "FIR" to identify the record as following this standard, followed by a zero byte as a null string terminator.

##### Returns

format identifier.

#### 3.14.2.9 getFormatIdentifierAsString()

- (NSString \*) getFormatIdentifierAsString

Get format identifier as String.

##### Returns

format identifier.

#### 3.14.2.10 `getHeader()`

- (NSData \*) getHeader

Get finger image record header data.

##### Returns

the data.

#### 3.14.2.11 `getHeaderAsHexString()`

- (NSString \*) getHeaderAsHexString

Get finger image record header data as HEX string.

##### Returns

the data.

#### 3.14.2.12 `getHorizontalLineLength()`

- (int) getHorizontalLineLength

Get horizontal line length (image width).

This field is used to specify the number of pixels contained on a single horizontal line of the transmitted image.

##### Returns

horizontal line length.

#### 3.14.2.13 `getImageAsquisitionLevel()`

- (int) getImageAsquisitionLevel

Get acquisition level.

This field specify the image acquisition level. The value used indicates the level at which all of the minimum acquisition parameters were satisfied during the capture of image.

##### Returns

acquisition level.

#### 3.14.2.14 `getImageCompressionAlgorithm()`

- (int) getImageCompressionAlgorithm

Get compression algorithm.

Specify the method used to record the uncompressed or compressed grayscale images.

Code	Compression algorithm
0	Uncompressed - no bit packing
1	Uncompressed - bit packing
2	Compressed - WSQ
3	Compressed - JPEG
4	Compressed - JPEG 2000
5	Compressed - PNG

**Returns**

compression algorithm.

**3.14.2.15 getImageResolutionHorz()**

- (int) getImageResolutionHorz

Get image resolution (horizontal).

This field specify the rounded image resolution used in the horizontal direction. The scale units field determine whether the value is pixel per inch or pixel per centimeter.

**Returns**

image resolution.

**3.14.2.16 getImageResolutionVert()**

- (int) getImageResolutionVert

Get image resolution (vertical).

This field specify the rounded image resolution used in the vertical direction. The scale units field determine whether the value is pixel per inch or pixel per centimeter.

**Returns**

image resolution.

**3.14.2.17 getImpressionType()**

- (int) getImpressionType

Get impression type.

**Returns**

impression type.

**3.14.2.18 getNumberOfFingers()**

- (int) getNumberOfFingers

Get number of finger/palm.

The number of finger or palm images included in the record. Multiple fingers acquired by a single capture and contained in the same image are counted as a single finger image. The number of views are not part of the count for this view.

**Returns**

number of finger/palm.

**3.14.2.19 getPixelDepth()**

- (int) getPixelDepth

Get pixel depth.

This field contains a number of bits used to represent pixel. The value can be from '0x01' to '0x10'.

**Returns**

pixel depth.

**3.14.2.20 getProductIdentifier()**

- (NSData \*) getProductIdentifier

Get product identifier.

This field specify the 'owner' of the encoding equipment.

Available only with ANSI INCITS 381-2004.

**Returns**

product identifier.

#### 3.14.2.21 getProductIdentifierAsHexString()

- (NSString \*) getProductIdentifierAsHexString

Get product identifier as HEX string.

This field specify the 'owner' of the encoding equipment.

Available only with ANSI INCITS 381-2004.

##### Returns

product identifier.

#### 3.14.2.22 getRecordLength()

- (int) getRecordLength

Get record length.

The length in bytes of the entire record that includes the combined lengths of all finger records.

##### Returns

record length.

#### 3.14.2.23 getScaleUnits()

- (int) getScaleUnits

Get scale units.

This field specify the units used to describe the scanning and image resolutions of the image. A '0x01' in this fields indicates pixel per inch, or the '0x02' indicates pixel per centimeter.

##### Returns

scale units.

#### 3.14.2.24 getScanResolutionHorz()

- (int) getScanResolutionHorz

Get scan resolution (horizontal).

This field specify the rounded scanning resolution used in the horizontal direction. The scale units field determine whether the value is pixel per inch or pixel per centimeter.

##### Returns

scan resolution.

#### 3.14.2.25 getScanResolutionVert()

- (int) getScanResolutionVert

Get scan resolution (vertical).

This field specify the rounded scanning resolution used in the vertical direction. The scale units field determine whether the value is pixel per inch or pixel per centimeter.

##### Returns

scan resolution.

#### 3.14.2.26 getVersionNumber()

- (NSData \*) getVersionNumber

Get version number.

The version number for the version of this standard used in construction the image record placed in four bytes. This version number consist of three ASCII numerals followed by a zero byte as a NULL string terminator. The first and second character will represent the major version number and the third character will represent the minor revision number. Upon approval of this specification, the version number is "010" – Version 1 revision.

##### Returns

version number.

#### 3.14.2.27 getVersionNumberAsString()

- (NSString \*) getVersionNumberAsString

Get version number as String.

##### Returns

version number.

#### 3.14.2.28 getViewNumber()

- (int) getViewNumber

Get view number.

This field contains the specific image view number associate with the finger or palm.

##### Returns

view number.

## 3.15 DTTouchIdentity Class Reference

Information about fingerprint scan.

Inherits NSObject.

### Properties

- int [slot](#)  
*The slot number where identity is stored inside the device.*
- NSData \* [identityData](#)  
*Identity data as binary.*
- NSString \* [identityString](#)  
*Identity data, represented as string.*

### 3.15.1 Detailed Description

Information about fingerprint scan.

### 3.15.2 Property Documentation

### 3.15.2.1 identityData

- (NSData\*) identityData [read], [write], [atomic], [copy]

Identity data as binary.

### 3.15.2.2 identityString

- (NSString\*) identityString [read], [atomic], [assign]

Identity data, represented as string.

### 3.15.2.3 slot

- (int) slot [read], [write], [atomic], [assign]

The slot number where identity is stored inside the device.

## 3.16 DTTouchTemplate Class Reference

Information about fingerprint template.

Inherits NSObject.

### Properties

- int [format](#)  
*The template format.*
- NSData \* [data](#)  
*Template data as binary.*

### 3.16.1 Detailed Description

Information about fingerprint template.

### 3.16.2 Property Documentation



### 3.16.2.1 data

- (NSData\*) data [read], [write], [atomic], [copy]

Template data as binary.

### 3.16.2.2 format

- (int) format [read], [write], [atomic], [assign]

The template format.

## 3.17 DTVoltageInfo Class Reference

Information about Voltage.

Inherits NSObject.

### Properties

- BOOL [keyGenerated](#)  
*Key is available, card can be read and encrypted.*
- BOOL [keyGenerationInProgress](#)  
*Key generation in progress, while the key is generated the old key will be used for encryption.*
- NSDate \* [keyGenerationDate](#)  
*The date/time of the last key generated.*
- int [settingsVersion](#)  
*Version of the voltage settings.*

### 3.17.1 Detailed Description

Information about Voltage.

### 3.17.2 Property Documentation

#### 3.17.2.1 keyGenerated

- (BOOL) keyGenerated [read], [write], [atomic], [assign]

Key is available, card can be read and encrypted.

### 3.17.2.2 keyGenerationDate

- (NSDate\*) keyGenerationDate [read], [write], [atomic], [copy]

The date/time of the last key generated.

### 3.17.2.3 keyGenerationInProgress

- (BOOL) keyGenerationInProgress [read], [write], [atomic], [assign]

Key generation in progress, while the key is generated the old key will be used for encryption.

### 3.17.2.4 settingsVersion

- (int) settingsVersion [read], [write], [atomic], [assign]

Version of the voltage settings.

## 3.18 EMSRDeviceInfo Class Reference

The class that represents Encrypted Magnetic Head information.

Inherits NSObject.

### Properties

- NSString \* [ident](#)  
*Identification string, for example "EMSR R".*
- NSData \* [serialNumber](#)  
*Unique serial number (16 bytes)*
- NSString \* [serialNumberString](#)  
*Unique serial number (16 bytes) in hexadecimal string for display purposes.*
- int [firmwareVersion](#)  
*Firmware version number in format MAJOR\*1000 + MINOR, i.e.*
- NSString \* [firmwareVersionString](#)  
*Firmware version number in string format, for display purposes.*
- int [securityVersion](#)  
*Security firmware version number in format MAJOR\*1000 + MINOR, i.e.*
- NSString \* [securityVersionString](#)  
*Firmware version number in string format, for display purposes.*

### 3.18.1 Detailed Description

The class that represents Encrypted Magnetic Head information.

## 3.18.2 Property Documentation

### 3.18.2.1 firmwareVersion

- (int) firmwareVersion [read], [write], [atomic], [assign]

Firmware version number in format MAJOR\*1000 + MINOR, i.e.

version 1.123 will be presented as 1123

### 3.18.2.2 firmwareVersionString

- (NSString\*) firmwareVersionString [read], [write], [atomic], [copy]

Firmware version number in string format, for display purposes.

### 3.18.2.3 ident

- (NSString\*) ident [read], [write], [atomic], [copy]

Identification string, for example "EMSR R".

### 3.18.2.4 securityVersion

- (int) securityVersion [read], [write], [atomic], [assign]

Security firmware version number in format MAJOR\*1000 + MINOR, i.e.

version 1.123 will be presented as 1123

### 3.18.2.5 securityVersionString

- (NSString\*) securityVersionString [read], [write], [atomic], [copy]

Firmware version number in string format, for display purposes.

### 3.18.2.6 serialNumber

- (NSData\*) serialNumber [read], [write], [atomic], [copy]

Unique serial number (16 bytes)

### 3.18.2.7 serialNumberString

- (NSString\*) serialNumberString [read], [write], [atomic], [copy]

Unique serial number (16 bytes) in hexadecimal string for display purposes.

## 3.19 EMSRKey Class Reference

The class that represents Encrypted Magnetic Head key.

Inherits NSObject.

### Properties

- int [keyID](#)  
*The ID of the key, one of the KEY\_\* constants.*
- int [keyVersion](#)  
*The version of the key.*
- NSData \* [dukptKSN](#)  
*DUKPT KSN (if any)*
- NSString \* [keyName](#)  
*The name of the key (for display purposes)*

### 3.19.1 Detailed Description

The class that represents Encrypted Magnetic Head key.

### 3.19.2 Property Documentation

#### 3.19.2.1 dukptKSN

- (NSData\*) dukptKSN [read], [write], [atomic], [copy]

DUKPT KSN (if any)

### 3.19.2.2 keyID

- (int) keyID [read], [write], [atomic], [assign]

The ID of the key, one of the KEY\_\* constants.

### 3.19.2.3 keyName

- (NSString\*) keyName [read], [write], [atomic], [copy]

The name of the key (for display purposes)

### 3.19.2.4 keyVersion

- (int) keyVersion [read], [write], [atomic], [assign]

The version of the key.

## 3.20 EMSRKeysInfo Class Reference

The class that represents Encrypted Magnetic Head keys information.

Inherits NSObject.

### Instance Methods

- (int) - [getKeyVersion](#):  
*Returns key version.*

### Class Methods

- (NSString \*) + [keyNameByID](#):  
*Returns the name of a key (for display purposes)*

### Properties

- NSArray< [EMSRKey](#) \* > \* [keys](#)  
*An array of [EMSRKey](#) objects representing the keys in the head.*
- bool [tampered](#)  
*Indicates if the head is tampered or not.*

### 3.20.1 Detailed Description

The class that represents Encrypted Magnetic Head keys information.

### 3.20.2 Method Documentation

#### 3.20.2.1 getKeyVersion:()

```
- (int) getKeyVersion:
    (int) keyID
```

Returns key version.

##### Parameters

<i>keyID</i>	key ID, one of the KEY_* constants
--------------	------------------------------------

##### Returns

key version or 0 if the key is missing

#### 3.20.2.2 keyNameByID:()

```
+ (NSString *) keyNameByID:
    (int) keyID
```

Returns the name of a key (for display purposes)

##### Parameters

<i>keyID</i>	key ID, one of the KEY_* constants
--------------	------------------------------------

##### Returns

name string or nil if the ID was wrong

### 3.20.3 Property Documentation

## 3.20.3.1 keys

```
- (NSArray<EMSRKey *>*) keys [read], [write], [atomic], [copy]
```

An array of [EMSRKey](#) objects representing the keys in the head.

## 3.20.3.2 tampered

```
- (bool) tampered [read], [write], [atomic], [assign]
```

Indicates if the head is tampered or not.

Tampered head needs to be reactivated at secure facility after checking

## 3.21 iHUBDevice Class Reference

Generic iHUB device class.

Inherits NSObject.

Inherited by [iHUBRS232Device](#).

## Instance Methods

- (NSData \*) - [readData:timeout:error:](#)
- (int) - [writeData:timeout:error:](#)

## Properties

- id [delegate](#)  
*Control delegate.*
- int [portIndex](#)  
*Port index, from 0 to available ports.*
- IHUB\_PORT\_TYPE [portType](#)  
*Port type, serial or usb.*
- IHUB\_PORT\_STATUS [portStatus](#)  
*Port status - availabe, connected or in error state.*
- NSString \* [portConfig](#)  
*Port configuration - either empty string or one of the port constants.*
- NSInputStream \* [inputStream](#)  
*Device input stream, See NSInputStream documentation.*
- NSOutputStream \* [outputStream](#)  
*Device output stream, See NSOutputStream documentation.*

### 3.21.1 Detailed Description

Generic iHUB device class.

### 3.21.2 Method Documentation

#### 3.21.2.1 readData:timeout:error:()

```
- (NSData *) readData:
    (int) maxBytes
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

#### 3.21.2.2 writeData:timeout:error:()

```
- (int) writeData:
    (NSData *) data
    timeout:(NSTimeInterval) timeout
    error:(NSError **) error
```

### 3.21.3 Property Documentation

#### 3.21.3.1 delegate

```
- (id) delegate [read], [write], [atomic], [assign]
```

Control delegate.

#### 3.21.3.2 inputStream

```
- (NSInputStream*) inputStream [read], [atomic], [assign]
```

Device input stream, See NSInputStream documentation.



### 3.21.3.3 outputStream

- (NSOutputStream\*) outputStream [read], [atomic], [assign]

Device output stream, See NSOutputStream documentation.

### 3.21.3.4 portConfig

- (NSString\*) portConfig [read], [write], [atomic], [copy]

Port configuration - either empty string or one of the port constants.

### 3.21.3.5 portIndex

- (int) portIndex [read], [write], [atomic], [assign]

Port index, from 0 to available ports.

### 3.21.3.6 portStatus

- (IHUB\_PORT\_STATUS) portStatus [read], [write], [atomic], [assign]

Port status - available, connected or in error state.

### 3.21.3.7 portType

- (IHUB\_PORT\_TYPE) portType [read], [write], [atomic], [assign]

Port type, serial or usb.

## 3.22 <iHUBDeviceDelegate> Protocol Reference

Generic iHUB device class delegate calls.

### Instance Methods

- (void) - [dataReceived:](#)
- (void) - [portStatusChanged:](#)

### 3.22.1 Detailed Description

Generic iHUB device class delegate calls.

### 3.22.2 Method Documentation

#### 3.22.2.1 dataReceived:()

```
- (void) dataReceived:
    (NSData *) data
```

#### 3.22.2.2 portStatusChanged:()

```
- (void) portStatusChanged:
    (IHUB_PORT_STATUS) newStatus
```

## 3.23 iHUBPortInfo Class Reference

Provides information about available ports on the device.

Inherits NSObject.

### Properties

- int [portIndex](#)  
*Port index, from 0 to available ports.*
- IHUB\_PORT\_TYPE [portType](#)  
*Port type, serial or usb.*
- IHUB\_PORT\_STATUS [portStatus](#)  
*Port status - available, connected or in error state.*
- NSString \* [portConfig](#)  
*Port configuration - either empty string or one of the port constants.*

### 3.23.1 Detailed Description

Provides information about available ports on the device.

### 3.23.2 Property Documentation

#### 3.23.2.1 portConfig

- (NSString\*) portConfig [read], [write], [atomic], [copy]

Port configuration - either empty string or one of the port constants.

#### 3.23.2.2 portIndex

- (int) portIndex [read], [write], [atomic], [assign]

Port index, from 0 to available ports.

#### 3.23.2.3 portStatus

- (IHUB\_PORT\_STATUS) portStatus [read], [write], [atomic], [assign]

Port status - available, connected or in error state.

#### 3.23.2.4 portType

- (IHUB\_PORT\_TYPE) portType [read], [write], [atomic], [assign]

Port type, serial or usb.

## 3.24 iHUBRS232Device Class Reference

iHUB RS232 device class

Inherits [iHUBDevice](#).

### Instance Methods

- (BOOL) - [setRS232ConfigWithBaud:dataBits:stopBits:parity:flowControl:error:](#)

### Additional Inherited Members

#### 3.24.1 Detailed Description

iHUB RS232 device class

### 3.24.2 Method Documentation

#### 3.24.2.1 `setRS232ConfigWithBaud:dataBits:stopBits:parity:flowControl:error:()`

```
- (BOOL) setRS232ConfigWithBaud:
    (int) baud
    dataBits:(int) dataBits
    stopBits:(IHUB_RS232_STOPBITS) stopBits
    parity:(IHUB_RS232_PARITY) parity
    flowControl:(IHUB_RS232_FLOW) flowControl
    error:(NSError **) error
```

## 3.25 iHUBUSBDeviceDescriptor Class Reference

Inherits NSObject.

### Properties

- uint16\_t [bcdUSB](#)
- uint8\_t [bDeviceClass](#)
- uint8\_t [bDeviceSubClass](#)
- uint8\_t [bDeviceProtocol](#)
- uint8\_t [bMaxPacketSize](#)
- uint16\_t [idVendor](#)
- uint16\_t [idProduct](#)
- uint16\_t [bcdDevice](#)
- NSString \* [iManufacturer](#)
- NSString \* [iProduct](#)
- NSString \* [iSerialNumber](#)
- uint8\_t [bNumConfigurations](#)

### 3.25.1 Property Documentation

#### 3.25.1.1 `bcdDevice`

```
- (uint16_t) bcdDevice [read], [write], [atomic], [assign]
```

#### 3.25.1.2 `bcdUSB`

```
- (uint16_t) bcdUSB [read], [write], [atomic], [assign]
```

#### 3.25.1.3 bDeviceClass

- (uint8\_t) bDeviceClass [read], [write], [atomic], [assign]

#### 3.25.1.4 bDeviceProtocol

- (uint8\_t) bDeviceProtocol [read], [write], [atomic], [assign]

#### 3.25.1.5 bDeviceSubClass

- (uint8\_t) bDeviceSubClass [read], [write], [atomic], [assign]

#### 3.25.1.6 bMaxPacketSize

- (uint8\_t) bMaxPacketSize [read], [write], [atomic], [assign]

#### 3.25.1.7 bNumConfigurations

- (uint8\_t) bNumConfigurations [read], [write], [atomic], [assign]

#### 3.25.1.8 idProduct

- (uint16\_t) idProduct [read], [write], [atomic], [assign]

#### 3.25.1.9 idVendor

- (uint16\_t) idVendor [read], [write], [atomic], [assign]

#### 3.25.1.10 iManufacturer

- (NSString\*) iManufacturer [read], [write], [atomic], [copy]

#### 3.25.1.11 iProduct

- (NSString\*) iProduct [read], [write], [atomic], [copy]

#### 3.25.1.12 iSerialNumber

- (NSString\*) iSerialNumber [read], [write], [atomic], [copy]

