



Windows SDK Guide for VP3300

#80149516-001

Rev. C



Revision History

Revision	Description and Reason for Change	Date
A	Initial Release - Manual;User;VP3300;SDK;Windows	2/08/2016
A	Updated UWP Implementation Information	9/16/2016
C	Updated TLV Information	9/27/2017

Contents

1	IDTech Windows SDK Reference Guide for VP3300	1
2	Important Security Notice	3
2.1	Applicability	3
2.2	What Does PA-DSS Mean to You?	3
2.3	Third Party Applications	4
2.4	PA-DSS Guidelines	4
2.5	More Information	9
3	Main Transaction Commands	11
3.1	EMV Methods	11
3.2	MSR/CTLS	12
4	Sending Direct Commands	13
5	Connecting to VP3300	14
5.1	Connect with USB:	14
6	Core Implementation: WinForms	15
6.1	Integrating with IDTechSDK.dll	15
6.2	Import the necessary libraries	15
6.3	Add using statements to utilize library	16
6.4	Implement the callback function	16
6.5	Initialize VP3300:	17
6.6	Sample Project Tutorial	17
6.6.1	Step 1: Create New Project	18
6.6.2	Step 2: Import Libraries	18
6.6.3	Step 3: Design Interface	18
6.6.4	Step 4: Configure the project file	19
6.6.5	Step 5: Configure callback to receive important SDK data (messages,log info and transaction results)	22
7	Core Implementation: UWP	27
7.1	Integrating with IDTechSDK_UWP.dll	27

7.2	Import the Necessary Libraries	27
7.3	Add Device Details to the Application's Manifest	28
7.4	Add Using Statements to Utilize Library	30
7.5	Implement the Callback Function	30
7.6	Initialize VP3300	31
7.7	Sample Project Tutorial	31
7.7.1	Step 1: Create New Project	32
7.7.2	Step 2: Import Libraries	33
7.7.3	Step 3: Add Device Details	33
7.7.4	Step 4: Design Interface	33
7.7.5	Step 5: Configure the Project File	34
7.7.6	Step 6: Configure Callback	38
8	LCD Foreign Language Mapping Table	42
9	Error Code Reference	44
10	Enumeration Reference	49
11	EMV Callback	51
12	EMV Tag Reference	52
13	Namespace Index	65
13.1	Packages	65
14	Class Index	66
14.1	Class List	66
15	Namespace Documentation	67
15.1	IDTechSDK Namespace Reference	67
15.1.1	Enumeration Type Documentation	68
15.1.1.1	CTLS_APPLICATION	69
15.1.1.2	EMV_CALLBACK_TYPE	69
15.1.1.3	EMV_LCD_DISPLAY_MODE	69
15.1.1.4	EMV_PIN_MODE	69
15.1.1.5	EMV_RESULT_CODE	69
16	Class Documentation	70
16.1	IDTechSDK.EMV_Callback Class Reference	70
16.1.1	Detailed Description	70
16.1.2	Member Data Documentation	70
16.1.2.1	callbackType	70
16.1.2.2	language	70

16.1.2.3	lcd_backlightTimeout	71
16.1.2.4	lcd_displayMode	71
16.1.2.5	lcd_entryTimeout	71
16.1.2.6	lcd_entryTimeoutMinor	71
16.1.2.7	lcd_messages	71
16.1.2.8	maskEntry	71
16.1.2.9	msr_displayMessage	72
16.1.2.10	msr_swipeTimeout	72
16.1.2.11	pin_entryInterval	72
16.1.2.12	pin_entryStartTimeout	72
16.1.2.13	pin_KSN	72
16.1.2.14	pin_pinMode	72
16.1.2.15	pin_truncatedPAN	72
16.2	IDTechSDK.IDT_VP3300 Class Reference	72
16.2.1	Detailed Description	74
16.2.2	Member Function Documentation	75
16.2.2.1	config_getDate(ref int year, ref int month, ref int day)	75
16.2.2.2	config_getSerialNumber(ref string response)	75
16.2.2.3	config_getTime(ref int hour, ref int minute)	75
16.2.2.4	config_setDate(int year, int month, int day)	76
16.2.2.5	ctls_activateTransaction(int timeout, byte[] tags, bool forceOnline, bool isFastE↔ MV=false)	76
16.2.2.6	ctls_cancelTransaction()	77
16.2.2.7	ctls_getAllConfigurationGroups(ref byte[][] response)	77
16.2.2.8	ctls_getConfigurationGroup(int group, ref byte[] tlv)	78
16.2.2.9	ctls_removeAllCAPK()	78
16.2.2.10	ctls_removeApplicationData(byte[] AID)	78
16.2.2.11	ctls_removeCAPK(byte[] capk)	78
16.2.2.12	ctls_removeConfigurationGroup(int group)	79
16.2.2.13	ctls_retrieveAIDList(ref byte[][] response)	79
16.2.2.14	ctls_retrieveApplicationData(byte[] AID, ref byte[] tlv)	79
16.2.2.15	ctls_retrieveCAPK(byte[] capk, ref byte[] key)	79
16.2.2.16	ctls_retrieveCAPKList(ref byte[] keys)	80
16.2.2.17	ctls_retrieveTerminalData(ref byte[] tlv)	80
16.2.2.18	ctls_setApplicationData(byte[] tlv)	81
16.2.2.19	ctls_setCAPK(byte[] key)	81
16.2.2.20	ctls_setConfigurationGroup(byte[] tlv)	81
16.2.2.21	ctls_setDefaultConfiguration()	82
16.2.2.22	ctls_setTerminalData(byte[] tlv)	82

16.2.2.23	<code>ctls_startTransaction(double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool forceOnline, bool isFastEMV=false)</code>	82
16.2.2.24	<code>device_activateTransaction(int timeout, byte[] tags, bool isFastEMV=false)</code>	84
16.2.2.25	<code>device_buzzer()</code>	85
16.2.2.26	<code>device_cancelTransaction()</code>	85
16.2.2.27	<code>device_controlLED(byte indexLED, byte control)</code>	85
16.2.2.28	<code>device_controlUserInterface(byte[] values)</code>	85
16.2.2.29	<code>device_enablePassThrough(bool enablePassThrough)</code>	87
16.2.2.30	<code>device_getFirmwareVersion(ref string response)</code>	87
16.2.2.31	<code>device_getPollMode(ref byte mode)</code>	87
16.2.2.32	<code>device_getResponseCodeString(RETURN_CODE eCode)</code>	87
16.2.2.33	<code>device_getTransactionResults(ref IDTransactionData results)</code>	97
16.2.2.34	<code>device_pingDevice()</code>	98
16.2.2.35	<code>device_sendDataCommand(string cmd, bool calcLRC, ref byte[] response)</code>	98
16.2.2.36	<code>device_sendDataCommand_ext(string cmd, bool calcLRC, ref byte[] response, int timeout, bool noResponse)</code>	98
16.2.2.37	<code>device_sendPAE(string command, ref string response, int timeout, string ip="")</code>	98
16.2.2.38	<code>device_sendVivoCommandP2(byte command, byte subCommand, byte[] data, ref byte[] response)</code>	99
16.2.2.39	<code>device_sendVivoCommandP2_ext(byte command, byte subCommand, byte[] data, ref byte[] response, int timeout, bool noResponse)</code>	99
16.2.2.40	<code>device_setBurstMode(byte mode)</code>	100
16.2.2.41	<code>device_setMerchantRecord(int index, bool enabled, string merchantID, string merchantURL)</code>	100
16.2.2.42	<code>device_setPollMode(byte mode)</code>	100
16.2.2.43	<code>device_startRKI()</code>	100
16.2.2.44	<code>device_startTransaction(double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool isFastEMV=false)</code>	101
16.2.2.45	<code>device_updateDeviceFirmware(byte[] firmwareData)</code>	102
16.2.2.46	<code>emv_activateTransaction(int timeout, byte[] tags, bool forceOnline, bool isFastEMV=false)</code>	103
16.2.2.47	<code>emv_allowFallback(bool allow)</code>	104
16.2.2.48	<code>emv_authenticateTransaction(byte[] updatedTLV)</code>	104
16.2.2.49	<code>emv_autoAuthenticate(bool authenticate)</code>	104
16.2.2.50	<code>emv_autoAuthenticate(bool authenticate, byte[] tags)</code>	104
16.2.2.51	<code>emv_callbackResponseLCD(EMV_LCD_DISPLAY_MODE type, byte selection)</code>	104
16.2.2.52	<code>emv_callbackResponseMSR(byte[] MSR)</code>	105
16.2.2.53	<code>emv_callbackResponsePIN(EMV_PIN_MODE type, byte[] KSN, byte[] PIN)</code>	105
16.2.2.54	<code>emv_cancelTransaction()</code>	106
16.2.2.55	<code>emv_completeTransaction(bool commError, byte[] authCode, byte[] iad, byte[] tlvScripts, byte[] tlv)</code>	106
16.2.2.56	<code>emv_getEMVConfigurationCheckValue(ref string response)</code>	106

16.2.2.57	emv_getEMVKernelCheckValue(ref string response)	107
16.2.2.58	emv_getEMVKernelVersion(ref string response)	107
16.2.2.59	emv_getTerminalMajorConfiguration(ref int configuration)	107
16.2.2.60	emv_removeAllApplicationData()	107
16.2.2.61	emv_removeAllCAPK()	108
16.2.2.62	emv_removeAllCRL()	108
16.2.2.63	emv_removeApplicationData(byte[] AID)	108
16.2.2.64	emv_removeCAPK(byte[] capk)	108
16.2.2.65	emv_removeCRL(byte[] crlList)	108
16.2.2.66	emv_removeTerminalData()	109
16.2.2.67	emv_retrieveAIDList(ref byte[][] response)	109
16.2.2.68	emv_retrieveApplicationData(byte[] AID, ref byte[] tlv)	109
16.2.2.69	emv_retrieveCAPK(byte[] capk, ref byte[] key)	109
16.2.2.70	emv_retrieveCAPKList(ref byte[] keys)	110
16.2.2.71	emv_retrieveCRLList(ref byte[] list)	110
16.2.2.72	emv_retrieveTerminalData(ref byte[] tlv)	111
16.2.2.73	emv_retrieveTransactionResult(byte[] tags, ref IDTTransactionData tlv)	111
16.2.2.74	emv_setApplicationData(byte[] name, byte[] tlv)	111
16.2.2.75	emv_setCAPK(byte[] key)	111
16.2.2.76	emv_setCRL(byte[] list)	112
16.2.2.77	emv_setTerminalData(byte[] tlv)	112
16.2.2.78	emv_setTerminalMajorConfiguration(int configuration)	113
16.2.2.79	emv_startTransaction(double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool forceOnline, bool isFastEMV=false)	113
16.2.2.80	getCommandTimeout()	113
16.2.2.81	icc_exchangeAPDU(string c_APDU, ref byte[] response)	114
16.2.2.82	icc_getICCRReaderStatus(ref byte status)	114
16.2.2.83	icc_powerOffICC()	114
16.2.2.84	icc_powerOnICC(ref byte[] ATR)	114
16.2.2.85	msr_cancelMSRSwipe()	115
16.2.2.86	msr_startMSRSwipe(int timeout)	115
16.2.2.87	SDK_Version()	115
16.2.2.88	setCallback(CallBack my_Callback)	115
16.2.2.89	setCallback(IntPtr my_Callback, SynchronizationContext context)	115
16.2.2.90	setCommandTimeout(int milliseconds)	116
16.2.3	Property Documentation	116
16.2.3.1	SharedController	116
16.3	IDTechSDK.IDTCryptoData Class Reference	116
16.3.1	Detailed Description	117
16.3.2	Member Data Documentation	117

16.3.2.1	BDK	117
16.3.2.2	clearPinBlock	117
16.3.2.3	dataResults	117
16.3.2.4	dataToProcess	117
16.3.2.5	DataVariant	117
16.3.2.6	DEK	117
16.3.2.7	errorString	117
16.3.2.8	finalPAN	117
16.3.2.9	IPEK	118
16.3.2.10	isDecryption	118
16.3.2.11	isTDES	118
16.3.2.12	keyVariant	118
16.3.2.13	KSN	118
16.3.2.14	MAC_Command	118
16.3.2.15	MACVariant	118
16.3.2.16	PAN	118
16.3.2.17	PIN	118
16.3.2.18	pinBlock	118
16.3.2.19	PINBlockType	119
16.3.2.20	PINVariant	119
16.4	IDTechSDK.IDTTransactionData Class Reference	119
16.4.1	Detailed Description	120
16.4.2	Member Data Documentation	120
16.4.2.1	captureCardType	120
16.4.2.2	captured_CSC	120
16.4.2.3	captured_Expiry	121
16.4.2.4	captured_firstPANDigits	121
16.4.2.5	captured_InitialVector	121
16.4.2.6	captured_KSN	121
16.4.2.7	captured_lastPANDigits	121
16.4.2.8	captured_MACKSN	121
16.4.2.9	captured_MACValue	121
16.4.2.10	captured_PAN	121
16.4.2.11	captured_SHA256	121
16.4.2.12	captureEncryptType	121
16.4.2.13	captureEncryptTypeEMV	122
16.4.2.14	ctlsApplication	122
16.4.2.15	device_RSN	122
16.4.2.16	emv_appErrorFn	122
16.4.2.17	emv_appErrorState	122

16.4.2.18 emv_clearingRecord	122
16.4.2.19 emv_encipheredOnlinePIN	122
16.4.2.20 emv_encryptedTags	122
16.4.2.21 emv_ESC	122
16.4.2.22 emv_hasAdvise	122
16.4.2.23 emv_hasReversal	123
16.4.2.24 emv_maskedTags	123
16.4.2.25 emv_resultCode	123
16.4.2.26 emv_RF_State	123
16.4.2.27 emv_rfStateCode	123
16.4.2.28 emv_transaction_Error_Code	123
16.4.2.29 emv_unencryptedTags	123
16.4.2.30 Event	123
16.4.2.31 fastEMV	123
16.4.2.32 hasMACVerificationData	123
16.4.2.33 iccPresent	123
16.4.2.34 isCTLS	124
16.4.2.35 mac	124
16.4.2.36 macKSN	124
16.4.2.37 message	124
16.4.2.38 msr_captureEncodeStatus	124
16.4.2.39 msr_cardType	124
16.4.2.40 msr_encTrack1	124
16.4.2.41 msr_encTrack2	124
16.4.2.42 msr_encTrack3	125
16.4.2.43 msr_errorCode	125
16.4.2.44 msr_extendedField	125
16.4.2.45 msr_hashTrack1	125
16.4.2.46 msr_hashTrack2	125
16.4.2.47 msr_hashTrack3	125
16.4.2.48 msr_KBOutput	125
16.4.2.49 msr_keyVariantType	125
16.4.2.50 msr_KSN	125
16.4.2.51 msr_rawData	125
16.4.2.52 msr_sessionID	125
16.4.2.53 msr_track1	126
16.4.2.54 msr_track1Length	126
16.4.2.55 msr_track2	126
16.4.2.56 msr_track2Length	126
16.4.2.57 msr_track3	126

16.4.2.58 msr_track3Length	126
16.4.2.59 Notification	126
16.4.2.60 pin_KeyEntry	126
16.4.2.61 pin_KSN	126
16.4.2.62 pin_pinblock	126
16.4.2.63 SW1	126
16.4.2.64 SW2	127
 Index	 128

Chapter 1

IDTech Windows SDK Reference Guide for VP3300



IDTechSDK.dll and IDTechSDK_UWP.dll are Windows dynamic link libraries that will be provided by IDTech as the main interface between Windows Forms (WinForms) and Universal Windows Platform (UWP) applications, respectively, the VP3300 and payment processing solutions.

The purpose of this document is to describe the requirements of the API as well as the interface definitions and requirements needed for a WinForms or UWP application wishing to deploy with the payment application.

- [Connecting To VP3300](#)
- [Core Implementation: WinForms](#)
- [Core Implementation: UWP](#)

- [Important Security Notice](#)
- [VP3300 Main Transaction Commands](#)
- [EMV Callback](#)
- [Sending Direct Commands](#)
- [EMV Tag Reference](#)
- [Enumeration Reference](#)
- [VP3300 Error Code Reference](#)
- [LCD Foreign Language Mapping Table](#)

Chapter 2

Important Security Notice

The Payment Card Industry Payment Application Data Security Standard (PCI PA-DSS) is comprised of fourteen requirements that support the Payment Card Industry Data Security Standard (PCI DSS). The PCI Security Standards Council (PCI SSC), which was founded by the major card brands in June 2005, set these requirements in order to protect cardholder payment information. The standards set by the council are enforced by the payment card companies who established the Council: American Express, Discover Financial Services, JCB International, MasterCard Worldwide, and Visa, Inc.

PCI PA-DSS is an evolution of Visas Payment Application Best Practices (PABP), which was based on the Visa Cardholder Information Security Program (CISP). In addition to Visa CISP, PCI DSS combines American Express Data Security Operating Policy (DSOP), Discover Networks Information Security and Compliance (DISC), and MasterCards Site Data Protection (SDP) into a single comprehensive set of security standards. The transition to PCI PA-DSS was announced in April 2008. In early October 2008, PCI PA-DSS Version 1.2 was released to align with the PCI DSS Version 1.2, which was released on October 1, 2008. On January 1, 2011, PCI PA-DSS Version 2.0 was released. This extends the PCI DSS Version 1.2, which was released on October 1, 2008 and is effective as of January 1, 2011.

2.1 Applicability

The PCI PA-DSS applies to any payment application that stores, processes, or transmits cardholder data as part of authorization or settlement, unless the application would fall under the merchants PCI DSS validation. It is important to note that PA-DSS validated payment applications alone do not guarantee PCI DSS compliance for the merchant. The validated payment application must be implemented in a PCI DSS compliant environment. If your application runs on Windows XP, you are required to turn off Windows XP System Restore Points.

2.2 What Does PA-DSS Mean to You?

The following table provides opening points to cover in any discussion with merchants on data storage.

	Data Element	Storage Permitted	Protection Required	PCI DSS Req. 3, 4
Cardholder Data	Primary Account Number	Yes	Yes	Yes
	Cardholder Name ¹	Yes	Yes ¹	No
	Service Code ¹	Yes	Yes ¹	No
	Expiration Date ¹	Yes	Yes ¹	No
Sensitive Authentication Data ²	Full Magnetic Stripe Data ³	No	N/A	N/A
	CAV2/CID/CVC2/CVV2	No	N/A	N/A
	PIN/PIN Block	No	N/A	N/A

¹ These data elements must be protected if stored in conjunction with the PAN. This protection should be per PCI DSS requirements for general protection of the cardholder environment. Additionally, other legislation (for example, related to consumer personal data protection, privacy, identity theft, or data security) may require specific protection of this data, or proper disclosure of a company's practices if consumer-related personal data is being collected during the course of business. PCI DSS, however, does not apply if PANs are not stored, processed, or transmitted.

² Do not store sensitive authentication data after authorization (even if encrypted).

³ Full track data from the magnetic stripe, magnetic-stripe image on the chip, or elsewhere.

2.3 Third Party Applications

The end-to-end transaction process, beginning with entry into the third party application until the response from the payment engine is returned, must meet the same level of compliance. In order to claim the third party application is end-to-end compliant, the application would need to be submitted to a QSA for a full PA-DSS audit.

The end user and/or P.O.S. developer can integrate and be compliant in the processing portion of a payment transaction. A brief review (given below) of the PA-DSS environmental variables that impact the end user merchant can help the end user merchant obtain and/or maintain PA-DSS compliance. Environmental variables that could prevent passing an audit include without limitation issues involving a secure network connection(s), end user setup location security, users, logging and assigned rights. Remove all testing configurations, samples, and data prior to going into production on your application.

2.4 PA-DSS Guidelines

The following PA-DSS Guidelines are being provided by IDTech as a convenience to its customers. Customers should not rely on these PA-DSS Guidelines, but should instead always refer to the most recent PCI DSS Program Guide published by PCI SSC.

1. Sensitive Data Storage Guidelines

Do not retain full magnetic stripe, card validation code or value (CAV2, CID, CVC2, CVV2), or PIN block data.

1.1 Do not store sensitive authentication data after authorization (even if encrypted): Sensitive authentication data includes the data as cited in the following Requirements 1.1.1 through 1.1.3. PCI Data Security Standard Requirement 3.2

Note: By prohibiting storage of sensitive authentication data after authorization, the assumption is that the transaction has completed the authorization process and the customer has received the final transaction approval. After authorization has completed, this sensitive authentication data cannot be stored.

1.1.1 After authorization, do not store the full contents of any track from the magnetic stripe (located on the back

of a card, contained in a chip, or elsewhere). This data is alternatively called full track, track, track 1, track 2, and magnetic-stripe data.

In the normal course of business, the following data elements from the magnetic stripe may need to be retained:

- The accountholders name,
- Primary account number (PAN),
- Expiration date, and
- Service code
- To minimize risk, store only those data elements needed for business.

Note: See PCI DSS and PA-DSS Glossary of Terms, Abbreviations, and Acronyms for additional information. PCI Data Security Standard Requirement 3.2.1

1.1.2 After authorization, do not store the card-validation value or code (three-digit or four-digit number printed on the front or back of a payment card) used to verify card-not-present transactions. Note: See PCI DSS and PA-DSS Glossary of Terms, Abbreviations, and Acronyms for additional information. PCI Data Security Standard Requirement 3.2.2

1.1.3 After authorization, do not store the personal identification number (PIN) or the encrypted PIN block.

Note: See PCI DSS and PA-DSS Glossary of Terms, Abbreviations, and Acronyms for additional information. PCI Data Security Standard Requirement 3.2.3

1.1.4 Securely delete any magnetic stripe data, card validation values or codes, and PINs or PIN block data stored by previous versions of the payment application, in accordance with industry-accepted standards for secure deletion, as defined, for example by the list of approved products maintained by the National Security Agency, or by other State or National standards or regulations. PCI Data Security Standard Requirement 3.2

Note: This requirement only applies if previous versions of the payment application stored sensitive authentication data.

1.1.5 Securely delete any sensitive authentication data (pre-authorization data) used for debugging or troubleshooting purposes from log files, debugging files, and other data sources received from customers, to ensure that magnetic stripe data, card validation codes or values, and PINs or PIN block data are not stored on software vendor systems. These data sources must be collected in limited amounts and only when necessary to resolve a problem, encrypted while stored, and deleted immediately after use. PCI Data Security Standard Requirement 3.2

2. Protect stored cardholder data

2.1 Software vendor must provide guidance to customers regarding purging of cardholder data after expiration of customer-defined retention period. PCI Data Security Standard Requirement 3.1

2.2 Mask PAN when displayed (the first six and last four digits are the maximum number of digits to be displayed).

Notes:

- This requirement does not apply to those employees and other parties with a legitimate business need to see full PAN;
- This requirement does not supersede stricter requirements in place for displays of cardholder data for example, for point-of-sale (POS) receipts. PCI Data Security Standard Requirement 3.3

2.3 Render PAN, at a minimum, unreadable anywhere it is stored, (including data on portable digital media, backup media, and in logs) by using any of the following approaches:

- One-way hashes based on strong cryptography with associated key management processes and procedures
- Truncation

- Index tokens and pads (pads must be securely stored)
- Strong cryptography with associated key management processes and procedures. The MINIMUM account information that must be rendered unreadable is the PAN. PCI Data Security Standard Requirement 3.4

The PAN must be rendered unreadable anywhere it is stored, even outside the payment application. Note: Strong cryptography is defined in the PCI DSS and PA-DSS Glossary of Terms, Abbreviations, and Acronyms.

2.4 If disk encryption is used (rather than file- or column-level database encryption), logical access must be managed independently of native operating system access control mechanisms (for example, by not using local user account databases). Decryption keys must not be tied to user accounts. PCI Data Security Standard Requirement 3.4.2

2.5 Payment application must protect cryptographic keys used for encryption of cardholder data against disclosure and misuse. PCI Data Security Standard Requirement 3.5

2.6 Payment application must implement key management processes and procedures for cryptographic keys used for encryption of cardholder data. PCI Data Security Standard Requirement 3.6

2.7 Securely delete any cryptographic key material or cryptogram stored by previous versions of the payment application, in accordance with industry-accepted standards for secure deletion, as defined, for example the list of approved products maintained by the National Security Agency, or by other State or National standards or regulations. These are cryptographic keys used to encrypt or verify cardholder data. PCI Data Security Standard Requirement 3.6

Note: This requirement only applies if previous versions of the payment application used cryptographic key materials or cryptograms to encrypt cardholder data.

3. Provide secure authentication features

3.1 The payment application must support and enforce unique user IDs and secure authentication for all administrative access and for all access to cardholder data. Secure authentication must be enforced to all accounts, generated or managed by the application by the completion of installation and for subsequent changes after the "out of the box" installation (defined at PCI DSS Requirements 8.1, 8.2, and 8.5.88.5.15) for all administrative access and for all access to cardholder data. PCI Data Security Standard Requirements 8.1, 8.2, and 8.5.88.5.15

Note: These password controls are not intended to apply to employees who only have access to one card number at a time to facilitate a single transaction. These controls are applicable for access by employees with administrative capabilities, for access to servers with cardholder data, and for access controlled by the payment application. This requirement applies to the payment application and all associated tools used to view or access cardholder data.

3.1.10 If a payment application session has been idle for more than 15 minutes, the application requires the user to re-authenticate. PCI Data Security Standard Requirement 8.5.15.

3.2 Software vendors must provide guidance to customers that all access to PCs, servers, and databases with payment applications must require a unique user ID and secure authentication. PCI Data Security Standard Requirements 8.1 and 8.2

3.3 Render payment application passwords unreadable during transmission and storage, using strong cryptography based on approved standards

Note: Strong cryptography is defined in PCI DSS and PA-DSS Glossary of Terms, Abbreviations, and Acronyms. PCI Data Security Standard Requirement 8.4

4. Log payment application activity

4.1 At the completion of the installation process, the out of the box default installation of the payment application must log all user access (especially users with administrative privileges), and be able to link all activities to individual users. PCI Data Security Standard Requirement 10.1

4.2 Payment application must implement an automated audit trail to track and monitor access. PCI Data Security Standard Requirements 10.2 and 10.3

5. Develop secure payment applications

5.1 Develop all payment applications in accordance with PCI DSS (for example, secure authentication and logging) and based on industry best practices and incorporate information security throughout the software development life cycle. These processes must include the following: PCI Data Security Standard Requirement 6.3

5.1.1 Live PANS are not used for testing or development. PCI Data Security Standard Requirement 6.4.4.

- Validation of all input (to prevent cross-site scripting, injection flaws, malicious file execution, etc.)
- Validation of proper error handling
- Validation of secure cryptographic storage
- Validation of secure communications
- Validation of proper role-based access control (RBAC)

5.1.2 Separate development/test, and production environments

5.1.3 Removal of test data and accounts before production systems become active development. PCI Data Security Standard Requirement 6.4.4

5.1.4 Review of payment application code prior to release to customers after any significant change, to identify any potential coding vulnerability. Removal of custom payment application accounts, user IDs, and passwords before payment applications are released to customers

Note: This requirement for code reviews applies to all payment application components (both internal and public-facing web applications), as part of the system development life cycle required by PA-DSS Requirement 5.1 and PCI DSS Requirement 6.3. Code reviews can be conducted by knowledgeable internal personnel or third parties.

5.2 Develop all web payment applications (internal and external, and including web administrative access to product) based on secure coding guidelines such as the Open Web Application Security Project Guide. Cover prevention of common coding vulnerabilities in software development processes, to include:

- Injection flaws, with particular emphasis on SQL injection, Cross-site scripting (XSS) OS Command Injection, LDAP and Xpath injection flaws, as well as other injection flaws.
- Buffer Overflow.
- Insecure cryptographic storage.
- Insecure communications.
- Improper error handling.
- All HIGH vulnerabilities as identified in the vulnerability identification process at PA-DSS Requirement 7.1.
- Cross-site scripting (XSS)
- Improper access control such as insecure direct object references, failure to restrict URL access and directory traversal.
- Cross-site request forgery (CSRF)

Note: The vulnerabilities listed in PA-DSS Requirements 5.2.1 through 5.2.9 and in PCI DSS at 6.5.1 through 6.5.9 were current in the OWASP guide when PCI DSS v1.2 / PCI DSS v2.0 (01/01/10) were published. However, if and when the OWASP guide is updated, the current version must be used for these requirements.

5.3 Software vendor must follow change control procedures for all product software configuration changes. PCI Data Security Standard Requirement 6.4. 5.The procedures must include the following:

- Documentation of impact
- Management sign-off by appropriate parties
- Testing functionality to verify the new change(s) does not adversely impact the security of the system. Remove all testing configurations, samples, and data before finalizing the product for production.

- Back-out or product de-installation procedures

5.4 The payment application must not use or require use of unnecessary and insecure services and protocols (for example, NetBIOS, file-sharing, Telnet, unencrypted FTP must be secured via SSH, S-FTP, SSL, IPsec and other technology to implement end to end security). PCI Data Security Standard Requirement 2.2.2

6. Protect wireless transmissions

6.1 For payment applications using wireless technology, the wireless technology must be implemented securely. Payment applications using wireless technology must facilitate use of industry best practices (for example, IEEE 802.11i) to implement strong encryption for authentication and transmission. Controls must be in place to protect the implemented wireless network from unknown wireless access points and clients. This includes testing the end users wireless deployment on a quarterly basis to detect unauthorized access points within the system. Change wireless vendor defaults, including but not limited to default wireless encryption keys, passwords, and SSID community strings. Maintain a detailed updated hardware list. The end to end wireless implementation must be end to end secure. The use of WEP as a security control was prohibited as of 30 June 2010. PCI Data Security Standard Requirements 1.2.3, 2.1.1, 4.1.1, 6.2, 11.1a-e and 11.4a-c.

7. Test payment applications to address vulnerabilities

7.1 Software vendors must establish a process to identify newly discovered security vulnerabilities (for example, subscribe to alert services freely available on the Internet) and to test their payment applications for vulnerabilities. Any underlying software or systems that are provided with or required by the payment application (for example, web servers, third-party libraries and programs) must be included in this process. Remove all test configurations, samples, and data after testing and before promoting the changes to production. PCI Data Security Standard Requirement 6.2

7.2 Software vendors must establish a process for timely development and deployment of security patches and upgrades, which includes delivery of updates and patches in a secure manner with a known chain-of-trust, and maintenance of the integrity of patch and update code during delivery and deployment.

8. Facilitate secure network implementation

8.1 The payment application must be able to be implemented into a secure network environment. Application must not interfere with use of devices, applications, or configurations required for PCI DSS compliance (for example, payment application cannot interfere with anti-virus protection, firewall configurations, or any other device, application, or configuration required for PCI DSS compliance). PCI Data Security Standard Requirements 1, 3, 4, 5, and 6.

9. Cardholder data must never be stored on a server connected to the Internet

9.1 The payment application must be developed such that the database server and web server are not required to be on the same server, nor is the database server required to be in the DMZ with the web server. PCI Data Security Standard Requirement 1.3.7

10. Facilitate secure remote software updates

10.1 If payment application updates are delivered securely via remote access into customers systems, software vendors must tell customers to turn on remote-access technologies only when needed for downloads from vendor

and to turn off immediately after download completes. Alternatively, if delivered via VPN or other high-speed connection, software vendors must advise customers to properly configure a firewall or a personal firewall product to secure authentication using a two factor authentication mechanism. PCI Data Security Standard Requirement 8.3

10.2 If payment application may be accessed remotely, remote access to the payment application must be authenticated using a two factor authentication mechanism. PCI Data Security Standard Requirement 8.3

10.3 Any remote access into the payment application must be done securely. If vendors, resellers/integrators, or customers can access customers payment applications remotely, the remote access must be implemented securely. PCI Data Security Standard Requirements 1, 8.3 and 12.3.9

11. Encrypt sensitive traffic over public networks

11.1 If the payment application sends, or facilitates sending, cardholder data over public networks, the payment application must support use of strong cryptography and security protocols such as SSL/TLS and Internet protocol security (IPSEC) to safeguard sensitive cardholder data during transmission over open, public networks. Examples of open, public networks that are in scope of the PCI DSS are: The Internet Wireless technologies Global System for Mobile Communications (GSM) General Packet Radio Service (GPRS) PCI Data Security Standard Requirement 4.1

11.2 The payment application must never send unencrypted PANs by end-user messaging technologies (for example, e-mail, instant messaging, and chat). PCI Data Security Standard Requirement 4.2

12. Encrypt all non-console administrative access

12.1 Instruct customers to encrypt all non-console administrative access using technologies such as SSH, VPN, or SSL/TLS for web-based management and other non-console administrative access. Telnet or remote login must never be used for administrative access. PCI Data Security Standard Requirement 2.3

13. Maintain instructional documentation and training programs for customers, resellers, and integrators

13.1 Develop, maintain, and disseminate a PA-DSS Implementation Guide(s) for customers, resellers, and integrators that accomplishes the following:

- Addresses all requirements in this document wherever the PA-DSS Implementation Guide is referenced.
- Includes a review at least annually and updates to keep the documentation current with all major and minor software changes as well as with changes to the requirements in this document.

13.2 Develop and implement training and communication programs to ensure payment application resellers and integrators know how to implement the payment application and related systems and networks according to the PA-DSS Implementation Guide and in a PCI DSS-compliant manner.

- Update the training materials on an annual basis and whenever new payment application versions are released.

2.5 More Information

IDTech Systems, Inc. highly recommends that merchants contact the card association(s) or their processing company and find out exactly what they mandate and/or recommend. Doing so may help merchants protect themselves from fines and fraud.

For more information related to security, visit:

- <http://www.pcisecuritystandards.org>
- <http://www.visa.com/cisp>
- <http://www.sans.org/resources>
- <http://www.microsoft.com/security/default.asp>
- <https://sdp.mastercardintl.com/>
- <http://www.americanexpress.com/merchantspecs>

CAPN questions: capninfocenter@aexp.com

Chapter 3

Main Transaction Commands

The methods below are provided as a reference to the main commands needed to execute an EMV transaction.

3.1 EMV Methods

Start EMV Transaction

```
IDTechSDK::IDT_VP3300::emv_startTransaction()
```

Begins an amount authorization request with the ICC. Returns authorization decision (approved, denied, or go online) in callback method.

Authenticate EMV Transaction

```
IDTechSDK::IDT_VP3300::emv_authenticateTransaction()
```

By default, auto-authenticate is ON and this step does not need to be performed. If auto-authenticate is OFF (`IDTechSDK::IDT_VP3300::emv_autoAuthenticate`), when the results to `IDTechSDK::IDT_VP3300::emv_startTransaction()` come back as `EMV_RESULT_CODE.EMV_RESULT_CODE_AUTHENTICATE_TRANSACTION`, this method must be called to continue the EMV transaction.

Complete Online EMV Transaction

```
IDTechSDK::IDT_VP3300::emv_completeTransaction()
```

After receiving a host response, pass host tags (minimum 8A Authorization Response Code) as a parameter.

If there was a communication error with host, you must still finish the EMV transaction by passing "TRUE" for `commError`.

Terminal Configuration

```
IDTechSDK::IDT_VP3300::emv_retrieveTerminalData()
IDTechSDK::IDT_VP3300::emv_setTerminalData()
```

Methods for terminal configuration. When setting the terminal data, you pass the tags in TLV format.

AID Management

```
IDTechSDK::IDT_VP3300::emv_retrieveApplicationData
IDTechSDK::IDT_VP3300::emv_removeApplicationData()
IDTechSDK::IDT_VP3300::emv_removeAllApplicationData()
IDTechSDK::IDT_VP3300::emv_setApplicationData()
IDTechSDK::IDT_VP3300::emv_retrieveAIDList()
```

Methods for AID management. When setting the AID, you pass tags in TLV format. When retrieving AID, you can receive the results as tags in TLV format. When retrieving the AID list, the list of AID Names/length can be retrieved from the 2 dimensional byte array

CAPK Management

```
IDTechSDK::IDT_VP3300::emv_retrieveCAPK()
IDTechSDK::IDT_VP3300::emv_removeCAPK()
IDTechSDK::IDT_VP3300::emv_removeAllCAPK()
IDTechSDK::IDT_VP3300::emv_setCAPK()
IDTechSDK::IDT_VP3300::emv_retrieveCAPKList()
```

Methods for Certificate Authority Public Key management. When setting the CAPK, you populate and pass the key as a sequence of ordered bytes. When specifying a CAPK to retrieve or remove, you populate the name in the byte[] parameter. When retrieving the CAPK list, the list of RID/Index can be retrieved from the ordered byte stream, 6 bytes each, bytes 1-5 RID, byte 6 index

CRL Management

```
IDTechSDK::IDT_VP3300::emv_removeCRL()
IDTechSDK::IDT_VP3300::emv_removeAllCRL()
IDTechSDK::IDT_VP3300::emv_retrieveCRLList()
IDTechSDK::IDT_VP3300::emv_setCRL:()
```

Methods for Certificate Revocation List management.

Kernel Version

```
IDTechSDK::IDT_VP3300::emv_getEMVKernelVersion()
```

Method to retrieve kernel version. Valued returned in IDTResult.data

APDU Communication

```
IDTechSDK::IDT_VP3300::device_setPassThroughMode:()
IDTechSDK::IDT_VP3300::icc_powerOnICC:()
IDTechSDK::IDT_VP3300::icc_powerOffICC:()
```

```
IDTechSDK::IDT_VP3300::icc_exchangeAPDU:()
```

Allows the direct sending of APDU packets to ICC. Pass through mode must first be enabled. Then Power On needs to complete successfully. Then APDU packet exchange can take place

3.2 MSR/CTLS

Request Swipe or Tap

```
IDTechSDK::IDT_VP3300::msr_startMSRSwipe()
IDTechSDK::IDT_VP3300::ctls_startTransaction()
```

Both methods perform identical operation. Enables MSR to receive Swipe and CTLS to receive tap.

Cancel Swipe or Tap

```
IDTechSDK::IDT_VP3300::msr_cancelMSRSwipe()
IDTechSDK::IDT_VP3300::ctls_cancelTransaction()
```

Both methods perform identical operation. Cancels the Swipe/Tap request.

Chapter 4

Sending Direct Commands

The main purpose of DLL for VP3300 is to expedite integration to the device by providing the connectivity and communication protocols. It also provides the main functions to get device info, perform contact EMV Transactions, perform swipe/Tap transactions, and to modify contact EMV data files.

The VP3300 has an extensive and powerful command set based on the NEO platform. A NEO command consists of a Command, a Sub Command, and optionally data. To access these commands, please reference the NEO/IDG Command document included as a separate item in the SDK. Please note that Protocol 1 commands have been deprecated, and any existing Protocol 1 commands relevant to VP3300 can be accomplished by a Protocol 2 command. The DLL uses the following the command to send Protocol 2 commands to VP3300:

[IDTechSDK::IDT_VP3300::device_sendVivoCommandP2\(\)](#)

Any function not supported by the SDK can be sent with the `sendVivoCommandP2`.

Chapter 5

Connecting to VP3300

The VP3300 connects through USB.

5.1 Connect with USB:

The VP3300 uses USB-HID (Human Interface Device) and does not need any vendor-specific drivers. Simply by plugging into an available USB port makes it available for SDK connectivity. The SDK will automatically scan/detect the VP3300 when any singleton instance command is executed. For example:

```
String fw = null;  
IDT_VP3300.SharedController.device_getFirmwareVersion(ref fw);
```

When the SharedController is accessed for the first time, the SDK scans the USB bus for the specific VID/PID of the VP3300. If found, it will execute the command.

Chapter 6

Core Implementation: WinForms

IDTechSDK.dll includes class libraries to interface with the VP3300. This guide assumes a fair understanding of Visual Studio 2013+, C# and general Windows programming knowledge.

6.1 Integrating with IDTechSDK.dll

- [Import the necessary libraries](#)
- [Add using statements to utilize library](#)
- [Implement the callback function](#)
- [Initialize VP3300](#)
- [Sample Project Tutorial](#)

6.2 Import the necessary libraries

Communicating with IDTech Devices requires the following library to be referenced by the project:

- IDTechSDK.dll

Add the reference as you would any .NET managed library reference. The most direct method would be right-click on the "References" in the Solution Explorer for the project, select "Add Reference...", click "Browse..." and locate IDTechSDK.dll.

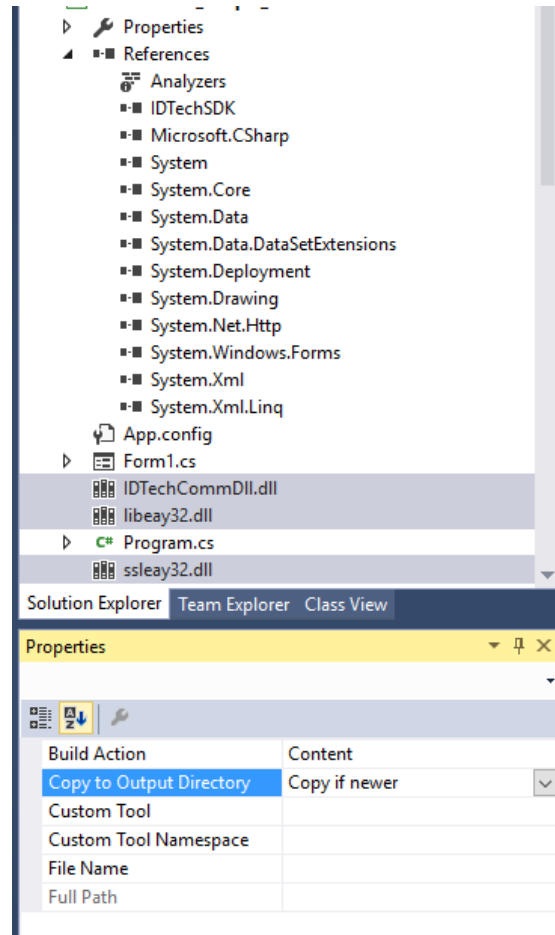
IDTechSDK.dll has a dependency of Microsoft .NET 4.5 or greater. Please make sure your final application installer checks for this dependency and installs it if not on the destination system.

In addition, the following libraries need to be added to project folder and included in with the application distribution:

- VP3300_config.dll
- VP3300_ctls.dll
- VP3300_device.dll
- VP3300_emv.dll
- VP3300_icc.dll
- VP3300_msr.dll
- VP3300_parse.dll

You can add these libraries by right-clicking on your project name in the solution Explorer and select "Add->Existing Item..." or keyboard shortcut Shift-Alt-A.

Once all three items are added, set their properties to "Copy if newer" so they will be included in the final applications destination folder.



6.3 Add using statements to utilize library

Add a line of code to the class that will utilize IDTechSDK.dll at the start of the file:

```
using IDTechSDK;
```

6.4 Implement the callback function

There is a single method that will receive all callback information from the SDK. It uses DeviceState to determine which action to take.

```
private void MessageCallBack(IDTechSDK.IDT_DEVICE_Types type, DeviceState state, byte[] data,
    IDTTransactionData cardData, EMV_Callback emvCallback, RETURN_CODE transactionResultCode)
{
    switch (state)
    {
```

```

        case DeviceState.ToConnect:
            //A connection attempt is starting for IDT_DEVICE_TYPES type
            break;
        case DeviceState.DefaultDeviceTypeChange:
            //The SDK is changing the default device to IDT_DEVICE_TYPES type
            break;
        case DeviceState.Connected:
            //A connection has been made to IDT_DEVICE_TYPES type
            break;
        case DeviceState.Disconnected:
            //A disconnection has occurred with IDT_DEVICE_TYPES type
            break;
        case DeviceState.ConnectionFailed:
            //A connection attempt has failed for IDT_DEVICE_TYPES type
            break;
        case DeviceState.TransactionData:
            //Transaction data is being returned in IDTTransactionData cardData
            break;
        case DeviceState.DataReceived:
            //Low-level data received for IDT_DEVICE_TYPES type
            break;
        case DeviceState.DataSent:
            //Low-level data sent for IDT_DEVICE_TYPES type
            break;
        case DeviceState.CommandTimeout:
            //Command timeout has occurred for IDT_DEVICE_TYPES type
            break;
        case DeviceState.ToSwipe:
            //Awaiting a swipe for IDT_DEVICE_TYPES type
            break;
        case DeviceState.MSRDecodeError:
            //Awaiting a swipe for IDT_DEVICE_TYPES type
            break;
        case DeviceState.ToTap:
            //Awaiting a contactless tap for IDT_DEVICE_TYPES type
            break;
        case DeviceState.SwipeTimeout:
            //Waiting for swipe timed out
            break;
        case DeviceState.TransactionCancelled:
            //Transaction has been cancelled
            break;
        case DeviceState.DeviceTimeout:
            //Waiting for device timeout
            SetOutputText("Callback:DeviceTimeout\n");
            break;
        case DeviceState.TransactionFailed:
            //Transaction failed to complete
            break;
        case DeviceState.EMVCallback:
            //Callback during EMV transaction retrieved from EMV_Callback emvCallback
            break;
        default:
            break;
    }
}
}

```

6.5 Initialize VP3300:

A Singleton instance has been established in the IDT_VP3300 class. Establish the callback, and then access the VP3300 through USB via the SharedController instance.

```

public VP3300_Simple_Demo()
{
    InitializeComponent();
    IDT_VP3300.SetCallback(MessageCallback);
}

```

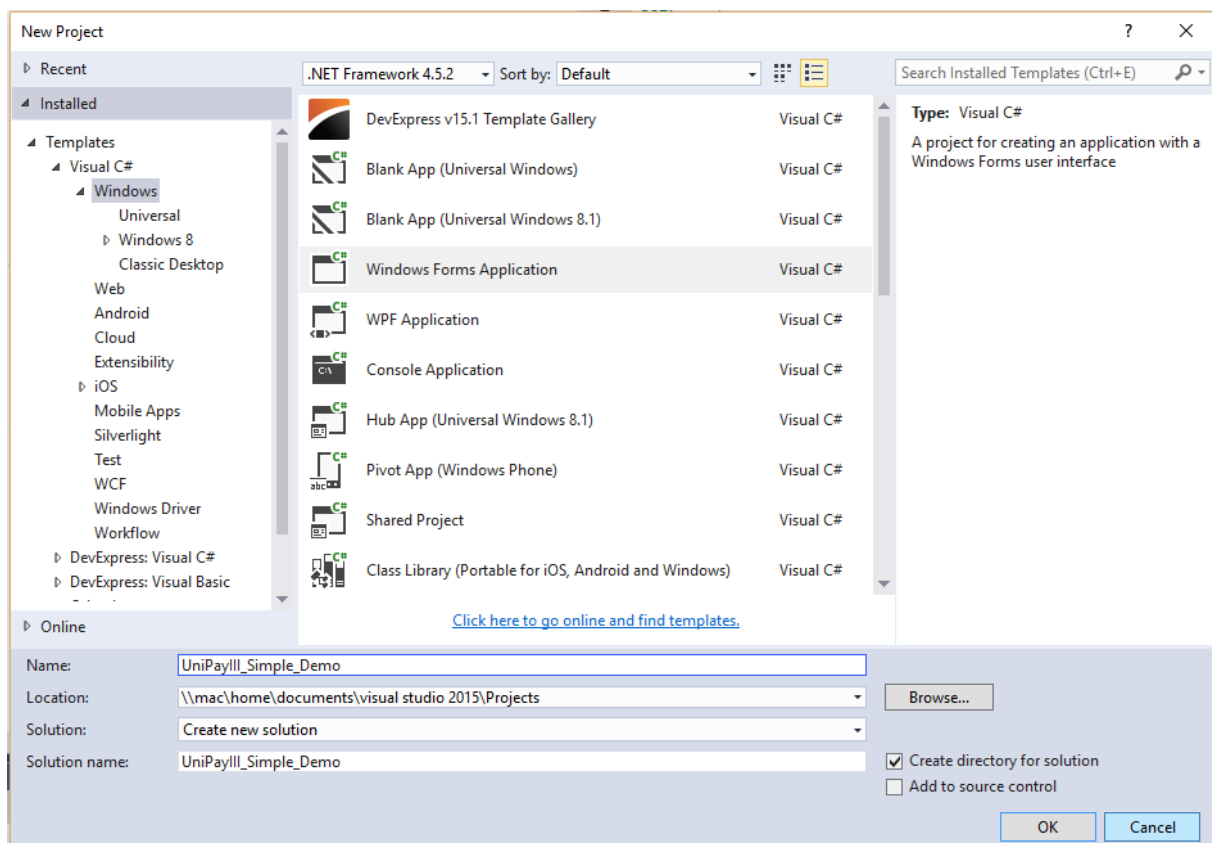
6.6 Sample Project Tutorial

Using Visual Studio 2015, we will create a C# sample project that will interface with the VP3300 and will perform the following activities:

- Get firmware version
- Display ICC Status (card inserted/removed, ICC power on/off)
- Turn on/off ICC reader
- Get/Set terminal data file
- Get/Set AID for Visa
- Get/Set CAPKs for Visa
- Perform EMV Transaction
- Start/Stop a Swipe/Tap Request
- Show log of all data going to/from VP3300

6.6.1 Step 1: Create New Project

Create a new Windows Form Application in Visual Studio. In our example, we use project name VP3300_Simple_Demo



6.6.2 Step 2: Import Libraries

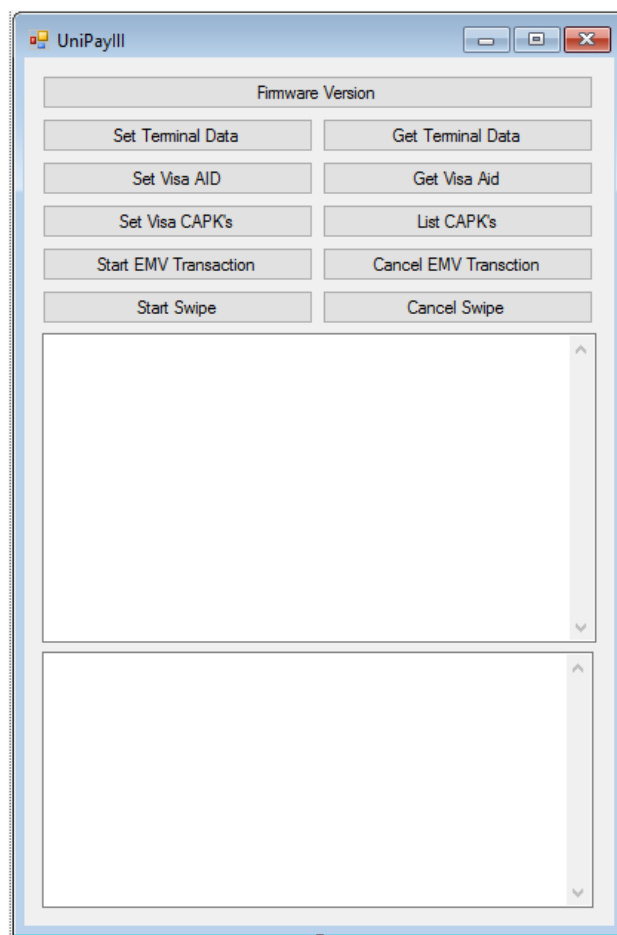
Import the necessary libraries

6.6.3 Step 3: Design Interface

Use the Form Designer to layout buttons/fields

Open your form designer and add items so it contains the following buttons/fields:

- Radio buttons for USB and COM selection. For COM selection, add a text box to specify COM port
- Add buttons to execute the following functions:
 - Show Firmware
 - Set Terminal Data
 - Get Terminal Data
 - Set Visa AID
 - Get Visa AID
 - Set Visa CAPKs
 - List All CAPKs
 - Start EMV Transaction
 - Cancel EMV Transaction
 - Start Swipe/Tap
 - Cancel Swipe/Tap
- Add a text box to communicate data from the VP3300.
- Add a text box for the log of VP3300.



6.6.4 Step 4: Configure the project file

In the start of the class file, perform the following:

- [Add using statements to utilize library](#)


```

else
{
    tbOutput.AppendText("Retrieve Terminal failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)
    )rt) + " : " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
}
}

private void btnSetVisaAid_Click(object sender, EventArgs e)
{
    RETURN_CODE rt;
    byte[] name = Common.getBytes("a0000000031010");
    byte[] aid = Common.getBytes("
9f01065649534130305f5701005f2a0208409f090200965f3601029f1b0400003a98df
25039f3704df28039f0802dfef150101df13050000000000df14050000000000df15050000000000df180100df170400002710df190100");
    rt = IDT_VP3300.SharedController.emv_setApplicationData(name, aid);
    if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
    {
        tbOutput.AppendText("Default AID Successful\r\n");
    }
    else
    {
        tbOutput.AppendText("Default AID failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) +
        " : " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
    }
}

private void btnGetVisaAid_Click(object sender, EventArgs e)
{
    byte[] tlv = null;
    RETURN_CODE rt = IDT_VP3300.SharedController.emv_retrieveApplicationData(Common.getBytes("
a0000000031010"), ref tlv);
    if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
    {
        tbOutput.AppendText("Retrieve AID Successful- TLV: " + " \r\n" + Common.getHexStringFromBytes(tlv)
        + " \r\n");
    }
    else
    {
        tbOutput.AppendText("Retrieve AID failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt)
        + " : " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
        System.Diagnostics.Debug.WriteLine("Retrieve AID failed Error Code: " + "0x" + String.Format(
        "{0:X}", (ushort)rt));
    }
}

private void btnSetVisaCAPKs_Click(object sender, EventArgs e)
{
    byte[] capk = Common.getBytes("
a000000003500101b769775668cacb5d22a647d1d993141edab7237b000100018000d
11197590057b84196c2f4d11a8f3c05408f422a35d702f90106ea5b019b28ae607aa9cdebcd0d81a38d48c7ebb0062d287369ec0c42
124246ac30d80cd602ab7238d51084ded4698162c59d25eac1e66255b4db2352526ef0982c3b8ad3dlcce85b01db5788e75e09f44be736136
RETURN_CODE rt = IDT_VP3300.SharedController.emv_setCAPK(capk, null);
capk = Common.getBytes("
a000000003510101b9d248075a3f23b522fe45573e04374dc4995d71000000039000db5fa29d
1fda8c1634b04dcccff148abee63c772035c79851d3512107586e02a917f7c7e885e7c4a7d529710a145334ce67dc412cb1597b77aa25
43b98d19cf2cb80c522bdbea0f1b113fa2c86216c8c610a2d58f29cf3355ceblbd3ef410d1eddlf7ae0f16897979de28c6ef293e0a19282bd
rt = IDT_VP3300.SharedController.emv_setCAPK(capk, null);
capk = Common.getBytes("
a000000003530101ac213a2e0d20ca35ad0201323536d58097e4e5700000003f800bcd83721
be52cccc4b6457321f22a7dc769f54eb8025913be804d9eabbfa19b3d7c5d3ca658d768caf57067eec83c7e6e9f81d0586703ed9ddd
dd20675d63424980b10eb364e81eb37db40ed100344c928886ff4ccc37203ee6106d5b59d1ac102e2cd2d7ac17f4d96c398e5fd993ec
b4ffdf79b17547ff9fa2aa8eedf6cbdal24cbb17a0f8528146387135e226b005a474b9062ff264d2ff8efa36814aa2950065b1b04c0a
1ae9b2f69d4a4aa979d6ce95fee9485ed0a03aee9bd953e81cfd1ef6e814dfd3c2ce37aefa38c1f9877371e91d6a5eb59fdedf75d3325fa3c
rt = IDT_VP3300.SharedController.emv_setCAPK(capk, null);
capk = Common.getBytes("
a0000000039601017616e9ac8be014af88c11a8fb17967b7394030e000000038000b74586d1
9a207be6627c5b0aafbc44a2ecf5a2942d3a26ce19c4ffae9e920521868922e893e7838225a3947a2614796fb2c0628ce8c11e3825a5
6d3b1bbaef783a5c6a81f36f8625395126fa983c5216d3166d48acde8a431212ff763a7f79d9edb7fed76b485de45beb829a3d4730848a366
rt = IDT_VP3300.SharedController.emv_setCAPK(capk, null);
capk = Common.getBytes("
a000000003570101251a5f5de61cf28b5c6e2b5807c0644a01d46ff5000100016000942b7f2b
a5ea307312b63df77c5243618acc2002bd7ecb74d821fe7bdc78bf28f49f74190ad9b23b9713b140ffec1fb429d93f56bdc7ade4ac075d755
rt = IDT_VP3300.SharedController.emv_setCAPK(capk, null);
capk = Common.getBytes("
a000000003580101753ed0aa23e4cd5abd69eae7904b684a34a57c2200010001c80099552c4a
1ecd68a0260157fc4151b5992837445d3fc57365ca5692c87be358cdcdf2c92fb6837522842a48eb11cdf2fd91770c7221e4af6207
c2de4004c7deeb1b6276dc62d52a87d2cd01fbf2dc4065db52824d2a2167a06d19e6a0f781071cddb2dd314cb94441d8dc0e936317b77b
f06f5177f6c5aba3a3bc6aa30209c97260b7alad3a192c9b8cd1d153570afcc87c3cd681d13e997fe33b3963a0a1c79772ac9f91033e1b839
rt = IDT_VP3300.SharedController.emv_setCAPK(capk, null);
capk = Common.getBytes("
a00000000354010106960618791a86d387301edd4a3baf2d34fef1b400010001f800c6ddc0b7
645f7f16286ab7e4116655f56dd0c944766040dc68664dd973bd3bfd4c525bcbb95272b6b3ad9ba8860303ad08d9e8cc344a4070f4cf
b9eeaf29c8a3460850c264cda39bbe3a7e7d08a69c31b5c8dd9f94ddbc9265758c0e7399adcf4362caee458d414c52b498274881b196
dacca7273f687f2a65faeb809d4b2ac1d3d1efb4f6490322318bd296d153b307a3283ab4e5be6ebd910359a8565eb9c4360d24baaca3
dbfe393f3d6c830d603c6fcl83409dfcd80d3a33ba243813bbb4ceaf9cbab6b74b00116f72ab278a88a011d70071e06cab140646438d986d
rt = IDT_VP3300.SharedController.emv_setCAPK(capk, null);
if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)

```

```

        {
            tbOutput.AppendText("Load Visa CAPK Successful:" + " \r\n");
        }
        else
        {
            tbOutput.AppendText("Load Visa CAPK failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt)
                + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
        }
    }

    private void btnListCAPKs_Click(object sender, EventArgs e)
    {
        byte[] capk = null;
        RETURN_CODE rt = IDT_VP3300.SharedController.emv_retrieveCAPKList(ref capk);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            tbOutput.AppendText("List CAPK Successful \r\n");
            if (capk.Length > 0)
            {
                for (int x = 0; x < capk.Length; x = x + 6)
                {
                    byte[] thecapk = new byte[] { capk[x], capk[x + 1], capk[x + 2], capk[x + 3], capk[x + 4],
                        capk[x + 5] };
                    tbOutput.AppendText(Common.getHexStringFromBytes(thecapk) + " \r\n");
                }
            }
        }
        else
        {
            tbOutput.AppendText("List CAPK failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + "
                : " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
        }
    }

    private void btnStartSwipe_Click(object sender, EventArgs e)
    {
        RETURN_CODE rt = IDT_VP3300.SharedController.msr_startMSRSwipe(60);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            tbOutput.AppendText("MSR Turned On successfully; Ready to swipe\r\n");
            tbOutput.ReadOnly = false;
            tbOutput.Focus();
        }
        else
        {
            tbOutput.AppendText("MSR Turned On failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt)
                + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
        }
    }

    private void btnCancelSwipe_Click(object sender, EventArgs e)
    {
        RETURN_CODE rt = IDT_VP3300.SharedController.msr_cancelMSRSwipe();
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            tbOutput.AppendText("MSR Turned Off successfully\r\n");
            System.Diagnostics.Debug.WriteLine("MSR Turned Off successfully");
        }
        else
        {
            tbOutput.AppendText("MSR Turned Off failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt)
                + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("MSR Turned Off failed Error Code: " + "0x" + String.
                Format("{0:X}", (ushort)rt));
        }
    }
}

```

6.6.5 Step 5: Configure callback to receive important SDK data (messages, log info and transaction results)

```

private void MessageCallback(IDTechSDK.IDT_DEVICE_Types type, DeviceState state, byte[] data,
    IDTTransactionData cardData, EMV_Callback emvCallback, RETURN_CODE transactionResultCode)
{
    switch (state)
    {
        case DeviceState.ToConnect:
            //A connection attempt is starting for IDT_DEVICE_TYPES type
            SetOutputText("Callback:ToConnect\n");
            break;
        case DeviceState.DefaultDeviceTypeChange:
            //The SDK is changing the default device to IDT_DEVICE_TYPES type
    }
}

```



```

        SetOutputText ("Callback:DefaultDeviceTypeChange\n");
        break;
    case DeviceState.Connected:
        //A connection has been made to IDT_DEVICE_TYPES type
        SetOutputText ("Callback:Connected\n");
        break;
    case DeviceState.Disconnected:
        //A disconnection has occurred with IDT_DEVICE_TYPES type
        SetOutputText ("Callback:Disconnected\n");
        break;
    case DeviceState.ConnectionFailed:
        //A connection attempt has failed for IDT_DEVICE_TYPES type
        SetOutputText ("Callback:ConnectionFailed\n");
        break;
    case DeviceState.TransactionData:
        //Transaction data is being returned in IDTTransactionData cardData
        SetOutputText ("Callback:TransactionData\n");
        if (cardData.emv_resultCode == EMV_RESULT_CODE.EMV_RESULT_CODE_GO_ONLINE)
        {
            //auto complete. Normally, a host response is required here
            SetOutputText ("Online request. Auto Complete EMV Transaction.\n");
            byte[] responseCode = new byte[] { 0x30, 0x30 };
            byte[] iad = new byte[] { 0x11, 0x22, 0x33, 0x44, 0x55, 0x66, 0x77, 0x88, 0x30, 0x30 };
            RETURN_CODE rt = IDT_VP3300.SharedController.emv_completeTransaction(false, responseCode,
iad, null, null);
            return;
        }
        displayCardData(cardData);
        break;
    case DeviceState.DataReceived:
        //Low-level data received for IDT_DEVICE_TYPES type
        SetOutputTextLog(GetTimestamp() + " IN: " + Common.getHexStringFromBytes(data));
        break;
    case DeviceState.DataSent:
        //Low-level data sent for IDT_DEVICE_TYPES type
        SetOutputTextLog(GetTimestamp() + " OUT: " + Common.getHexStringFromBytes(data));
        break;
    case DeviceState.CommandTimeout:
        SetOutputText ("Callback:CommandTimeout\n");
        //Command timeout has occurred for IDT_DEVICE_TYPES type
        break;
    case DeviceState.ToSwipe:
        //Awaiting a swipe for IDT_DEVICE_TYPES type
        SetOutputText ("Callback:ToSwipe\n");
        break;
    case DeviceState.MSRDecodeError:
        //Awaiting a swipe for IDT_DEVICE_TYPES type
        SetOutputText ("Callback:MSRDecodeError\n");
        break;
    case DeviceState.ToTap:
        //Awaiting a contactless tap for IDT_DEVICE_TYPES type
        SetOutputText ("Callback:ToTap\n");
        break;
    case DeviceState.SwipeTimeout:
        //Waiting for swipe timed out
        SetOutputText ("Callback:SwipeTimeout\n");
        break;
    case DeviceState.TransactionCancelled:
        //Transaction has been cancelled
        SetOutputText ("Callback:TransactionCancelled\n");
        break;
    case DeviceState.DeviceTimeout:
        //Waiting for device timeout
        SetOutputText ("Callback:DeviceTimeout\n");
        break;
    case DeviceState.TransactionFailed:
        //Transaction failed to complete
        SetOutputText ("Callback:TransactionFailed\n");
        break;
    case DeviceState.EMVCallback:
        //Callback during EMV transaction retrieved from EMV_Callback emvCallback
        SetOutputText ("Callback:EMVCallback\n");
        if (emvCallback.callbackType == EMV_CALLBACK_TYPE.EMV_CALLBACK_TYPE_LCD) //LCD
        Callback Type
        {
            if (emvCallback.lcd_displayMode == EMV_LCD_DISPLAY_MODE.
EMV_LCD_DISPLAY_MODE_CLEAR_SCREEN)
            {
                SetOutputText ("LCD Callback:Clear LCD Screen\n");
                return;
            }
            else if (emvCallback.lcd_displayMode == EMV_LCD_DISPLAY_MODE.
EMV_LCD_DISPLAY_MODE_MESSAGE)
            {
                // A message is requested to be displayed. See other test app included with SDK for a
                complete example.
            }
        }
    }
}

```

```

        SetOutputText("LCD Callback:Display Message\n");
    }
    else
    {
        //Display message with menu/language or prompt, and return result to
        emv_callbackResponseLCD
        //Kernel will not proceed until this step is complete
        //seeing to default value of 1. See other test app included with SDK for a complete
        example
        SetOutputText("LCD Callback:Menu Display Request. Sending result 1\n");
        IDT_VP3300.SharedController.emv_callbackResponseLCD(emvCallback.lcd_displayMode, 1);
    }

    }
    break;
default:
    break;
}

}

private void displayCardData(IDTTransactionData cardData)
{
    string text = "";

    if (cardData.Event == EVENT_TRANSACTION_DATA_Types.EVENT_TRANSACTION_PIN_DATA)
    {
        SetOutputText("PIN Data received:\r\nKSN: " + cardData.pin_KSN + "\r\nPINBLOCK: " + cardData.
            pin_pinblock + "\r\n");
        return;
    }

    if (cardData.Event == EVENT_TRANSACTION_DATA_Types.EVENT_TRANSACTION_DATA_CARD_DATA)
    {
        SetOutputText("Data received: (Length [" + cardData.msr_rawData.Length.ToString() + "])\n" + string.
            Concat(cardData.msr_rawData.ToArray().Select(b => b.ToString("X2")).ToArray()) + "\r\n");
        System.Diagnostics.Debug.WriteLine("Data received: (Length [" + cardData.msr_rawData.Length.
            ToString() + "])\n" + string.Concat(cardData.msr_rawData.ToArray().Select(b => b.ToString("X2")).ToArray()));
    }

    if (cardData.device_RSN != null && cardData.device_RSN.Length > 0)
        text += "Serial Number: " + cardData.device_RSN + "\r\n";

    if (cardData.msr_track1Length > 0)
        text += "Track 1: " + cardData.msr_track1 + "\r\n";

    if (cardData.msr_encTrack1 != null)
        text += "Track 1 Encrypted: " + Common.getHexStringFromBytes(cardData.msr_encTrack1) + "\r\n";

    if (cardData.msr_hashTrack1 != null)
        text += "Track 1 Hash: " + Common.getHexStringFromBytes(cardData.msr_hashTrack1) + "\r\n";

    if (cardData.msr_track2Length > 0)
        text += "Track 2: " + cardData.msr_track2 + "\r\n";

    if (cardData.msr_encTrack2 != null)
        text += "Track 2 Encrypted: " + Common.getHexStringFromBytes(cardData.msr_encTrack2) + "\r\n";

    if (cardData.msr_hashTrack2 != null)
        text += "Track 2 Hash: " + Common.getHexStringFromBytes(cardData.msr_hashTrack2) + "\r\n";

    if (cardData.msr_track3Length > 0)
        text += "Track 3: " + cardData.msr_track3 + "\r\n";

    if (cardData.msr_encTrack3 != null)
        text += "Track 3 Encrypted: " + Common.getHexStringFromBytes(cardData.msr_encTrack3) + "\r\n";

    if (cardData.msr_hashTrack3 != null)
        text += "Track 3 Hash: " + Common.getHexStringFromBytes(cardData.msr_hashTrack3) + "\r\n";
}

```

```

if (cardData.msr_KSN != null)
    text += "KSN: " + Common.getHexStringFromBytes(cardData.msr_KSN) + "\r\n";

if (cardData.emv_clearingRecord != null)
{
    if (cardData.emv_clearingRecord.Length > 0)
    {
        text += "\r\nCTLS Clearing Record: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_clearingRecord) + "\r\n";
        Dictionary<string, string> dict = Common.processTLVUnencrypted(cardData.emv_clearingRecord);
        foreach (KeyValuePair<string, string> kvp in dict) text += kvp.Key + ": " + kvp.Value + "\r\n";
        text += "\r\n\r\n";
    }
}

if (cardData.emv_unencryptedTags != null)
{
    if (cardData.emv_unencryptedTags.Length > 0)
    {
        text += "\r\n===== \r\n";

        text += "\r\nUnencrypted Tags: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_unencryptedTags) + "\r\n\r\n";
        text += tlvToValues(cardData.emv_unencryptedTags);
        text += "\r\n===== \r\n";
    }
}

if (cardData.emv_encryptedTags != null)
{
    if (cardData.emv_encryptedTags.Length > 0)
    {
        text += "\r\n===== \r\n";
        text += "\r\nEncrypted Tags: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_encryptedTags) + "\r\n\r\n";
        text += tlvToValues(cardData.emv_encryptedTags);
        text += "\r\n===== \r\n";
    }
}

if (cardData.emv_maskedTags != null)
{
    if (cardData.emv_maskedTags.Length > 0)
    {
        text += "\r\n===== \r\n";
        text += "\r\nMasked Tags: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_maskedTags) + "\r\n\r\n";
        text += tlvToValues(cardData.emv_maskedTags);
        text += "\r\n===== \r\n";
    }
}

text += "ICC Present: ";
text += (cardData.iccPresent ? "TRUE" : "FALSE") + "\r\n";
text += "is CTLS: ";
text += (cardData.isCTLS ? "TRUE" : "FALSE") + "\r\n";

if (cardData.Event == EVENT_TRANSACTION_DATA.Types.EVENT_TRANSACTION_DATA_EMV_DATA)
{
    if (!cardData.isCTLS) text += "Capture Encrypt Type: " + ((cardData.emv_encryptionMode ==
    EMV_ENCRYPTION_MODE.EMV_ENCRYPTION_MODE_TDES) ? "TDES" : "AES") + "\r\n";
    switch (cardData.emv_resultCode)
    {
        case EMV_RESULT_CODE.EMV_RESULT_CODE_APPROVED:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_APPROVED" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_APPROVED_OFFLINE:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_APPROVED_OFFLINE" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_DECLINED_OFFLINE:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_DECLINED_OFFLINE" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_DECLINED:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_DECLINED" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_GO_ONLINE:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_GO_ONLINE" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_CALL_YOUR_BANK:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_CALL_YOUR_BANK" + "\r\n");
    }
}

```

```

        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_NOT_ACCEPTED:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_NOT_ACCEPTED" + "\r\n");
        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_FALLBACK_TO_MSR:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_FALLBACK_TO_MSR" + "\r\n");
        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_TIMEOUT:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_TIMEOUT" + "\r\n");
        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_AUTHENTICATE_TRANSACTION:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_AUTHENTICATE_TRANSACTION" + "\r\n");
        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_SWIPE_NON_ICC:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_SWIPE_NON_ICC" + "\r\n");
        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_CTLS_TWO_CARDS:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_CTLS_TWO_CARDS" + "\r\n");
        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_CTLS_TERMINATE:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_CTLS_TERMINATE" + "\r\n");
        break;
    case EMV_RESULT_CODE.EMV_RESULT_CODE_CTLS_TERMINATE_TRY_ANOTHER:
        text += ("EMV RESULT: " + "EMV_RESULT_CODE_CTLS_TERMINATE_TRY_ANOTHER" + "\r\n");
        break;
    }
}

SetOutputText(text);
}

private string tlvToValues(byte[] tlv)
{
    string text = "";
    Dictionary<string, string> dict = Common.processTLVUnencrypted(tlv);
    foreach (KeyValuePair<string, string> kvp in dict) text += kvp.Key + ": " + kvp.Value + "\r\n";
    return text;
}

delegate void SetTextCallback(string text);

private void SetOutputText(string text)
{
    // InvokeRequired required compares the thread ID of the
    // calling thread to the thread ID of the creating thread.
    // If these threads are different, it returns true.
    if (tbOutput.InvokeRequired)
    {
        SetTextCallback d = new SetTextCallback(SetOutputText);
        Invoke(d, new object[] { text });
    }
    else
    {
        try { tbOutput.AppendText(text + "\r\n"); } catch (Exception ex) { }
    }
}

private void SetOutputTextLog(string text)
{
    // InvokeRequired required compares the thread ID of the
    // calling thread to the thread ID of the creating thread.
    // If these threads are different, it returns true.
    if (logOutput.InvokeRequired)
    {
        SetTextCallback d = new SetTextCallback(SetOutputTextLog);
        Invoke(d, new object[] { text });
    }
    else
    {
        try { logOutput.AppendText(text + "\r\n"); }
        catch (Exception ex)
        {
            System.Diagnostics.Debug.WriteLine("Exception: " + ex);
        }
    }
}
}

```

Chapter 7

Core Implementation: UWP

IDTechSDK_UWP.dll includes class libraries to interface with the VP3300. This guide assumes a fair understanding of Visual Studio 2015+, C# and general Windows programming knowledge.

7.1 Integrating with IDTechSDK_UWP.dll

- [Import the Necessary Libraries](#)
- [Add Device Details to the Application's Manifest](#)
- [Add Using Statements to Utilize Library](#)
- [Implement the Callback Function](#)
- [Initialize VP3300](#)
- [Sample Project Tutorial](#)

7.2 Import the Necessary Libraries

Communicating with IDTech Devices requires the following library to be referenced by the project:

- IDTechSDK_UWP.dll

Add the reference as you would any .NET managed library reference. The most direct method would be right-click on the "References" in the Solution Explorer for the project, select "Add Reference...", click "Browse..." and locate IDTechSDK_UWP.dll.

IDTechSDK_UWP.dll has a dependency of Microsoft .NET Core. Please make sure your final application installer checks for this dependency and installs it if not on the destination system.

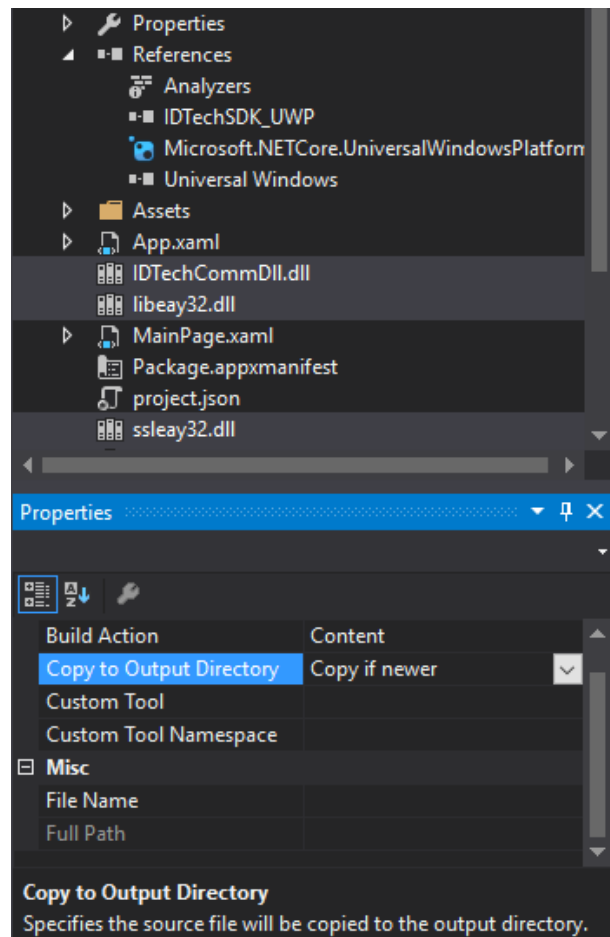
In addition, the following libraries need to be added to project folder and included in with the application distribution:

- VP3300_config_UWP.dll
- VP3300_ctls_UWP.dll
- VP3300_device_UWP.dll
- VP3300_emv_UWP.dll
- VP3300_icc_UWP.dll
- VP3300_msr_UWP.dll

- VP3300_parse_UWP.dll

You can add these libraries by right-clicking on your project name in the solution Explorer and select "Add->Existing Item..." or keyboard shortcut Shift-Alt-A.

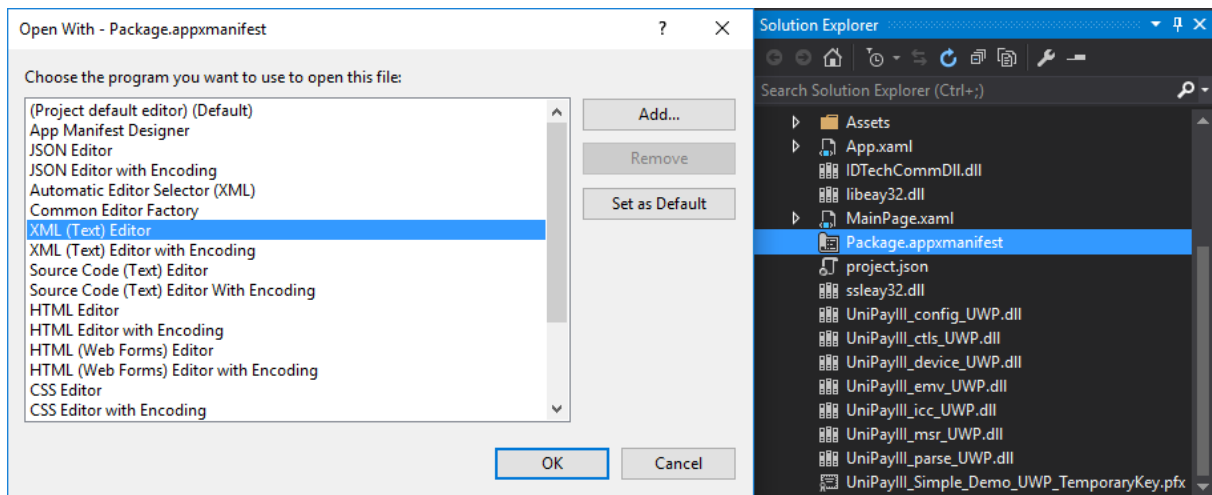
Once all three items are added, set their properties to "Copy if newer" so they will be included in the final applications destination folder.



7.3 Add Device Details to the Application's Manifest

In order for your application to recognize the device, the device's details must be added to the application's manifest file.

Open up your project's Package.appxmanifest file by right-clicking on it in the Solution Explorer, selecting "Open With...", and then choosing "XML (Text) Editor".



Search for the "Capabilities" tag and add the following code in between:

```
<DeviceCapability Name="humaninterfacedevice">
  <!-- VP3300 -->
  <Device Id="vidpid:0ACD 3520 usb">
    <Function Type="usage:FF00 0001"/>
  </Device>
</DeviceCapability>
```

The aforementioned code contains the vendor ID (VID) and product ID (PID) of a VP3300 device.

The Package.appxmanifest file should now look similar to the following:

```
<?xml version="1.0" encoding="utf-8"?>

<Package
  xmlns="http://schemas.microsoft.com/appx/manifest/foundation/windows10"
  xmlns:mp="http://schemas.microsoft.com/appx/2014/phone/manifest"
  xmlns:uap="http://schemas.microsoft.com/appx/manifest/uap/windows10"
  IgnorableNamespaces="uap mp">

  <Identity
    Name="122f2a12-ff29-418e-b4d4-f006ce22dd96"
    Publisher="CN=davidt"
    Version="1.0.0.0" />

  <mp:PhoneIdentity PhoneProductId="122f2a12-ff29-418e-b4d4-f006ce22dd96" PhonePublisherId="
    00000000-0000-0000-0000-000000000000"/>

  <Properties>
    <DisplayName>VP3300_Simple_Demo_UWP</DisplayName>
    <PublisherDisplayName>davidt</PublisherDisplayName>
    <Logo>Assets\StoreLogo.png</Logo>
  </Properties>

  <Dependencies>
    <TargetDeviceFamily Name="Windows.Universal" MinVersion="10.0.0.0" MaxVersionTested="10.0.0.0" />
  </Dependencies>

  <Resources>
    <Resource Language="x-generate"/>
  </Resources>

  <Applications>
    <Application Id="App"
      Executable="$targetnametoken$.exe"
      EntryPoint="VP3300_Simple_Demo_UWP.App">
      <uap:VisualElements
        DisplayName="VP3300_Simple_Demo_UWP"
        Square150x150Logo="Assets\Square150x150Logo.png"
        Square44x44Logo="Assets\Square44x44Logo.png"
        Description="VP3300_Simple_Demo_UWP"
        BackgroundColor="transparent">
```

```

        <uap:DefaultTile Wide310x150Logo="Assets\Wide310x150Logo.png"/>
        <uap:SplashScreen Image="Assets\SplashScreen.png" />
    </uap:VisualElements>
</Application>
</Applications>

<Capabilities>
    <Capability Name="internetClient" />
    <DeviceCapability Name="humaninterfacedevice">
        <!-- VP3300 -->
        <Device Id="vidpid:0ACD 3520 usb">
            <Function Type="usage:FF00 0001"/>
        </Device>
    </DeviceCapability>
</Capabilities>
</Package>

```

7.4 Add Using Statements to Utilize Library

Add a line of code to the class that will utilize IDTechSDK_UWP.dll at the start of the file:

```
using IDTechSDK;
```

7.5 Implement the Callback Function

There is a single method that will receive all callback information from the SDK. It uses DeviceState to determine which action to take.

```

private void MessageCallBack(IDTechSDK.IDT_DEVICE_Types type, DeviceState state, byte[] data,
    IDTTransactionData cardData, EMV_Callback emvCallback, RETURN_CODE transactionResultCode)
{
    switch (state)
    {
        case DeviceState.ToConnect:
            //A connection attempt is starting for IDT_DEVICE_TYPES type
            break;
        case DeviceState.DefaultDeviceTypeChange:
            //The SDK is changing the default device to IDT_DEVICE_TYPES type
            break;
        case DeviceState.Connected:
            //A connection has been made to IDT_DEVICE_TYPES type
            break;
        case DeviceState.Disconnected:
            //A disconnection has occurred with IDT_DEVICE_TYPES type
            break;
        case DeviceState.ConnectionFailed:
            //A connection attempt has failed for IDT_DEVICE_TYPES type
            break;
        case DeviceState.TransactionData:
            //Transaction data is beign returned in IDTTransactionData cardData
            break;
        case DeviceState.DataReceived:
            //Low-level data received for IDT_DEVICE_TYPES type
            break;
        case DeviceState.DataSent:
            //Low-level data sent for IDT_DEVICE_TYPES type
            break;
        case DeviceState.CommandTimeout:
            //Command timeout has occurred for IDT_DEVICE_TYPES type
            break;
        case DeviceState.ToSwipe:
            //Awaiting a swipe for IDT_DEVICE_TYPES type
            break;
    }
}

```



```

        case DeviceState.MSRDecodeError:
            //Awaiting a swipe for IDT_DEVICE_TYPES type
            break;
        case DeviceState.ToTap:
            //Awaiting a contactless tap for IDT_DEVICE_TYPES type
            break;
        case DeviceState.SwipeTimeout:
            //Waiting for swipe timed out
            break;
        case DeviceState.TransactionCancelled:
            //Transaction has been cancelled
            break;
        case DeviceState.DeviceTimeout:
            //Waiting for device timeout
            SetOutputText("Callback:DeviceTimeout\n");
            break;
        case DeviceState.TransactionFailed:
            //Transaction failed to complete
            break;
        case DeviceState.EMVCallback:
            //Callback during EMV transaction retrieved from EMV_Callback emvCallback
            break;
        default:
            break;
    }
}

```

7.6 Initialize VP3300

A Singleton instance has been established in the IDT_VP3300 class. Establish the callback, and then access the VP3300 through USB via the SharedController instance.

```

public MainPage()
{
    this.InitializeComponent();
    IDT_VP3300.setCallback(MessageCallBack);
}

```

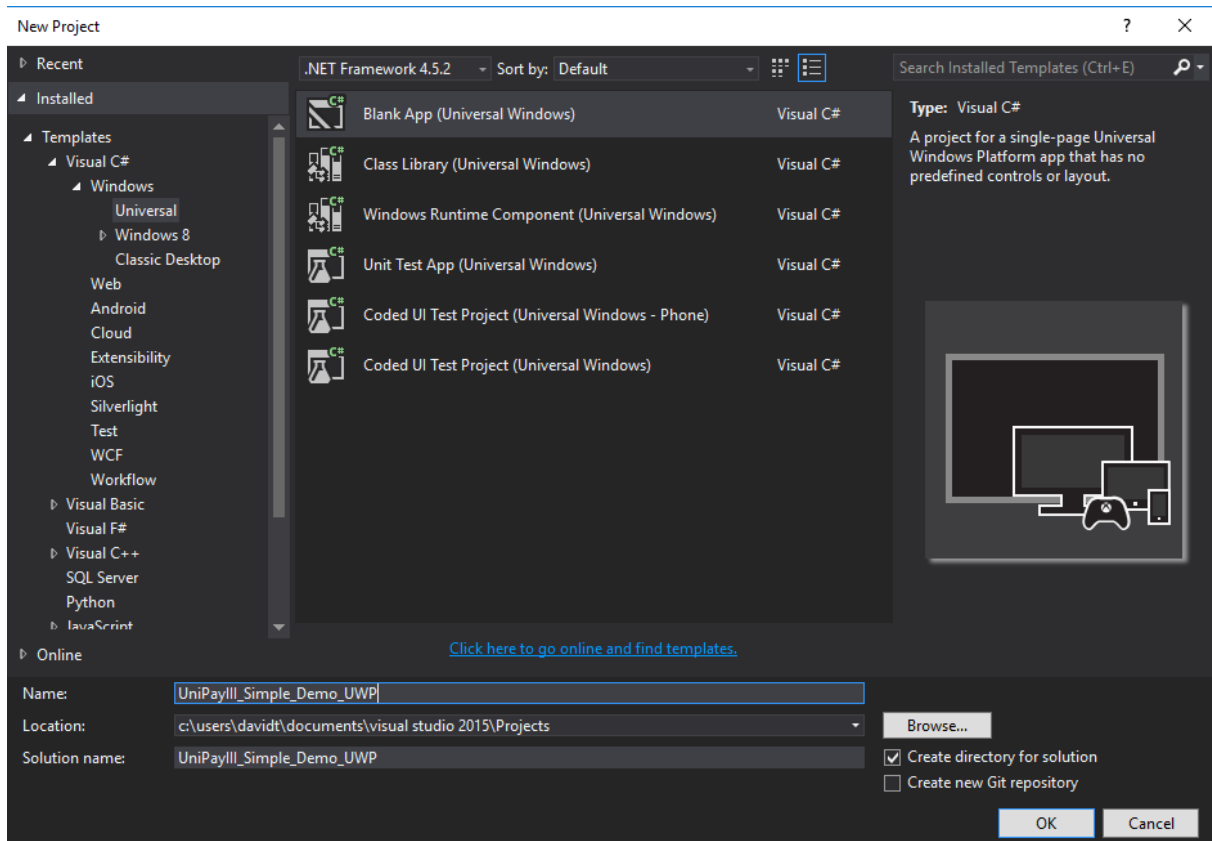
7.7 Sample Project Tutorial

Using Visual Studio 2015, we will create a C# sample project that will interface with the VP3300 and will perform the following activities:

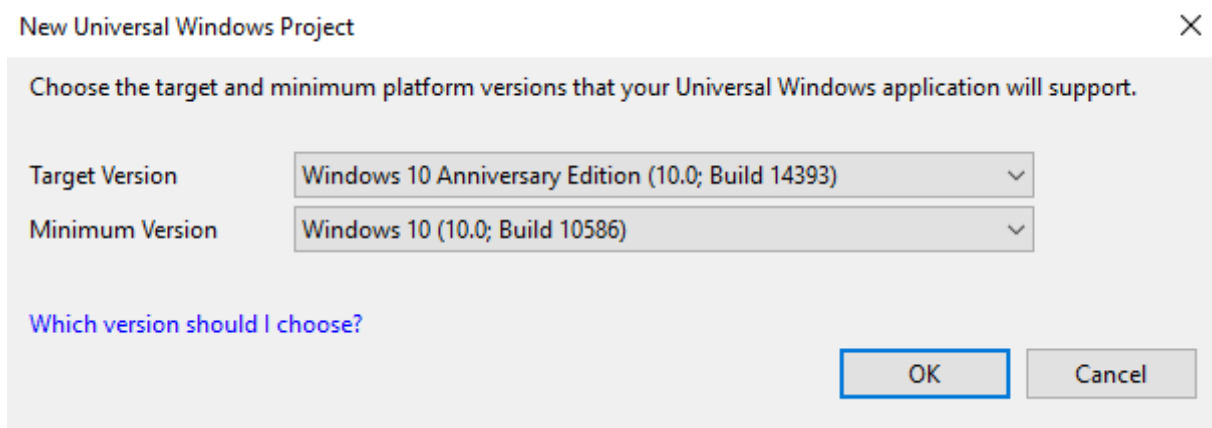
- Get firmware version
- Get/Set terminal data file
- Get/Set AID for Visa
- Get/Set CAPKs for Visa
- Perform EMV Transaction
- Start/Stop a Swipe/Tap Request
- Show log of all data going to/from VP3300

7.7.1 Step 1: Create New Project

Create a new Blank App (Universal Windows) in Visual Studio. In our example, we use project name VP3300_↔ Simple_Demo_UWP



On the following popup, choose the target and minimum versions that your application will support. We have chosen the following for our demo application:



7.7.2 Step 2: Import Libraries

[Import the Necessary Libraries](#)

7.7.3 Step 3: Add Device Details

[Add Device Details to the Application's Manifest](#)

7.7.4 Step 4: Design Interface

Use the Designer to layout buttons/fields

Open your designer and add items so it contains the following buttons/fields:

- Add buttons to execute the following functions:
 - Show Firmware
 - Set Terminal Data
 - Get Terminal Data
 - Set Visa AID
 - Get Visa AID
 - Set Visa CAPKs
 - List All CAPKs
 - Start EMV Transaction
 - Cancel EMV Transaction
 - Start Swipe/Tap
 - Cancel Swipe/Tap
- Add a text box to communicate data from the VP3300.
- Add a text box for the log of VP3300.
- Add a text box to display the connection status.



7.7.5 Step 5: Configure the Project File

In the start of the class file, perform the following:

- [Add Using Statements to Utilize Library](#)
- Set callback method and initialize VP3300 singleton object in the class initializer. Reference: [Initialize VP3300](#)
- Implement the button methods Click handlers for button press code execution

```
private void btnGetFirmwareVersion_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        string firmwareVersion = "";
        byte[] reData = { };
        RETURN_CODE rt = IDT_VP3300.SharedController.device_getFirmwareVersion(ref firmwareVersion);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            try
            {
                SetOutputText("Firmware Ver: " + firmwareVersion + "\r\n");
            }
            catch (Exception ex)
            {
                System.Diagnostics.Debug.WriteLine(ex.Message);
            }
            System.Diagnostics.Debug.WriteLine("Firmware Ver: " + firmwareVersion);
        }
        else
    }
}
```

```

        {
            SetOutputText("Get Firmware Fail Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " +
                IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Get Firmware Fail Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnSetTerminalData_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        byte[] term = Common.getBytesArray("5f3601029f1a0208409f3501229f330360f8c89f4005f00000a0019f1e085465726d696e616c9f150212349f160f30303030303030303030303030309f1c0838373635343332319f4e2231303732312057616c6b65722053742e20437970726573732c204341202c5553412edf260101df1008656e667265737a68df110101df270100dfee150101dfee160100dfee170107dfee180180dfee1e08f0dc3cf0c29e9400dfee1f0180dfee1b083030303135313030dfee20013cdfee21010adfee2203323c");
        RETURN_CODE rt = IDT_VP3300.SharedController.emv_setTerminalData(term);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("Set Terminal Successful: " + "\r\n");
            System.Diagnostics.Debug.WriteLine("Set Terminal Successful");
        }
        else
        {
            SetOutputText("Save Terminal failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " +
                IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Save Terminal failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnGetTerminalData_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        byte[] tlv = null;
        RETURN_CODE rt = IDT_VP3300.SharedController.emv_retrieveTerminalData(ref tlv);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("Retrieve Terminal Successful- TLV: " + "\r\n" + Common.getHexStringFromBytes(tlv) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Retrieve Terminal Successful- TLV: " + "\r\n" + Common.getHexStringFromBytes(tlv));
        }
        else
        {
            SetOutputText("Retrieve Terminal failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " +
                IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Retrieve Terminal failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnSetVisaAID_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        RETURN_CODE rt;
        byte[] name = Common.getBytesArray("a0000000031010");
        byte[] aid = Common.getBytesArray("9f01065649534130305f5701005f2a0208409f090200965f3601029f1b0400003a98df25039f3704df28039f0802dfee150101df13050000000000df14050000000000df15050000000000df180100df170400002710df19010");
        rt = IDT_VP3300.SharedController.emv_setApplicationData(name, aid);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("Default AID Successful\r\n");
            System.Diagnostics.Debug.WriteLine("Default AID Successful");
        }
        else
        {
            SetOutputText("Default AID failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " +
                IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Default AID failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnGetVisaAID_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        byte[] tlv = null;
    });
}

```

```

        RETURN_CODE rt = IDT_VP3300.SharedController.emv_retrieveApplicationData(Common.getByteArray("
a0000000031010"), ref tlv);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("Retrieve AID Successful- TLV: " + " \r\n" + Common.getHexStringFromBytes(tlv) +
                "\r\n");
            System.Diagnostics.Debug.WriteLine("Retrieve AID Successful- TLV: " + " \r\n" + Common.
getHexStringFromBytes(tlv));
        }
        else
        {
            SetOutputText("Retrieve AID failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) +
                ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Retrieve AID failed Error Code: " + "0x" + String.
Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnSetVisaCAPKs_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        byte[] capk = Common.getByteArray("
a000000003500101b769775668cacb5d22a647d1d993141edab7237b000100018
000d11197590057b84196c2f4d11a8f3c05408f422a35d702f90106ea5b019bb28ae607aa9cdebc0d81a38d48c7ebb0062d287369ec
0c42124246ac30d80cd602ab7238d51084ded4698162c59d25eac1e66255b4db2352526ef0982c3b8ad31cce85b01db5788e75e09f44be73
RETURN_CODE rt = IDT_VP3300.SharedController.emv_setCAPK(capk);
        capk = Common.getByteArray("
a000000003510101b9d248075a3f23b522fe45573e04374dc4995d71000000039000db5f
a29d1fda8c1634b04dcccff148abee63c772035c79851d3512107586e02a917f7c7e885e7c4a7d529710a145334ce67dc412cb1597b77
aa2543b98d19cf2cb80c522bdbbea0f1b113fa2c86216c8c610a2d58f29cf3355ceb1bd3ef410d1edd1f7ae0f16897979de28c6ef293e0a192
rt = IDT_VP3300.SharedController.emv_setCAPK(capk);
        capk = Common.getByteArray("
a000000003530101ac213a2e0d2c0ca35ad0201323536d58097e4e5700000003f800bcd8
3721be52cccc4b6457321f22a7dc769f54eb8025913be804d9eabfbfa19b3d7c5d3ca658d768caf57067eec83c7e6e9f81d0586703ed9
dddadd20675d63424980b10eb364e81eb37db40ed100344c928886ff4ccc37203ee6106d5b59d1ac102e2cd2d7ac17f4d96c398e5fd9
93ecb4ffdf79b17547ff9fa2aa8eefd6cbda124cbb17a0f8528146387135e226b005a474b9062ff264d2ff8efa36814aa2950065b1b0
4c01ae9b2f69d44aa979d6ce95fee9485ed0a03aee9bd953e81cfdlef6e814dfd3c2ce37aefa38c1f9877371e91d6a5eb59fdedf75d3325
rt = IDT_VP3300.SharedController.emv_setCAPK(capk);
        capk = Common.getByteArray("
a0000000039601017616e9ac8be014af88call1a8fb17967b7394030e000000038000b745
86d19a207be6627c5b0aafbc44a2ecf5a2942d3a26ce19c4ffaeee920521868922e893e7838225a3947a2614796fb2c0628ce8c11e38
25a56d3b1bbaef783a5c6a81f36f8625395126fa983c5216d3166d48acde8a431212ff763a7f79d9edb7fed76b485de45beb829a3d4730848
rt = IDT_VP3300.SharedController.emv_setCAPK(capk);
        capk = Common.getByteArray("
a000000003570101251a5f5de61cf28b5c6e2b5807c0644a01d46ff5000100016000942b
7f2ba5ea307312b63df77c5243618acc2002bd7ecb74d821fe7bdc78fb28f49f74190ad9b23b9713b140ffec1fb429d93f56bdc7ade4ac075
rt = IDT_VP3300.SharedController.emv_setCAPK(capk);
        capk = Common.getByteArray("
a000000003580101753ed0aa23e4cd5abd69eae7904b684a34a57c2200010001c8009955
2c4alecd68a0260157fc4151b5992837445d3fc57365ca5692c87be358cdcdf2c92fb6837522842a48eb11cdf2fd91770c7221e4af
6207c2de4004c7deeb6276dc62d52a87d2cd01fbf2dc0465db52824d2a2167a06d19e6a0f781071cdb2dd314cb94441d8dc0e936317
b77bf06f5177f6c5aba3a3bc6aa30209c97260b7a1ad3a192c9b8cd1d153570afcc87c3cd681d13e997fe33b3963a0a1c79772acf99103321
rt = IDT_VP3300.SharedController.emv_setCAPK(capk);
        capk = Common.getByteArray("
a00000000354010106960618791a86d387301edd4a3baf2d34fef1b400010001f800c6dd
c0b7645f7f16286ab7e4116655f56dd0c944766040dc68664dd973bd3bfd4c525bcbb95272b6b3ad9ba8860303ad08d9e8cc344a4070
f4cfb9eeaf29c8a3460850c264cda39bbe3a7e7d08a69c31b5c8dd9f94ddbc9265758c0e7399adcf4362caee458d414c52b498274881
b196dacca7273f687f2a65faeb809d4b2ac1d3d1efb4f6490322318bd296d153b307a3283ab4e5be6ebd910359a8565eb9c4360d24ba
aca3dbfe393f3d6c830d603c6fc1e83409dfcd80d3a33ba243813bbb4ceaf9cbab6b74b00116f72ab278a88a011d70071e06cab140646438d
rt = IDT_VP3300.SharedController.emv_setCAPK(capk);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("Load Visa CAPK Successful:" + " \r\n");
            System.Diagnostics.Debug.WriteLine("Load Visa CAPK Successful");
        }
        else
        {
            SetOutputText("Load Visa CAPK failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt)
                + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Load Visa CAPK failed Error Code: " + "0x" + String.
Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnListCAPKs_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        byte[] capk = null;
        RETURN_CODE rt = IDT_VP3300.SharedController.emv_retrieveCAPKList(ref capk);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("List CAPK Successful\r\n");
            System.Diagnostics.Debug.WriteLine("List CAPK Successful");
        }
    });
}

```

```

        if (capk.Length > 0)
        {
            for (int x = 0; x < capk.Length; x = x + 6)
            {
                byte[] thecapk = new byte[] { capk[x], capk[x + 1], capk[x + 2], capk[x + 3], capk[x + 4], capk[x + 5] };
                SetOutputText (Common.GetHexStringFromBytes(thecapk) + " \r\n");
            }
        }
        else
        {
            SetOutputText("List CAPK failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("List CAPK failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnStartEMVTransaction_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        byte[] additionalTags = new byte[] { 0x8E, 0x5A };
        RETURN_CODE rt = IDT_VP3300.SharedController.emv_startTransaction(1.00, 0, 0, 0, 30, additionalTags, false);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("Start EMV Successful\r\n");
            System.Diagnostics.Debug.WriteLine("Start EMV Successful");
        }
        else
        {
            SetOutputText("Start EMV failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Start EMV failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnCancelEMVTransaction_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        RETURN_CODE rt = IDT_VP3300.SharedController.emv_cancelTransaction();
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("Cancel Transaction Successful\r\n");
            System.Diagnostics.Debug.WriteLine("Cancel Transaction Successful");
        }
        else
        {
            SetOutputText("Cancel Transaction failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("Cancel Transaction failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnStartSwipe_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {
        RETURN_CODE rt = IDT_VP3300.SharedController.msr_startMSRSwipe(60);
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("MSR Turned On successfully; Ready to swipe\r\n");
            System.Diagnostics.Debug.WriteLine("MSR Turned On successfully; Ready to swipe");
            isReadingMSR = true;
        }
        else
        {
            SetOutputText("MSR Turned On failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt) + ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("MSR Turned On failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt));
        }
    });
}

private void btnCancelSwipe_Click(object sender, RoutedEventArgs e)
{
    Task.Run(() =>
    {

```

```

        RETURN_CODE rt = IDT_VP3300.SharedController.msr_cancelMSRSwipe();
        if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
        {
            SetOutputText("MSR Turned Off successfully\r\n");
            System.Diagnostics.Debug.WriteLine("MSR Turned Off successfully");
        }
        else
        {
            SetOutputText("MSR Turned Off failed Error Code: " + "0x" + String.Format("{0:X}", (ushort)rt)
+ ": " + IDTechSDK.errorCode.getErrorString(rt) + "\r\n");
            System.Diagnostics.Debug.WriteLine("MSR Turned Off failed Error Code: " + "0x" + String.
Format("{0:X}", (ushort)rt));
        }

        isReadingMSR = false;
    });
}

```

Note that all the the click handlers' code are ran asynchronously. At least the device command needs to be executed asynchronously or it will block the UI thread. The UWP API that is used by the IDTechSDK_UWP library for communication with HID devices is asynchronous.

7.7.6 Step 6: Configure Callback

The callback is used to receive important SDK data (messages, log info, and transaction results). Reference: [Implement the Callback Function](#)

```

private void MessageCallBack(IDTechSDK.IDT_DEVICE_Types type, DeviceState state, byte[] data,
    IDTTransactionData cardData, EMV_Callback emvCallback, RETURN_CODE transactionResultCode)
{
    switch (state)
    {
        case DeviceState.ToConnect:
            //A connection attempt is starting for IDT_DEVICE_TYPES type
            SetOutputText("Callback:ToConnect\n");
            break;
        case DeviceState.DefaultDeviceTypeChange:
            //The SDK is changing the default device to IDT_DEVICE_TYPES type
            SetOutputText("Callback:DefaultDeviceTypeChange\n");
            connectionStatus.Text = "VP3300 connected.";
            connectionStatus.Background = new SolidColorBrush(Windows.UI.Colors.Green);
            break;
        case DeviceState.Connected:
            //A connection has been made to IDT_DEVICE_TYPES type
            SetOutputText("Callback:Connected\n");
            connectionStatus.Text = "VP3300 connected.";
            connectionStatus.Background = new SolidColorBrush(Windows.UI.Colors.Green);
            break;
        case DeviceState.Disconnected:
            //A disconnection has occurred with IDT_DEVICE_TYPES type
            SetOutputText("Callback:Disconnected\n");
            connectionStatus.Text = "VP3300 not connected.";
            connectionStatus.Background = new SolidColorBrush(Windows.UI.Colors.Red);
            break;
        case DeviceState.ConnectionFailed:
            //A connection attempt has failed for IDT_DEVICE_TYPES type
            SetOutputText("Callback:ConnectionFailed\n");
            break;
        case DeviceState.TransactionData:
            //Transaction data is beign returned in IDTTransactionData cardData
            SetOutputText("Callback:TransactionData\n");
            if (cardData.emv_resultCode == EMV_RESULT_CODE.EMV_RESULT_CODE_GO_ONLINE)
            {
                //auto complete. Normally, a host response is required here
                SetOutputText("Online request. Auto Complete EMV Transaction.\n");
                byte[] responseCode = new byte[] { 0x30, 0x30 };
                byte[] iad = new byte[] { 0x11, 0x22, 0x33, 0x44, 0x55, 0x66, 0x77, 0x88, 0x30, 0x30 };
                Task.Run(() => IDT_VP3300.SharedController.emv_completeTransaction(false, responseCode, iad
, null, null));
                return;
            }
            displayCardData(cardData);
            break;
        case DeviceState.DataReceived:
            //Low-level data received for IDT_DEVICE_TYPES type
            SetOutputTextLog(GetTimestamp() + " IN: " + Common.getHexStringFromBytes(data));
            break;
    }
}

```



```

        case DeviceState.DataSent:
            //Low-level data sent for IDT_DEVICE_TYPES type
            if (!isReadingMSR) SetOutputTextLog(GetTimestamp() + " OUT: " + Common.getHexStringFromBytes(
data));
            break;
        case DeviceState.CommandTimeout:
            SetOutputText("Callback:CommandTimeout\n");
            //Command timeout has occurred for IDT_DEVICE_TYPES type
            break;
        case DeviceState.ToSwipe:
            //Awaiting a swipe for IDT_DEVICE_TYPES type
            SetOutputText("Callback:ToSwipe\n");
            break;
        case DeviceState.MSRDecodeError:
            //Awaiting a swipe for IDT_DEVICE_TYPES type
            SetOutputText("Callback:MSRDecodeError\n");
            break;
        case DeviceState.ToTap:
            //Awaiting a contactless tap for IDT_DEVICE_TYPES type
            SetOutputText("Callback:ToTap\n");
            break;
        case DeviceState.SwipeTimeout:
            //Waiting for swipe timed out
            SetOutputText("Callback:SwipeTimeout\n");
            break;
        case DeviceState.TransactionCancelled:
            //Transaction has been cancelled
            SetOutputText("Callback:TransactionCancelled\n");
            break;
        case DeviceState.DeviceTimeout:
            //Waiting for EMV transaction to complete timed out
            SetOutputText("Callback:DeviceTimeout\n");
            break;
        case DeviceState.TransactionFailed:
            //Transaction failed to complete
            SetOutputText("Callback:TransactionFailed\n");
            break;
        case DeviceState.EMVCallback:
            //Callback during EMV transaction retrieved from EMV_Callback emvCallback
            SetOutputText("Callback:EMVCallback\n");
            if (emvCallback.callbackType == EMV_CALLBACK_TYPE.EMV_CALLBACK_TYPE_LCD) //LCD
Callback Type
            {
                if (emvCallback.lcd_displayMode == EMV_LCD_DISPLAY_MODE.
EMV_LCD_DISPLAY_MODE_CLEAR_SCREEN)
                {
                    SetOutputText("LCD Callback:Clear LCD Screen\n");
                    return;
                }
                else if (emvCallback.lcd_displayMode == EMV_LCD_DISPLAY_MODE.
EMV_LCD_DISPLAY_MODE_MESSAGE)
                {
                    // A message is requested to be displayed. See other test app included with SDK for a
complete example.
                    SetOutputText("LCD Callback:Display Message\n");
                }
                else
                {
                    //Display message with menu/language or prompt, and return result to
emv_callbackResponseLCD
                    //Kernel will not proceed until this step is complete
                    //seeing to default value of 1. See other test app included with SDK for a complete
example
                    SetOutputText("LCD Callback:Menu Display Request. Sending result 1\n");
                    IDT_VP3300.SharedController.emv_callbackResponseLCD(emvCallback.lcd_displayMode, 1);
                }
            }
            break;
        default:
            break;
    }
}

public static String GetTimestamp()
{
    DateTime value = DateTime.Now;
    return value.ToString("HH:mm:ss.fff");
}

private void displayCardData(IDTTransactionData cardData)
{
    string text = "";
    if (cardData.Event == EVENT_TRANSACTION_DATA.Types.EVENT_TRANSACTION_PIN_DATA)
    {
        SetOutputText("PIN Data received:\r\nKSN: " + cardData.pin_KSN + "\r\nPINBLOCK: " + cardData.
pin_pinblock + "\r\n");
        return;
    }
}

```

```

}
if (cardData.Event == EVENT_TRANSACTION_DATA_Types.EVENT_TRANSACTION_DATA_CARD_DATA)
{
    SetOutputText("Data received: (Length [" + cardData.msr_rawData.Length.ToString() + "])\n" + string
.Concat(cardData.msr_rawData.ToArray().Select(b => b.ToString("X2")).ToArray()) + "\r\n");
    System.Diagnostics.Debug.WriteLine("Data received: (Length [" + cardData.msr_rawData.Length
.ToString() + "])\n" + string.Concat(cardData.msr_rawData.ToArray().Select(b => b.ToString("X2")).ToArray()));
}
if (cardData.device_RSN != null && cardData.device_RSN.Length > 0)
    text += "Serial Number: " + cardData.device_RSN + "\r\n";
if (cardData.msr_track1Length > 0)
    text += "Track 1: " + cardData.msr_track1 + "\r\n";
if (cardData.msr_encTrack1 != null)
    text += "Track 1 Encrypted: " + Common.getHexStringFromBytes(cardData.msr_encTrack1) + "\r\n";
if (cardData.msr_hashTrack1 != null)
    text += "Track 1 Hash: " + Common.getHexStringFromBytes(cardData.msr_hashTrack1) + "\r\n";
if (cardData.msr_track2Length > 0)
    text += "Track 2: " + cardData.msr_track2 + "\r\n";
if (cardData.msr_encTrack2 != null)
    text += "Track 2 Encrypted: " + Common.getHexStringFromBytes(cardData.msr_encTrack2) + "\r\n";
if (cardData.msr_hashTrack2 != null)
    text += "Track 2 Hash: " + Common.getHexStringFromBytes(cardData.msr_hashTrack2) + "\r\n";
if (cardData.msr_track3Length > 0)
    text += "Track 3: " + cardData.msr_track3 + "\r\n";
if (cardData.msr_encTrack3 != null)
    text += "Track 3 Encrypted: " + Common.getHexStringFromBytes(cardData.msr_encTrack3) + "\r\n";
if (cardData.msr_hashTrack3 != null)
    text += "Track 3 Hash: " + Common.getHexStringFromBytes(cardData.msr_hashTrack3) + "\r\n";
if (cardData.msr_KSN != null)
    text += "KSN: " + Common.getHexStringFromBytes(cardData.msr_KSN) + "\r\n";
if (cardData.emv_clearingRecord != null)
{
    if (cardData.emv_clearingRecord.Length > 0)
    {
        text += "\r\nCTLS Clearing Record: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_clearingRecord) + "\r\n";
        Dictionary<string, string> dict = Common.processTLVUnencrypted(cardData.emv_clearingRecord);
        foreach (KeyValuePair<string, string> kvp in dict) text += kvp.Key + ": " + kvp.Value + "\r\n";
        text += "\r\n\r\n";
    }
}
if (cardData.emv_unencryptedTags != null)
{
    if (cardData.emv_unencryptedTags.Length > 0)
    {
        text += "\r\n===== \r\n";
        text += "\r\nUnencrypted Tags: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_unencryptedTags) + "\r\n\r\n";
        text += tlvToValues(cardData.emv_unencryptedTags);
        text += "\r\n===== \r\n";
    }
}
if (cardData.emv_encryptedTags != null)
{
    if (cardData.emv_encryptedTags.Length > 0)
    {
        text += "\r\n===== \r\n";
        text += "\r\nEncrypted Tags: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_encryptedTags) + "\r\n\r\n";
        text += tlvToValues(cardData.emv_encryptedTags);
        text += "\r\n===== \r\n";
    }
}
if (cardData.emv_maskedTags != null)
{
    if (cardData.emv_maskedTags.Length > 0)
    {
        text += "\r\n===== \r\n";
        text += "\r\nMasked Tags: \r\n";
        text += Common.getHexStringFromBytes(cardData.emv_maskedTags) + "\r\n\r\n";
        text += tlvToValues(cardData.emv_maskedTags);
        text += "\r\n===== \r\n";
    }
}
text += "ICC Present: ";
text += (cardData.iccPresent == 1 ? "TRUE" : "FALSE") + "\r\n";
text += "is CTLS: ";
text += (cardData.isCTLS == 1 ? "TRUE" : "FALSE") + "\r\n";
if (cardData.Event == EVENT_TRANSACTION_DATA_Types.EVENT_TRANSACTION_DATA_EMV_DATA)
{
    if (cardData.isCTLS == 2) text += "Capture Encrypt Type: " + ((cardData.emv_encryptionMode ==
EMV_ENCRYPTION_MODE.EMV_ENCRYPTION_MODE_TDES) ? "TDES" : "AES") + "\r\n";
    switch (cardData.emv_resultCode)
    {
        case EMV_RESULT_CODE.EMV_RESULT_CODE_APPROVED:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_APPROVED" + "\r\n");
            break;
    }
}

```

```

        case EMV_RESULT_CODE.EMV_RESULT_CODE_APPROVED_OFFLINE:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_APPROVED_OFFLINE" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_DECLINED_OFFLINE:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_DECLINED_OFFLINE" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_DECLINED:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_DECLINED" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_GO_ONLINE:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_GO_ONLINE" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_CALL_YOUR_BANK:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_CALL_YOUR_BANK" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_NOT_ACCEPTED:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_NOT_ACCEPTED" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_FALLBACK_TO_MSR:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_FALLBACK_TO_MSR" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_TIMEOUT:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_TIMEOUT" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_AUTHENTICATE_TRANSACTION:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_AUTHENTICATE_TRANSACTION" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_SWIPE_NON_ICC:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_SWIPE_NON_ICC" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_CTLS_TWO_CARDS:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_CTLS_TWO_CARDS" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_CTLS_TERMINATE:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_CTLS_TERMINATE" + "\r\n");
            break;
        case EMV_RESULT_CODE.EMV_RESULT_CODE_CTLS_TERMINATE_TRY_ANOTHER:
            text += ("EMV RESULT: " + "EMV_RESULT_CODE_CTLS_TERMINATE_TRY_ANOTHER" + "\r\n");
            break;
    }
}
SetOutputText(text);
isReadingMSR = false;
}

private string tlvToValues(byte[] tlv)
{
    string text = "";
    Dictionary<string, string> dict = Common.processTLVUnencrypted(tlv);
    foreach (KeyValuePair<string, string> kvp in dict) text += kvp.Key + ": " + kvp.Value + "\r\n";
    return text;
}

delegate void SetTextCallback(string text);

private async void SetOutputText(string text)
{
    await Dispatcher.RunAsync(Windows.UI.Core.CoreDispatcherPriority.Normal, () =>
    {
        tbOutput.Text = text + "\r\n" + tbOutput.Text;
    });
}

private void SetOutputTextLog(string text)
{
    logOutput.Text = text + "\r\n" + logOutput.Text;
}

```

Chapter 8

LCD Foreign Language Mapping Table

ID	Message ID	English	French	Spanish	Chinese
0	MSG_NULL	-	-	-	-
1	MSG_AMOUNT	AMOUNT	MONTANT	CANTIDAD	金
2	MSG_AMOUNT_↔ OK	AMOUNT OK?	MONTANT OK	MONTO CORRE↔ CTO?	确定金
3	MSG_APPROVED	APPROVED	APPROUVE	APROVADO	通
4	MSG_CALL_YO↔ UR_BANK	CALL YOUR BANK	APPE VOTRE B↔ ANQE	LLAME A SU BA↔ NCO	系您的行
5	MSG_CANCEL_↔ OR_ENTER	CANCEL OR EN↔ TER	ANNULE OU EN↔ TRER	CANCEL O ENT↔ RAR	取消或确定
6	MSG_CARD_ER↔ ROR	CARD ERROR	ERREUR CARTE	ERROR DE TAR↔ JETA	卡
7	MSG_DECLINED	DECLINED	REFUSE	DECLINADO	卡被拒
8	MSG_ENTER_A↔ MOUNT	ENTER AMOUNT	ENTRER MONT↔ ANT	INGRESE MONTO	入金
9	MSG_ENTER_PIN	ENTER PIN:	ENTRER PIN:	ENTRAR NPI:	入密
10	MSG_INCORRE↔ CT_PIN	INCORRECT PIN	NIP INCORRECT	NPI INCORRECTO	密
11	MSG_ICC_MSR1	SWIPE OR INSE↔ RT	PASSER OU INS↔ ERT	MOVER O INSERT	刷卡或插卡
12	MSG_ICC_MSR2	CARD	CARTE	TARJETA	卡
13	MSG_INSERT_↔ CARD	INSERT CARD	INSERT CARTE	INSERTAR TAR↔ JETA	插卡
14	MSG_USE_CHI↔ P_READER	USE CHIP READ↔ ER UTI	LECTEUR CHIP	USO CHIP LECT↔ OR	使用芯片卡
15	MSG_NOT_ACC↔ EPTED	NOT ACCEPTED	PAS ACCEPTE	DENEGADO	法接受
16	MSG_PIN_OK	GET PIN OK			密正确
17	MSG_PLEASE_↔ WAIT	PLEASE WAIT...	ATTENDRE...	POR FAVOR ES↔ PERE	等候中
18	MSG_PROCESS↔ ING_ERROR	PROCESSING E↔ RROR	ERREUR DE TR↔ AITE	ERROR PROCE↔ SANDO	理
19	MSG_USE_MAG↔ STRIPE	USE MAGSTRIPE	USAGE MAGST↔ RIPE	USO DE MAGST↔ RIPE	使用磁卡
20	MSG_TRY_AGAIN	TRY AGAIN	REESSAYER	VUELV INTENTA↔ RLO	重
21	MSG_ONLINE	GO ONLINE	GO LIGNE	GO LINEA	在

ID	Message ID	English	French	Spanish	Chinese
22	MSG_TRANSACTION_ERROR↔	TRANSACTION ERR	ERREUR DE TRAN↔	ERROR DE TRA↔NSAC	交易
23	MSG_TERMINATE	TERMINATE	RESILIER	TERMINAR	止
24	MSG_ADVICE	ADVICE	CONSEILS	CONSEJOS	建
25	MSG_TIMEOUT	TIME OUT	TIMEOUT	TIEMPO DE ESP↔ERA	超
26	MSG_PROCESSING↔	PROCESSING...	PROCESSUS...	PROCESANDO...	理中。。。
27	MSG_PIN_TRY_EX↔	PIN TRY LIMIT EX	PIN TRY DEPAS↔SE	TRY PIN SUPER↔ADA	密次多
28	MSG_ISSUER_AUTH_FAIL↔	ISSUER AUTH FAIL	EMETTEUR FAIL	EMISOR FALLA	与卡机构
29	MSG_CONTINUE_PROCESS↔	CONTINUE PROCESS	CONTINUER LA	CONTINUAR PR↔OCES	理
30	MSG_GET_PIN_ERROR↔	GET PIN ERROR	GET PIN ERROR	OBTENER PIN E↔RR	密
31	MSG_GET_PIN_FAIL↔	GET PIN FAIL	GET PIN FAIL	OBTENER PIN F↔ALL	取密
32	MSG_NOKEY_GET_PIN↔	NO KEY GET PIN	NO KEY GET PIN	NO CLAVE GET PIN	法入密
33	MSG_CANCELLED↔	CANCELLED	ANNULE	CANCELADO	取消
34	MSG_LAST_PIN_TRY↔	LAST PIN TRY	-	-	最后一次入密

Chapter 9

Error Code Reference

```

public static string getErrorString(RETURN_CODE code)
{
    switch ((int)code)
    {
        case 0: return "no error, beginning task";
        case 1: return "no response from reader";
        case 2: return "invalid response data";
        case 3: return "time out for task or CMD";
        case 4: return "wrong parameter";
        case 5: return "SDK is doing MSR or ICC task";
        case 6: return "SDK is doing PINPad task";
        case 7: return "SDK is doing CTLS task";
        case 8: return "SDK is doing EMV task";
        case 9: return "SDK is doing Other task";
        case 10: return "err response or data";
        case 11: return "no reader attached";
        case 12: return "mono audio is enabled";
        case 13: return "did connection";
        case 14: return "audio volume is too low";
        case 15: return "task or CMD be canceled";
        case 16: return "UF wrong string format";
        case 17: return "UF file not found";
        case 18: return "UF wrong file format";
        case 19: return "Attempt to contact online host failed";
        case 20: return "Attempt to perform RKI failed";
        case 0x300: return "Key Type(TDES) of Session Key is not same as the related Master Key.";
        case 0x400: return "Related Key was not loaded.";
        case 0x500: return "Key Same.";
        case 0x501: return "Key is all zero";
        case 0x502: return "TR-31 format error";
        case 0x702: return "PAN is Error Key.";
        case 0x705: return "No Internal MSR PAN (or Internal MSR PAN is erased timeout)";
        case 0X0C01: return "Incorrect Frame Tag";
        case 0X0C02: return "Incorrect Frame Type";
        case 0X0C03: return "Unknown Frame Type";
        case 0X0C04: return "Unknown Command";
        case 0X0C05: return "Unknown Sub-Command";
        case 0X0C06: return "CRC Error";
        case 0X0C07: return "Failed";
        case 0X0C08: return "Timeout";
        case 0X0C0A: return "Incorrect Parameter";
        case 0X0C0B: return "Command Not Supported";
        case 0X0C0C: return "Sub-Command Not Supported";
        case 0X0C0D: return "Parameter Not Supported / Status Abort Command";
        case 0X0C0F: return "Sub-Command Not Allowed";
        case 0X0D01: return "Incorrect Header Tag";
        case 0X0D02: return "Unknown Command";
        case 0X0D03: return "Unknown Sub-Command";
        case 0X0D04: return "CRC Error in Frame";
        case 0X0D05: return "Incorrect Parameter";
        case 0X0D06: return "Parameter Not Supported";
        case 0X0D07: return "Mal-formatted Data";
        case 0X0D08: return "Timeout";
        case 0X0D0A: return "Failed / NACK";
        case 0X0D0B: return "Command not Allowed";
        case 0X0D0C: return "Sub-Command not Allowed";
        case 0X0D0D: return "Buffer Overflow (Data Length too large for reader buffer)";
        case 0X0D0E: return "User Interface Event";
        case 0X0D11: return "Communication type not supported, VT-1, burst, etc.";
    }
}

```

```

    case 0X0D12: return "Secure interface is not functional or is in an intermediate state.";
    case 0X0D13: return "Data field is not mod 8";
    case 0X0D14: return "Pad 0x80 not found where expected";
    case 0X0D15: return "Specified key type is invalid";
    case 0X0D1: return "Could not retrieve key from the SAM(InitSecureComm)";
    case 0X0D17: return "Hash code problem";
    case 0X0D18: return "Could not store the key into the SAM(InstallKey)";
    case 0X0D19: return "Frame is too large";
    case 0X0D1A: return "Unit powered up in authentication state but POS must resend the
InitSecureComm command";
    case 0X0D1B: return "The EEPROM may not be initialized because SecCommInterface does not
make sense";
    case 0X0D1C: return "Problem encoding APDU";
    case 0X0D20: return "Unsupported Index(ILM) SAM Transceiver error - problem communicating
with the SAM(Key Mgr)";
    case 0X0D2: return "Unexpected Sequence Counter in multiple frames for single bitmap(ILM)
Length error in data returned from the SAM(Key Mgr)";
    case 0X0D22: return "Improper bit map(ILM)";
    case 0X0D23: return "Request Online Authorization";
    case 0X0D24: return "ViVOCard3 raw data read successful";
    case 0X0D25: return "Message index not available(ILM) ViVOComm activate transaction card
type(ViVOComm)";
    case 0X0D26: return "Version Information Mismatch(ILM)";
    case 0X0D27: return "Not sending commands in correct index message index(ILM)";
    case 0X0D28: return "Time out or next expected message not received(ILM)";
    case 0X0D29: return "ILM languages not available for viewing(ILM)";
    case 0X0D2A: return "Other language not supported(ILM)";
    case 0X0D41: return "Unknown Error from SAM";
    case 0X0D42: return "Invalid data detected by SAM";
    case 0X0D43: return "Incomplete data detected by SAM";
    case 0X0D44: return "Reserved";
    case 0X0D45: return "Invalid key hash algorithm";
    case 0X0D46: return "Invalid key encryption algorithm";
    case 0X0D47: return "Invalid modulus length";
    case 0X0D48: return "Invalid exponent";
    case 0X0D49: return "Key already exists";
    case 0X0D4A: return "No space for new RID";
    case 0X0D4B: return "Key not found";
    case 0X0D4C: return "Crypto not responding";
    case 0X0D4D: return "Crypto communication error";
    case 0X0D4E: return "Module-specific error for Key Manager";
    case 0X0D4F: return "All key slots are full (maximum number of keys has been installed)";
    case 0X0D50: return "Auto-Switch OK";
    case 0X0D51: return "Auto-Switch failed";
    case 0X0D90: return "Account DUKPT Key not exist";
    case 0X0D91: return "Account DUKPT Key KSN exhausted";
    case 0x0D00: return "This Key had been loaded.";
    case 0x0E00: return "Base Time was loaded.";
    case 0x0F00: return "Encryption Or Decryption Failed.";
    case 0x1000: return "Battery Low Warning (It is High Priority Response while Battery is
Low.)";
    case 0x1800: return "Send \"Cancel Command\" after send \"Get Encrypted PIN\" & \"Get Numeric \"&
\"Get Amount\"";
    case 0x1900: return "Press \"Cancel\" key after send \"Get Encrypted PIN\" & \"Get Numeric \"&
\"Get Amount\"";
    case 0x30FF: return "Security Chip is not connect";
    case 0x3000: return "Security Chip is deactivation & Device is In Removal Legally State.";
    case 0x3101: return "Security Chip is activation & Device is In Removal Legally State.";
    case 0x5500: return "No Admin DUKPT Key.";
    case 0x5501: return "Admin DUKPT Key STOP.";
    case 0x5502: return "Admin DUKPT Key KSN is Error.";
    case 0x5503: return "Get Authentication Code1 Failed.";
    case 0x5504: return "Validate Authentication Code Error.";
    case 0x5505: return "Encrypt or Decrypt data failed.";
    case 0x5506: return "Not Support the New Key Type.";
    case 0x5507: return "New Key Index is Error.";
    case 0x5508: return "Step Error.";
    case 0x5509: return "KSN Error";
    case 0x550A: return "MAC Error.";
    case 0x550B: return "Key Usage Error.";
    case 0x550C: return "Mode Of Use Error.";
    case 0x550F: return "Other Error.";
    case 0x6000: return "Save or Config Failed / Or Read Config Error.";
    case 0x6200: return "No Serial Number.";
    case 0x6900: return "Invalid Command - Protocol is right, but task ID is invalid.";
    case 0x6A01: return "Unsupported Command - Protocol and task ID are right, but command is
invalid - In this State";
    case 0x6A00: return "Unsupported Command - Protocol and task ID are right, but command is
invalid.";
    case 0x6B00: return "Unknown parameter in command - Protocol task ID and command are right,
but parameter
is invalid.";
    case 0x6C00: return "Unknown parameter in command - Protocol task ID and command are right,
but length is
out of the requirement.";
    case 0x7200: return "Device is suspend (MKSK suspend or press password suspend).";
    case 0x7300: return "PIN DUKPT is STOP (21 bit 1).";
    case 0x7400: return "Device is Busy.";
    case 0xE100: return "Can not enter sleep mode";

```

```

case 0xE200: return "File has existed";
case 0xE300: return "File has not existed";
case 0xE313: return "IO line low -- Card error after session start";
case 0xE400: return "Open File Error";
case 0xE500: return "SmartCard Error";
case 0xE600: return "Get MSR Card data is error";
case 0xE700: return "Command time out";
case 0xE800: return "File read or write is error";
case 0xE900: return "Active 1850 error!";
case 0xEA00: return "Load bootloader error";
case 0xEF00: return "Protocol Error- STX or ETX or check error.";
case 0xEB00: return "Picture is not exist";
case 0x2C02: return "No Microprocessor ICC seated";
case 0x2C06: return "no card seated to request ATR";
case 0x2D01: return "Card Not Supported,";
case 0x2D03: return "Card Not Supported, wants CRC";
case 0x690D: return "Command not supported on reader without ICC support";
case 0x8100: return "ICC error time out on power-up";
case 0x8200: return "invalid TS character received - Wrong operation step";
case 0x8300: return "Decode MSR Error";
case 0x8400: return "TriMagII no Response";
case 0x8500: return "No Swipe MSR Card";
case 0x8510: return "No Financial Card";
case 0x8600: return "Unsupported F, D, or combination of F and D";
case 0x8700: return "protocol not supported EMV TD1 out of range";
case 0x8800: return "power not at proper level";
case 0x8900: return "ATR length too long";
case 0x8B01: return "EMV invalid TA1 byte value";
case 0x8B02: return "EMV TB1 required";
case 0x8B03: return "EMV Unsupported TB1 only 00 allowed";
case 0x8B04: return "EMV Card Error, invalid BWI or CWI";
case 0x8B06: return "EMV TB2 not allowed in ATR";
case 0x8B07: return "EMV TC2 out of range";
case 0x8B08: return "EMV TC2 out of range";
case 0x8B09: return "per EMV96 TA3 must be > 0xF";
case 0x8B10: return "ICC error on power-up";
case 0x8B11: return "EMV T=1 then TB3 required";
case 0x8B12: return "Card Error, invalid BWI or CWI";
case 0x8B13: return "Card Error, invalid BWI or CWI";
case 0x8B17: return "EMV TC1/TB3 conflict*";
case 0x8B20: return "EMV TD2 out of range must be T=1";
case 0x8C00: return "TCK error";
case 0xA304: return "connector has no voltage setting";
case 0xA305: return "ICC error on power-up invalid (SBLK(IFSD) exchange";
case 0xE301: return "ICC error after session start";
case 0xFF00: return "Request to go online";
case 0xFF01: return "EMV: Accept the offline transaction";
case 0xFF02: return "EMV: Decline the offline transaction";
case 0xFF03: return "EMV: Accept the online transaction";
case 0xFF04: return "EMV: Decline the online transaction";
case 0xFF05: return "EMV: Application may fallback to magstripe technology";
case 0xFF06: return "EMV: ICC detected that the conditions of use are not satisfied";
case 0xFF07: return "EMV: ICC didn't accept transaction";
case 0xFF08: return "EMV: Transaction was cancelled";
case 0xFF09: return "EMV: Application was not selected by kernel or ICC format error or ICC
missing data error";
case 0xFF0A: return "EMV: Transaction is terminated";
case 0xFF0B: return "EMV: Other EMV Error";
case 0xFFFF: return "NO RESPONSE";
case 0xF002: return "ICC communication timeout";
case 0xF003: return "ICC communication Error";
case 0xF00F: return "ICC Card Seated and Highest Priority, disable MSR work request";
case 0xF200: return "AID List / Application Data is not exist";
case 0xF201: return "Terminal Data is not exist";
case 0xF202: return "TLV format is error";
case 0xF203: return "AID List is full";
case 0xF204: return "Any CA Key is not exist";
case 0xF205: return "CA Key RID is not exist";
case 0xF206: return "CA Key Index it not exist";
case 0xF207: return "CA Key is full";
case 0xF208: return "CA Key Hash Value is Error";
case 0xF209: return "Transaction format error";
case 0xF20A: return "The command will not be processing";
case 0xF20B: return "CRL is not exist";
case 0xF20C: return "CRL number exceed max number";
case 0xF20D: return "Amount, Other Amount, Transaction Type are missing";
case 0xF20E: return "The Identification of algorithm is mistake";
case 0xF20F: return "No Financial Card";
case 0xF210: return "In Encrypt Result state, TLV total Length is greater than Max Length";
case 0x1001: return "INVALID ARG";
case 0x1002: return "FILE_OPEN_FAILED";
case 0x1003: return "FILE_OPERATION_FAILED";
case 0x2001: return "MEMORY_NOT_ENOUGH";
case 0x3002: return "SMARTCARD_FAIL";
case 0x3003: return "SMARTCARD_INIT_FAILED";
case 0x3004: return "FALLBACK_SITUATION";
case 0x3005: return "SMARTCARD_ABSENT";

```



```

case 0x3006: return "SMARTCARD_TIMEOUT";
case 0x5001: return "EMV_PARSING_TAGS_FAILED";
case 0x5002: return "EMV_DUPLICATE_CARD_DATA_ELEMENT";
case 0x5003: return "EMV_DATA_FORMAT_INCORRECT";
case 0x5004: return "EMV_NO_TERM_APP";
case 0x5005: return "EMV_NO_MATCHING_APP";
case 0x5006: return "EMV_MISSING_MANDATORY_OBJECT";
case 0x5007: return "EMV_APP_SELECTION_RETRY";
case 0x5008: return "EMV_GET_AMOUNT_ERROR";
case 0x5009: return "EMV_CARD_REJECTED";
case 0x5010: return "EMV_AIP_NOT_RECEIVED";
case 0x5011: return "EMV_AFL_NOT_RECEIVED";
case 0x5012: return "EMV_AFL_LEN_OUT_OF_RANGE";
case 0x5013: return "EMV_SFI_OUT_OF_RANGE";
case 0x5014: return "EMV_AFL_INCORRECT";
case 0x5015: return "EMV_EXP_DATE_INCORRECT";
case 0x5016: return "EMV_EFF_DATE_INCORRECT";
case 0x5017: return "EMV_ISS_COD_TBL_OUT_OF_RANGE";
case 0x5018: return "EMV_CRYPTOGAM_TYPE_INCORRECT";
case 0x5019: return "EMV_PSE_NOT_SUPPORTED_BY_CARD";
case 0x5020: return "EMV_USER_SELECTED_LANGUAGE";
case 0x5021: return "EMV_SERVICE_NOT_ALLOWED";
case 0x5022: return "EMV_NO_TAG_FOUND";
case 0x5023: return "EMV_CARD_BLOCKED";
case 0x5024: return "EMV_LEN_INCORRECT";
case 0x5025: return "CARD_COM_ERROR";
case 0x5026: return "EMV_TSC_NOT_INCREASED";
case 0x5027: return "EMV_HASH_INCORRECT";
case 0x5028: return "EMV_NO_ARC";
case 0x5029: return "EMV_INVALID_ARC";
case 0x5030: return "EMV_NO_ONLINE_COMM";
case 0x5031: return "TRAN_TYPE_INCORRECT";
case 0x5032: return "EMV_APP_NO_SUPPORT";
case 0x5033: return "EMV_APP_NOT_SELECT";
case 0x5034: return "EMV_LANG_NOT_SELECT";
case 0x5035: return "EMV_NO_TERM_DATA";
case 0x6001: return "CVM_TYPE_UNKNOWN";
case 0x6002: return "CVM_AIP_NOT_SUPPORTED";
case 0x6003: return "CVM_TAG_8E_MISSING";
case 0x6004: return "CVM_TAG_8E_FORMAT_ERROR";
case 0x6005: return "CVM_CODE_IS_NOT_SUPPORTED";
case 0x6006: return "CVM_COND_CODE_IS_NOT_SUPPORTED";
case 0x6007: return "NO_MORE_CVM";
case 0x6008: return "PIN_BYPASSED_BEFORE";
case 0x7001: return "PK_BUFFER_SIZE_TOO_BIG";
case 0x7002: return "PK_FILE_WRITE_ERROR";
case 0x7003: return "PK_HASH_ERROR";
case 0x8001: return "NO_CARD_HOLDER_CONFIRMATION";
case 0x8002: return "GET_ONLINE_PIN";
case 0xD000: return "Data not exist";
case 0xD001: return "Data access error";
case 0xD100: return "RID not exist";
case 0xD101: return "RID existed";
case 0xD102: return "Index not exist";
case 0xD200: return "Maximum exceeded";
case 0xD201: return "Hash error";
case 0xD205: return "System Busy";
case 0xE001: return "Unable to go online";
case 0xE002: return "Technical Issue";
case 0xE003: return "Declined";
case 0xE004: return "Issuer Referral transaction";
case 0xF001: return "Decline the online transaction";
case 0xF002: return "Request to go online";
case 0xF003: return "Transaction is terminated";
case 0xF005: return "Application was not selected by kernel or ICC format error or ICC
missing data error";
case 0xF007: return "ICC didn't accept transaction";
case 0xF00A: return "Application may fallback to magstripe technology";
case 0xF00C: return "Transaction was cancelled";
case 0xF00D: return "Timeout";
case 0xF00F: return "Other EMV Error";
case 0xF010: return "Accept the offline transaction";
case 0xF011: return "Decline the offline transaction";
case 0xF021: return "ICC detected tah the conditions of use are not satisfied";
case 0xF022: return "No app were found on card matching terminal configuration";
case 0xF023: return "Terminal file does not exist";
case 0xF024: return "CAPK file does not exist";
case 0xF025: return "CRL Entry does not exist";
case 0xFFFE: return "Return code when blocking is disabled";
case 0xFFFF: return "Return code when command is not applicable on the selected device";
case 0xF005: return "ICC Encrypted C-APDU Data Structure Length Error Or Format Error.";
case 0xBBE0: return "CM100 Success";
case 0xBBE1: return "CM100 Parameter Error";
case 0xBBE2: return "CM100 Low Output Buffer";
case 0xBBE3: return "CM100 Card Not Found";
case 0xBBE4: return "CM100 Collision Card Exists";
case 0xBBE5: return "CM100 Too Many Cards Exist";

```

```

    case 0xBBE6: return "CM100 Saved Data Does Not Exist";
    case 0xBBE8: return "CM100 No Data Available";
    case 0xBBE9: return "CM100 Invalid CID Returned";
    case 0xBBEA: return "CM100 Invalid Card Exists";
    case 0xBBEC: return "CM100 Command Unsupported";
    case 0xBBED: return "CM100 Error In Command Process";
    case 0xBBEE: return "CM100 Invalid Command";

    case 0X9031: return "Unknown command";
    case 0X9032: return "Wrong parameter (such as the length of the command is incorrect)";

    case 0X9038: return "Wait (the command couldn't be finished in BWT)";
    case 0X9039: return "Busy (a previously command has not been finished)";
    case 0X903A: return "Number of retries over limit";

    case 0X9040: return "Invalid Manufacturing system data";
    case 0X9041: return "Not authenticated";
    case 0X9042: return "Invalid Master DUKPT Key";
    case 0X9043: return "Invalid MAC Key";
    case 0X9044: return "Reserved for future use";
    case 0X9045: return "Reserved for future use";
    case 0X9046: return "Invalid DATA DUKPT Key";
    case 0X9047: return "Invalid PIN Pairing DUKPT Key";
    case 0X9048: return "Invalid DATA Pairing DUKPT Key";
    case 0X9049: return "No nonce generated";
    case 0X9949: return "No GUID available. Perform getVersion first.";
    case 0X9950: return "MAC Calculation unsuccessful. Check BDK value.";

    case 0X904A: return "Not ready";
    case 0X904B: return "Not MAC data";

    case 0X9050: return "Invalid Certificate";
    case 0X9051: return "Duplicate key detected";
    case 0X9052: return "AT checks failed";
    case 0X9053: return "TR34 checks failed";
    case 0X9054: return "TR31 checks failed";
    case 0X9055: return "MAC checks failed";
    case 0X9056: return "Firmware download failed";

    case 0X9060: return "Log is full";
    case 0X9061: return "Removal sensor unengaged";
    case 0X9062: return "Any hardware problems";

    case 0X9070: return "ICC communication timeout";
    case 0X9071: return "ICC data error (such check sum error)";
    case 0X9072: return "Smart Card not powered up";

    }
    return "";
}

```

Chapter 10

Enumeration Reference

Common

```

public enum EVENT_TRANSACTION_DATA_Types
{
    EVENT_TRANSACTION_DATA_UNKNOWN, EVENT_TRANSACTION_DATA_CARD_DATA, EVENT_TRANSACTION_DATA_EMV_DATA,
    EVENT_TRANSACTION_DATA_MSR_CANCEL_KEY, EVENT_TRANSACTION_DATA_MSR_BACKSPACE_KEY,
    EVENT_TRANSACTION_DATA_MSR_ENTER_KEY, EVENT_TRANSACTION_DATA_MSR_DATA_ERROR, EVENT_TRANSACTION_PIN_DATA
}

public enum CAPTURE_ENCODE_TYPE
{
    CAPTURE_ENCODE_TYPE_ISOABA, CAPTURE_ENCODE_TYPE_AAMVA, CAPTURE_ENCODE_TYPE_Other,
    CAPTURE_ENCODE_TYPE_Raw, CAPTURE_ENCODE_TYPE_JisI_II
}

public enum CAPTURE_ENCRYPT_TYPE
{
    CAPTURE_ENCRYPT_TYPE_TDES, CAPTURE_ENCRYPT_TYPE_AES, CAPTURE_ENCRYPT_TYPE_NONE
}

public enum EMV_ENCRYPTION_MODE
{
    EMV_ENCRYPTION_MODE_TDES = 0, EMV_ENCRYPTION_MODE_AES = 1
}

public enum EMV_ENCRYPTION_MODE
{
    EMV_ENCRYPTION_MODE_TDES = 0, EMV_ENCRYPTION_MODE_AES = 1
}

public enum EMV_LCD_DISPLAY_MODE
{
    EMV_LCD_DISPLAY_MODE_CANCEL = 0, EMV_LCD_DISPLAY_MODE_MENU = 1, EMV_LCD_DISPLAY_MODE_PROMPT = 2,
    EMV_LCD_DISPLAY_MODE_MESSAGE = 3, EMV_LCD_DISPLAY_MODE_LANGUAGE_SELECT = 8, EMV_LCD_DISPLAY_MODE_CLEAR_SCREEN = 16
}

public enum EMV_RESULT_CODE
{
    EMV_RESULT_CODE_APPROVED_OFFLINE = 0,
    EMV_RESULT_CODE_DECLINED_OFFLINE = 1,
    EMV_RESULT_CODE_APPROVED = 2,
    EMV_RESULT_CODE_DECLINED = 3,
    EMV_RESULT_CODE_GO_ONLINE = 4,
    EMV_RESULT_CODE_CALL_YOUR_BANK = 5,
    EMV_RESULT_CODE_NOT_ACCEPTED = 6,
    EMV_RESULT_CODE_FALLBACK_TO_MSR = 7,
    EMV_RESULT_CODE_TIMEOUT = 8,
    EMV_RESULT_CODE_GO_ONLINE_CTLS = 9,
    EMV_RESULT_CODE_AUTHENTICATE_TRANSACTION = 0x0010,
    EMV_RESULT_CODE_SWIPE_NON_ICC = 17,
    EMV_RESULT_CODE_CTLS_TWO_CARDS = 0x7A,
    EMV_RESULT_CODE_CTLS_TERMINATE = 0x7E,
    EMV_RESULT_CODE_CTLS_TERMINATE_TRY_ANOTHER = 0x7D,
    EMV_RESULT_CODE_UNABLE_TO_REACH_HOST
}

```


Chapter 11

EMV Callback

During an EMV transaction, without a built-in LCD display on the VP3300, LCD Display messages will be returned as an EMV Callback.

In the MessageCallback for the SDK, there is a DeviceState EMVCallback. When this DeviceState is received, a [IDTechSDK::EMV_Callback](#) class object will be returned. [IDTechSDK::EMV_Callback::callbackType](#) will specify the type of callback: EMV_CALLBACK_TYPE_LCD, EMV_CALLBACK_TYPE_PINPAD, EMV_CALLBACK_MSR. The VP3300 will not utilize the EMV_CALLBACK_TYPE_PINPAD.

If VP3300 terminal settings specify MSR is part of the configuration, for cases of fallback, the type of callback will be EMV_CALLBACK_MSR. When this is received, MSR data must be collected and returned to [IDTechSDK::IDT_VP3300::emv_callbackResponseMSR\(\)](#) to complete the transaction.

For LCD display messages, the callback type will be EMV_CALLBACK_TYPE_LCD. To evaluate what kind of LCD message, you get EMV_LCD_DISPLAY_MODE from [IDTechSDK::EMV_Callback::lcd_displayMode](#): 1- LCD_DISPLAY_MODE_MENU: Menu selection, response required with selected menu index #, or 0 to cancel 2- LCD_DISPLAY_MODE_PROMPT: Message Prompt, response required 'E' for Enter/Accept, or 'C' for cancel 3- LCD_DISPLAY_MODE_MESSAGE: Display Message, no response required 8 - LCD_DISPLAY_MODE_LANGUAGE_SELECT: Language selection, response required with selected language index # 16 - LCD_DISPLAY_MODE_CLEAR_SCREEN: Request to clear LCD screen of information

If the mode is LCD_DISPLAY_MODE_MESSAGE or LCD_DISPLAY_MODE_CLEAR_SCREEN, these do not pause the EMV transaction. These two modes are for displaying a message (no response required), or for clearing the screen.

If the mode is LCD_DISPLAY_MODE_MENU, LCD_DISPLAY_MODE_PROMPT, or LCD_DISPLAY_MODE_LANGUAGE_SELECT, the provided message must be displayed, and then the EMV transaction pauses until a response is sent to [IDTechSDK::IDT_VP3300::emv_callbackResponseLCD\(\)](#).

The message to display is byte[] lcd_messages. This contains either Message String, or a Message ID according to LCD Foreign Language Mapping Table ([Foreign Language Mapping Table](#)).

Chapter 12

EMV Tag Reference

Tag	Description
42	Issuer Identification Number (IIN)
4F	Application Identifier (ADF Name)
50	Application Label
52	Command to perform
56	Track 1 Data
57	Track 2 Equivalent Data
5A	Application Primary Account Number (PAN)
5D	Deleted (see 9D)
5F20	Cardholder Name
5F24	Application Expiration Date
5F28	Issuer Country Code
5F2A	Transaction Currency Code (Default: 08 40)
5F2D	Language Preference
5F30	Service Code
5F34	Application Primary Account Number (PAN) Sequence Number (PSN)
5F36	Transaction Currency Exponent
5F3C	Transaction Reference Currency Code
5F3D	Transaction Reference Currency Exponent
5F50	Issuer URL
5F53	International Bank Account Number (IBAN)
5F54	Bank Identifier Code (BIC)
5F55	Issuer Country Code (alpha2 format)
5F56	Issuer Country Code (alpha3 format)
5F57	Account Type Selection
6F	File Control Information (FCI) Template
61	Application Template
62	File Control Parameters (FCP) Template
70	READ RECORD Response Message Template
71	Issuer Script Template 1
72	Issuer Script Template 2
73	Directory Discretionary Template
77	Response Message Template Format 2
80	Response Message Template Format 1
81	Amount, Authorised (Binary)
82	Application Interchange Profile (AIP)

Tag	Description
83	Command Template
84	Dedicated File (DF) Name
86	Issuer Script Command
87	Application Priority Indicator
88	Short File Identifier (SFI)
89	Authorisation Code
8A	Authorization Response Code
8A	Authorisation Response Code (ARC)
8C	Card Risk Management Data Object List 1 (CDOL1)
8D	Card Risk Management Data Object List 2 (CDOL2)
8E	Cardholder Verification Method (CVM) List
8F	Certification Authority Public Key Index (PKI)
90	Issuer Public Key Certificate
91	Issuer Authentication Data
92	Issuer Public Key Remainder
93	Signed Application Data
94	Application File Locator (AFL)
95	Terminal Verification Results (TVR)
97	Transaction Certificate Data Object List (TDOL)
98	Transaction Certificate (TC) Hash Value
99	Transaction Personal Identification Number (PIN) Data
99	Transaction Personal Identification Number (PIN) Data
98	Transaction Certificate (TC) Hash Value
9A	Transaction Date (YYMMDD)
9A	Transaction Date
9B	Transaction Status Information
9B	Transaction Status Information
9C	Transaction Type
9C	Transaction Type
9D	Directory Definition File (DDF) Name
9F01	Acquirer Identifier
9F02	Amount, Authorized (Numeric)
9F03	Amount, Other (Numeric)
9F04	Amount, Other (Binary)
9F05	Application Discretionary Data
9F06	Application Identifier (AID) – terminal
9F07	Application Usage Control (AUC)
9F08	Application Version Number
9F09	Application Version Number (Default: 00 02)
9F0B	Cardholder Name Extended
9F0D	Issuer Action Code - Default
9F0E	Issuer Action Code - Denial
9F0F	Issuer Action Code - Online
9F10	Issuer Application Data (IAD)
9F11	Issuer Code Table Index
9F12	Application Preferred Name
9F13	Last Online Application Transaction Counter (ATC) Register
9F14	Lower Consecutive Offline Limit
9F15	Merchant Category Code

Tag	Description
9F16	Merchant Identifier
9F17	Personal Identification Number (PIN) Try Counter
9F18	Issuer Script Identifier
9F19	Deleted (see 9F49)
9F1A	Terminal Country Code
9F1B	Terminal Floor Limit
9F1C	Terminal Identification
9F1D	Terminal Risk Management Data
9F1E	Interface Device (IFD) Serial Number
9F1F	Track 1 Discretionary Data
9F20	Track 2 Discretionary Data
9F21	Transaction Time (HHMMSS)
9F22	Certification Authority Public Key Index
9F23	Upper Consecutive Offline Limit
9F26	Application Cryptogram (AC)
9F27	Cryptogram Information Data (CID)
9F29	Extended Selection
9F2A	Kernel Identifier
9F2D	Integrated Circuit Card (ICC) PIN Encipherment Public Key Certificate
9F2E	Integrated Circuit Card (ICC) PIN Encipherment Public Key Exponent
9F2F	Integrated Circuit Card (ICC) PIN Encipherment Public Key Remainder
9F32	Issuer Public Key Exponent
9F33	Terminal Capabilities (see below)
9F34	Cardholder Verification Method (CVM) Results
9F35	Terminal Type (see below)
9F36	Application Transaction Counter (ATC)
9F37	Unpredictable Number
9F38	Processing Options Data Object List (PDOL)
9F39	POS Entry Mode (Default: 07)
9F3A	Amount, Reference Currency
9F3B	Application Reference Currency
9F3C	Transaction Reference Currency Code
9F3D	Transaction Reference Currency Exponent
9F40	Additional Terminal Capabilities (see below)
9F41	Transaction Sequence Counter
9F42	Application Currency Code
9F43	Application Reference Currency Exponent
9F44	Application Currency Exponent
9F45	Data Authentication Code
9F46	Integrated Circuit Card (ICC) Public Key Certificate
9F47	Integrated Circuit Card (ICC) Public Key Exponent
9F48	Integrated Circuit Card (ICC) Public Key Remainder
9F49	Dynamic Data Authentication Data Object List (DDOL)
9F4A	Static Data Authentication Tag List (SDA)
9F4B	Signed Dynamic Application Data (SDAD)
9F4C	ICC Dynamic Number
9F4D	Log Entry
9F4E	Merchant Name and Location
9F4E	Merchant Name and Location

Tag	Description
9F4F	Log Format
9F50	Offline Accumulator Balance
9F51	Application Currency Code
9F52	Application Default Action (ADA)
9F53	Transaction Category Code
9F54	DS ODS Card
9F55	Geographic Indicator
9F56	Issuer Authentication Indicator
9F57	Issuer Country Code
9F58	Consecutive Transaction Counter Limit (CTCL)
9F59	Consecutive Transaction Counter Upper Limit (CTCUL)
9F5A	Application Program Identifier (Program ID)
9F5B	Issuer Script Results
9F5C	Magstripe Data Object List (MDOL)
9F5D	Available Offline Spending Amount (AOSA)
9F5D	Application Capabilities Information (ACI)
9F5E	Consecutive Transaction International Upper Limit (CTIUL)
9F5E	DS ID
9F5F	DS Slot Availability
9F60	CVC3 (Track1)
9F61	CVC3 (Track2)
9F62	PCVC3 (Track1)
9F64	NATC (Track1)
9F65	PCVC3 (Track2)
9F66	PUNATC (Track2)
9F67	NATC (Track2)
9F68	Card Additional Processes
9F69	UDOL
9F6A	Unpredictable Number (Numeric)
9F6B	Track 2 Data
9F6C	Card Transaction Qualifiers (CTQ)
9F6D	Mag-stripe Application Version Number (Reader)
9F6E	Third Party Data
9F6E	Terminal Transaction Capabilities
9F6F	DS Slot Management Control
9F70	Protected Data Envelope 1
9F71	Protected Data Envelope 2
9F72	Protected Data Envelope 3
9F73	Protected Data Envelope 4
9F74	Protected Data Envelope 5
9F75	Unprotected Data Envelope 1
9F76	Unprotected Data Envelope 2
9F77	Unprotected Data Envelope 3
9F78	Unprotected Data Envelope 4
9F79	Unprotected Data Envelope 5
9F7A	VLP Terminal Support Indicator
9F7B	VLP Terminal Transaction Limit
9F7C	Customer Exclusive Data (CED)
9F7D	DS Summary 1

Tag	Description
9F7F	DS Unpredictable Number
A5	File Control Information (FCI) Proprietary Template
BF0C	File Control Information (FCI) Issuer Discretionary Data
BF50	Visa Fleet - CDO
BF60	Integrated Data Storage Record Update Template
C3	Card issuer action code -decline
C4	Card issuer action code -default
C5	Card issuer action code online
C6	PIN Try Limit
C7	CDOL 1 Related Data Length
C8	Card risk management country code
C9	Card risk management currency code
CA	Lower cumulative offline transaction amount
CB	Upper cumulative offline transaction amount
CD	Card Issuer Action Code (PayPass) – Default
CE	Card Issuer Action Code (PayPass) – Online
CF	Card Issuer Action Code (PayPass) – Decline
D1	Currency conversion table
D2	Integrated Data Storage Directory (IDSD)
D3	Additional check table
D5	Application Control
D6	Default ARPC response code
D7	Application Control (PayPass)
D8	AIP (PayPass)
D9	AFL (PayPass)
DA	Static CVC3-TRACK1
DB	Static CVC3-TRACK2
DC	IVCVC3-TRACK1
DD	IVCVC3-TRACK2
DF01	ApplePay VAS Protocol
DF02	ApplePay VAS Failure Report
DF10	Terminal Languages Supported
DF10	Multi Language (Default: "enfr")
DF11	Enable Transaction Logging
DF13	Terminal Action Code - Default
DF14	Terminal Action Code - Denial
DF15	Terminal Action Code - Online
DF17	Threshold Value for Biased Random Selection
DF18	Target Percentage to be Used for Random Selection
DF19	Maximum Target Percentage to be used for Biased Random Selection
DF1F	Last 4 digits of Primary Account Number (PAN)
DF21	Issuer Script Results
DF22	Force Online (1-Enable, 0-Disable)
DF25	Default DDOL (1-Enable, 0-Disable)
DF26	Revocation List Support (Default: Enable - 1)
DF27	Exception File Support (Default: Disable - 0)
DF28	Default TDOL
DF29	Terminal Capabilities - CVM Required
DF2A	Threshold Value for Biased Random Selection(Interac)

Tag	Description
DF2B	Maximum Target Percentage for Biased Random Selection (Interac)
DF2C	Target Percentage for Random Selection(Interac)
DF30	Track Data Source
DF31	DD Card Track 1
DF32	DD Card Track 2
DF33	Interac Receipt Required
DF34	TTK Customer - Firmware Version
DF40	Message to be displayed by EMV Kernel on "PIN Try Limit Exceeded" condition
DF41	Message to be displayed by EMV Kernel on "Last PIN Try" condition
DF42	Message to be displayed by EMV Kernel on "Please Try Again" condition
DF43	Message to be displayed by EMV Kernel on "Call Your Bank" condition
DF45	GMEDS Secret Keys
DF46	GMAD MIDs
DF47	ISIS Read Cmd Data
DF48	ISIS Write Data
DF49	ISIS Transaction Data
DF4A	TTK Customer - Current KSN of Data encryption Key
DF4B	TTK Customer - MSR all track data
DF4C	TTK Customer - Masked PAN
DF4D	TTK Customer - Additional POS Info
DF4E	Polling Options
DF4F	TTK Customer - Fallback Reason
DF50	Special Flow
DF51	Amex Terminal Capability
DF52	Transaction CVM
DF55	RID
DF56	Activate Trans for DESFireViVOCComm Flows
DF57	Reader Primary Language
DF57	2nd usage: Remaining Candidates
DF58	Reader Secondary Language
DF5A	TLVExclusion List
DF5B	Terminal Entry Capability
DF5C	RF Deactivate Period
DF5D	D-PAS Issuer Script Response status
DF5E	Transaction Timing Information
DF5F	Encrypted PAN for remote PIN Pad
DF60	Product ID
DF61	Processor ID
DF61	CVMRequiredLimit_JCBScheme
DF62	Main Firmware Build ID
DF63	CB Enhanced DDA Indicator (same block as DF03)
DF64	CB Wave 2 CVM Requirements (same block as DF04)
DF65	Build ID Num (Cxx)
DF65	CB Display Offline Funds Indicator (same block as DF05)
DF65	Serial heartbeat Required
DF66	SVN Number
DF66	CB Terminal Type (same block as 9F35)
DF66	Display Unsupported Card
DF68	Enable/Disable STOP command processing
DF69	ConfigureProprietaryTags

Tag	Description
DF6A	Enable/Disable Comm Error Recovery
DF6C	Cubic FTP Phase 2 Mode Options
DF6D	Cubic Mode 3 Match AID
DF6E	Cubic Fixed Fare Amounts
DF6F	Cubic Timestamp Data
DF70	Loyalty Program ID
DF70	Generic Name String
DF71	Value Added Tax 1
DF71	Generic Numeric
DF72	Value Added Tax 2
DF72	Generic Specification String
DF73	Merchant Category Code
DF73	Generic Implementation String
DF74	Discover Optional Features
DF75	Communications Error Message Delay
DF76	TVR from GenAC
DF77	ViVOPay MSR Custom Data Output Tag
DF78	MC Timing Performance Enable
DF79	Card Disable Mask
DF7A	Card Disable Interval
DF7B	Serial Port (UART) Inter-character Timeout Period
DF7C	Auto Switch Feature
DF7D	Track Formatting Feature
DF7F	Improved Collision Detection & Media Removal Feature
DF891B	Poll Mode
DF891C	Interac Retry Limit
DFDE04	MSR Encryption Option
DFEE0C	PPSE Terminate Flags
DFEE12	KID
DFEE15	Application Selection Indicator
DFEE16	DUKPT Key or MKSK Select for Online PIN Encrypted
DFEE17	ICC Terminal Entry Mode
DFEE18	MSR Terminal Entry Mode
DFEE19	Online DOL
DFEE1A	Output data element
DFEE1B	Authorization Request data elements
DFEE1E	Contact Terminal Configuration (see below)
DFEE1F	Issuer script device limit, Range: 0~255 (Default: 128)
DFEE20	ICC Power on detect waiting time. (Unit: Sec) (Default: 60S)
DFEE21	ICC L1 waiting time. (Unit: Sec)(Default: 10 S)
DFEE22	Driver (Menu, Get PIN, Get MSR) Timeout. (Unit: Sec) (see below)
DFEE23	MSR Track Data
DFEE24	Force Acceptance (Default: 00)
DFEE25	ICC Response Code
DFEE26	Encryption StatusInformation
DFEE27	MSR Control
DFEF1A	TLV available
DFEF1A	Encrypted Sensitive Tags
DFEF1A	Auto Authenticate
DFEF20	MAC option in reponse data

Tag	Description
DFEF21	BIN
DFEF22	AID
DFEF23	HMAC
DFEF24	HMAC KSN
DFEF25	Output Data Format Select
DFEF26	MSR fallback
DFEF27	Online capability
DFEF28	Disable Encrypt ON
DFEF2C	Terminal AID List
DFEF2E	Terminal Transaction Log
DFEF2F	CUP configuration
DFEF30	White List
DFEF31	Black List
DFEF32	Auto-Switch
DFEF34	Antenna Detection Switch
DFEF35	Communications Watchdog Period
DFEF36	Media Control & Status Tracking
DFEF37	Interface Select
DFEF38	Timeout for Next Command
DFEF39	Network Indicate
DFEF3A	Reader Behavior Mode
DFEF3B	Autopoll Transaction Separation Interval
DFEF40	Ascii-code encryption Tag57 TLV
DFEF41	MAC Verification Data for SRED
DFEF42	MAC VerificationKSN for SRED
DFEF43	Local TZ/DST information.
DFEF44	CombinationOptions
DFEF45	Removal Timeout
DFEF46	ACT Pass Response DOL
DFEF47	CDA Hash Input
DFEF48	Indicate - retrieve transaction result again due to Output RAM is Not enough.
DFEF49	Outcome Parameter Set
DFE↔ F4A	User Interface Request Data
DFEF4B	MSR Equivalent Data Option
DFEF4C	MSR Equivalent Data Track Lengths
DFEF4D	MSR Equivalent Data
DFEF4E	ACT MSD Response DOL
DFEF4F	ACT Decline Response DOL
DFEF50	Terminal Interchange Profile (JCB)
DFEF51	Bypass EMV Completion Output
DFEF52	Re-FallBack times
DFEF53	Dynamic Reader Limits
DFEF54	SmartTap AID Index
DFEF55	Kernel Specific Features
DFEF56	Retry Limit
DFEF57	PPSE Terminate Flags
DFEF59	Terminal Data Setting - Default Amount
DFEF5A	Terminal Data Setting - Tags to Return
DFE↔ F5B	Mask for Tag5A

Tag	Description
DFEF5C	Mask for Tag56
DFEF5D	Mask for Tag57
DFEF5E	Mask for Tag9F6B
DFEF5F	Mask for TagFFEE13
DFEF60	Mask for TagFFEE14
DFEF61	Error Code
DFEF62	Allow MSR Swipe data from ICC Card
DFEF63	Tags To Read Yet
DFEF64	Referral Timeout
DFEF6E	USB-KB Output Data Postfix
DFEF6F	Inter-character Delay for USB-KB Interface
DFEF70	PISCES dual interface interference prevention mechanism fine-tune parameters.
DFEF71	Waiting ICC insert time
DFEF72	Pre-poll card mechanism control in ACT cmd & config setting
DFEF73	Transaction Message Type
DFEF74	Reference amplitude value
DFEF75	Reference delta value
DFEF76	Transaction Interface Type to activate
DFEF77	Timeout for waiting next command
DFEF78	EMV contact L2 display messages option
DFEF79	PIN block format (when TDES)
DFEF7A	Enable Apple Pay Check
DFEF7B	Apple Pay Status
DFEF7C	Track Bit Encoding
DFEF7D	Re-power on times
DFEF7E	Fallback response code list
FF69	ViVOpay Proprietary Tag List
FF70	Serial Finite State Machine Version
FF71	Transaction Finite State Machine Version
FF72	System Information Suite
FF73	Serial Protocol Version
FF74	Serial Protocol Suite
FF75	L1 Paypass Version
FF76	L1 LCR Version
FF77	L2 Card App Version
FF78	L2 Card App Suite
FF79	GMEDs Data
FF79	User Experience Version
FF7A	User Experience Suite
FF7B	ViVOtech Proprietary Suite
FF7C	VIUDS Scheme IDs Supported
FF7D	VIUDS Scheme ID Selection Criteria
FFE0	Registered Application Provider Identifier (RID)
FFE1	Partial Selection Allowed
FFE2	Application Flow
FFE3	Selection Features - GR 1.2.10
FFE4	Group Number / Fallback Group
FFE5	Max AID Length
FFE6	AID Disabled

Tag	Description
FFE7	Interface Support
FFE8	Exclude from Processing
FFE9	Kernel ID Transaction Type Group List
FFEA	Default Kernel ID
FFEE01	ViVOpay TLV Group Tag
FFEE02	ViVOpay Pre-PPSE Special Flow Group Tag
FFEE03	ViVOpay Post-PPSE Special Flow Group Tag
FFEE04	M/Chip3 Intermediate Message Data
FFEE05	M/Chip3 Intermediate Message Marker
FFEE06	ApplePay VAS Container
FFEE07	Encrypted Sensitive Tags
FFEE08	Masked Tags
FFEE0A	BIN Range
FFEE0B	AID Range
FFEE0C	White List
FFEE10	ViVOpay MChip Group Tag
FFEE11	ViVOpay Discover Group Tag
FFEE12	KID
FFEE12	Cash Reader Risk Record
FFEE13	Track 1 Data
FFEE13	Cashback Reader Risk Record
FFEE14	Track 2 Data
FFEE14	DRL Record 1
FFEE15	DRL Record 2
FFEE16	DRL Record 3
FFEE17	DRL Record 4
FFEE18	Tags To Write Yet Before GenAC
FFEE19	Tags To Write Yet After GenAC
FFEE1A	Terminal App DET Data
FFEE1C	Unpredictable Number Range
FFEE1D	Sensitive Data Mask
FFE↔ E1E	Group 0 Initialize Flag
FFE↔ E1F	Error Code Table
FFEE20	Restart Deactivation Time
FFF0	Specific Features Switch
FFF1	Terminal Contactless Transaction Limit
FFF2	Terminal IFD
FFF3	Application Capability
FFF4	Visa Reader Risk Flags
FFF6	Torn Transaction Log Clean Interval (minutes)
FFF7	Burst Mode
FFF8	UI Scheme
FFF9	LCD Font Size
FFFA	LCD Delay Time
FFFB	Language Option for LCD
FFFC	Force MagStripe

9F33 Terminal Capabilities

Byte 1

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Manual key entry
x	1	x	x	x	x	x	x	Magnetic stripe
x	x	1	x	x	x	x	x	IC with contacts
x	x	x	0	x	x	x	x	RFU
x	x	x	x	0	x	x	x	RFU
x	x	x	x	x	0	x	x	RFU
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	x	0	RFU

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Plaintext PIN for IC verification
x	1	x	x	x	x	X	x	Enciphered PIN for online verification
x	x	1	x	x	x	X	x	Signature(paper)
x	x	x	1	x	x	X	x	Enciphered PIN for offline verification
x	x	x	x	1	x	X	x	No CVM Required
x	x	x	x	x	0	x	x	RFU
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	X	0	RFU

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	SDA
X	1	x	x	x	x	x	x	DDA
X	x	1	x	x	x	x	x	Card capture
x	x	x	0	x	x	x	x	RFU
x	x	x	x	1	x	x	X	CDA
x	x	x	x	x	0	x	x	RFU
x	x	x	x	x	x	0	x	RFU
x	x	x	x	X	X	x	0	RFU

9F40 Additional Terminal Capabilities

b1	b2	b3	b4	b5	b6	b7	b8	Meaning
1	x	x	x	x	x	x	x	Cash
x	1	x	x	x	x	x	x	Goods
x	x	1	x	x	x	x	x	Services
x	x	x	1	x	x	x	x	Cashback
x	x	x	x	1	x	x	x	Inquiry
x	x	x	x	x	1	x	x	Transfer
x	x	x	x	x	x	1	x	Payment
x	x	x	x	x	x	x	1	Administrative

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Cash Deposit
x	0	x	x	x	x	x	x	RFU
x	x	0	x	x	x	x	x	RFU
x	x	x	0	x	x	x	x	RFU
x	x	x	x	0	x	x	x	RFU
x	x	x	x	x	0	x	x	RFU
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	x	0	RFU

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Numeric keys
x	1	x	x	x	x	x	x	Alphabetic and special characters keys
x	x	1	x	x	x	x	x	Command keys
x	x	x	1	x	x	x	x	Function Keys
x	x	x	x	0	x	x	x	RFU
x	x	x	x	x	0	x	x	RFU
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	x	0	RFU

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Print, attendant
x	1	x	x	x	x	x	x	Print, cardholder
x	x	1	x	x	x	x	x	Display, attendant
x	x	x	1	x	x	x	x	Display, cardholder
x	x	x	x	0	x	x	x	RFU
x	x	x	x	x	0	x	x	RFU
x	x	x	x	x	x	1	x	Code table 10
x	x	x	x	x	x	x	1	Code table 9

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Code table 8
x	1	x	x	x	x	x	x	Code table 7
x	x	1	x	x	x	x	x	Code table 6
x	x	x	1	x	x	x	x	Code table 5
x	x	x	x	1	x	x	x	Code table 4
x	x	x	x	x	1	x	x	Code table 3

x	x	x	x	x	x	1	x	Code table 2
x	x	x	x	x	x	x	1	Code table 1

9F35 Terminal Type

Environment	Financial Institution	Merchant	Cardholder
Attended			
Online only	11	21	
Offline with online capability	12	22	
Offline only	13	23	
Unattended			
Online only	14	24	34
Offline with online capability	15	25	35
Offline only	16	26	36

DFEE1E Contact Terminal Configuration (Default: F0 DC 3C F0 C2 9E 94 00)

Byte 1

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Key Pad support
x	1	x	x	x	x	x	x	LCD support
x	x	1	x	x	x	x	x	PIN Pad support
x	x	x	1	x	x	x	x	Print Support
x	x	x	x	0	x	x	x	RFU
x	x	x	x	x	0	x	x	RFU
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	X	0	RFU

Byte 2

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	PSE support
x	1	x	x	x	x	x	x	Cardholder confirmation
x	x	1	x	x	x	x	x	Preferred display order
x	x	x	1	x	x	x	x	Multi language
x	x	x	x	1	x	x	x	EMV language selection method
x	x	x	x	x	1	x	x	Default DDOL
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	x	0	RFU

Byte 3

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
0	x	x	x	x	x	x	x	RFU
(Revocation of Issuer Public Key Certificate (DF26))								
x	1	x	x	x	x	x	x	Manual action when CA PK loading fails
x	x	1	x	x	x	x	x	CA PK verified with check sum
x	x	x	1	x	x	x	x	Bypass PIN Entry
x	x	x	x	1	x	x	x	Subsequent bypass PIN Entry
x	x	x	x	x	1	x	x	Get data for pin try counter
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	x	0	RFU

Byte 4

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Amount before CVM processing
x	1	x	x	x	x	x	x	Floor limit checking
x	x	1	x	x	x	x	x	Random transaction selection
x	x	x	1	x	x	x	x	Velocity checking
x	x	x	x	0	x	x	x	RFU
(Transaction Log (DF11))								
x	x	x	x	x	0	x	x	RFU
(Exception File (DF27))								
x	x	x	x	x	x	0	x	RFU
x	x	x	x	x	x	x	0	RFU

Byte 5

b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	X	Terminal action code support
x	1	x	x	x	x	x	x	Terminal action code can be change
x	x	1	x	x	x	x	x	Terminal action code can be deleted or disable
x	x	x	1	x	x	x	x	Default Action code processing before 1st GAC
x	x	x	x	1	x	x	x	Default Action code processing after 1st GAC
x	x	x	x	x	1	x	x	TAC/IAC default process when unable to go online (Skipped)
x	x	x	x	x	x	1	x	TAC/IAC default process when unable to go online (Normal)
x	x	x	x	x	x	x	0	RFU

Byte 6								
b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	Forced Online support
x	1	x	x	x	x	x	x	Forced acceptance support
x	x	1	x	x	x	x	x	Advices support
x	x	x	1	x	x	x	x	Issuer referrals support
X	x	x	x	1	x	x	x	Batch data capture
x	x	x	x	x	1	x	x	Online data capture
X	x	x	x	x	x	1	x	Default TDOL
X	x	x	x	x	x	x	0	RFU

Byte 7								
b8	b7	b6	b5	b4	b3	b2	b1	Meaning
1	x	x	x	x	x	x	x	amount and pin entered on the same keypad
x	1	x	x	x	x	x	x	ICC/Magstripe reader combined
x	x	1	x	x	x	x	x	Magstripe read first
x	x	x	1	x	x	x	x	Support account type selection
x	x	x	x	1	x	x	x	On fly script processing
x	x	x	x	x	1	x	x	Internal date management
x	x	x	x	x	x	1	x	Reversal Mode
(1)Unable go online								
(2) ARC Error								
0: (3) Online Approved but reader not approved.								
1: (3) Online Approved but card response AAC.								
x	x	x	x	x	x	x	0	RFU

Byte 8								
b8	b7	b6	b5	b4	b3	b2	b1	Meaning
x	x	x	x	x	x	x	x	RFU

DFEE22 Driver (Menu, Get PIN, Get MSR) Timeout. (Unit: Sec)

Byte1: Timeout for Menu. (Default: 30 S)
 Byte2: Timeout for Get PIN. (Default: 60 S)
 Byte3: Timeout for Get MSR. (Default: 60 S)

Chapter 13

Namespace Index

13.1 Packages

Here are the packages with brief descriptions (if available):

IDTechSDK	67
---------------------------	----

Chapter 14

Class Index

14.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

IDTechSDK.EMV_Callback	70
IDTechSDK.IDT_VP3300	72
IDTechSDK.IDTCryptoData	116
IDTechSDK.IDTTransactionData	119

Chapter 15

Namespace Documentation

15.1 IDTechSDK Namespace Reference

Classes

- class [EMV_Callback](#)
- class [IDT_VP3300](#)
- class [IDTCryptoData](#)
- class [IDTTransactionData](#)

Enumerations

- enum [EMV_CALLBACK_TYPE](#) { [EMV_CALLBACK_TYPE_LCD](#) =1, [EMV_CALLBACK_TYPE_PINPAD](#) =2, [EMV_CALLBACK_MSR](#) =3 }
- enum [EMV_LCD_DISPLAY_MODE](#) { [EMV_LCD_DISPLAY_MODE_CANCEL](#) = 0, [EMV_LCD_DISPLAY_MODE_MENU](#) = 1, [EMV_LCD_DISPLAY_MODE_PROMPT](#) = 2, [EMV_LCD_DISPLAY_MODE_MESSAGE](#) = 3, [EMV_LCD_DISPLAY_MODE_LANGUAGE_SELECT](#) = 8, [EMV_LCD_DISPLAY_MODE_CLEAR_SCREEN](#) = 16, [EMV_LCD_DISPLAY_MODE_AR_MESSAGE2](#) = 0xf2, [EMV_LCD_DISPLAY_MODE_AR_MESSAGE3](#) = 0xf3, [EMV_LCD_DISPLAY_MODE_AR_MESSAGE4](#) = 0xf4 }
- enum [CTLS_APPLICATION](#) { [CTLS_APPLICATION_NONE](#) = 0, [CTLS_APPLICATION_MASTERCARD](#) = 1, [CTLS_APPLICATION_VISA](#) = 2, [CTLS_APPLICATION_AAMEX](#) = 3, [CTLS_APPLICATION_DISCOVER](#) = 4, [CTLS_APPLICATION_SPEEDPASS](#) = 5, [CTLS_APPLICATION_GIFT_CARD](#) = 6, [CTLS_APPLICATION_DINERS_CLUB](#) = 7, [CTLS_APPLICATION_EN_ROUTE](#) = 8, [CTLS_APPLICATION_JCB](#) = 9, [CTLS_APPLICATION_VIVO_DIAGNOSTIC](#) = 10, [CTLS_APPLICATION_HID](#) = 11, [CTLS_APPLICATION_MSR_SWIPE](#) = 12, [CTLS_APPLICATION_RESERVED](#) = 13, [CTLS_APPLICATION_DES_FIRE_TRACK_DATA](#) = 14, [CTLS_APPLICATION_DES_FIRE_RAW_DATA](#) = 15, [CTLS_APPLICATION_RBS](#) = 17, [CTLS_APPLICATION_VIVO_COMM](#) = 20 }
- enum [EMV_PIN_MODE](#) { [EMV_PIN_MODE_CANCEL](#) =0, [EMV_PIN_MODE_ONLINE_DUKPT](#) =1, [EMV_PIN_MODE_ONLINE_MKSK](#) =2, [EMV_PIN_MODE_OFFLINE](#) =3, [EMV_PIN_MODE_POG](#) = 0x10, [EMV_PIN_MODE_MCPOG](#) = 0x11 }
- enum [EMV_RESULT_CODE](#) { [EMV_RESULT_CODE_UNKNOWN](#) = -1, [EMV_RESULT_CODE_APPROVED_OFFLINE](#) = 0, [EMV_RESULT_CODE_DECLINED_OFFLINE](#) = 1, [EMV_RESULT_CODE_APPROVED](#) = 2, [EMV_RESULT_CODE_DECLINED](#) = 3, [EMV_RESULT_CODE_GO_ONLINE](#) = 4, [EMV_RESULT_CODE_CALL_YOUR_BANK](#) = 5, [EMV_RESULT_CODE_NOT_ACCEPTED](#) = 6, [EMV_RESULT_CODE_FALLBACK_TO_MSR](#) = 7, [EMV_RESULT_CODE_TIMEOUT](#) = 8, [EMV_RESULT_CODE_OTHER](#) = 9 }

```

T_CODE_GO_ONLINE_CTLS = 9, EMV_RESULT_CODE_FAILED = 10,
EMV_RESULT_CODE_AUTHENTICATE_TRANSACTION = 0x0010, EMV_RESULT_CODE_TRANSACTION_CANCELED = 0x0012, EMV_RESULT_CODE_SWIPE_NON_ICC = 0x11, EMV_RESULT_CODE_CTLS_TWO_CARDS = 0x7A,
EMV_RESULT_CODE_CTLS_TERMINATE = 0x7E, EMV_RESULT_CODE_CTLS_TERMINATE_TRY_ANOTHER = 0x7D, EMV_RESULT_CODE_MSR_SWIPE_CAPTURED = 0x80, EMV_RESULT_CODE_REQUEST_ONLINE_PIN = 0x81,
EMV_RESULT_CODE_REQUEST_SIGNATURE = 0x82, EMV_RESULT_CODE_FALLBACK_TO_CONTACT = 0x83, EMV_RESULT_CODE_FALLBACK_TO_OTHER = 0x84, EMV_RESULT_CODE_REVERSAL_REQUIRED = 0x85,
EMV_RESULT_CODE_ADVISE_REQUIRED = 0x86, EMV_RESULT_CODE_ADVISE_REVERSAL_REQUIRED = 0x87, EMV_RESULT_CODE_NO_ADVISE_REVERSAL_REQUIRED = 0x88, EMV_RESULT_CODE_UNABLE_TO_REACH_HOST = 0xFF,
EMV_RESULT_CODE_FILE_ARG_INVALID = 0x1001, EMV_RESULT_CODE_FILE_OPEN_FAILED = 0x1002, EMV_RESULT_CODE_FILE_OPERATION_FAILED = 0x1003, EMV_RESULT_CODE_MEMORY_NOT_ENOUGH = 0x2001,
EMV_RESULT_CODE_SMARTCARD_OK = 0x3001, EMV_RESULT_CODE_SMARTCARD_FAIL = 0x3002, EMV_RESULT_CODE_SMARTCARD_INIT_FAILED = 0x3003, EMV_RESULT_CODE_FALLBACK_SITUATION = 0x3004,
EMV_RESULT_CODE_SMARTCARD_ABSENT = 0x3005, EMV_RESULT_CODE_SMARTCARD_TIMEOUT = 0x3006, EMV_RESULT_CODE_MSR_CARD_ERROR = 0x3007, EMV_RESULT_CODE_MSR_CARD_READ_ERROR = 0x3012,
EMV_RESULT_CODE_PARSING_TAGS_FAILED = 0x5001, EMV_RESULT_CODE_CARD_DATA_ELEMENT_DUPLICATE = 0x5002, EMV_RESULT_CODE_DATA_FORMAT_INCORRECT = 0x5003, EMV_RESULT_CODE_APP_NO_TERM = 0x5004,
EMV_RESULT_CODE_APP_NO_MATCHING = 0x5005, EMV_RESULT_CODE_MANDATORY_OBJECT_MISSING = 0x5006, EMV_RESULT_CODE_APP_SELECTION_RETRY = 0x5007, EMV_RESULT_CODE_AMOUNT_ERROR_GET = 0x5008,
EMV_RESULT_CODE_CARD_REJECTED = 0x5009, EMV_RESULT_CODE_AIP_NOT_RECEIVED = 0x5010, EMV_RESULT_CODE_AFL_NOT_RECEIVED = 0x5011, EMV_RESULT_CODE_AFL_LENGTH_OUT_OF_RANGE = 0x5012,
EMV_RESULT_CODE_SFI_OUT_OF_RANGE = 0x5013, EMV_RESULT_CODE_AFL_INCORRECT = 0x5014, EMV_RESULT_CODE_EXP_DATE_INCORRECT = 0x5015, EMV_RESULT_CODE_EFFECTIVE_DATE_INCORRECT = 0x5016,
EMV_RESULT_CODE_ISS_CODE_TBL_OUT_OF_RANGE = 0x5017, EMV_RESULT_CODE_CRYPTOGRAM_TYPE_INCORRECT = 0x5018, EMV_RESULT_CODE_PSE_BY_CARD_NOT_SUPPORTED = 0x5019, EMV_RESULT_CODE_USER_LANGUAGE_SELECTED = 0x5020,
EMV_RESULT_CODE_SERVICE_NOT_ALLOWED = 0x5021, EMV_RESULT_CODE_NO_TAG_FOUND = 0x5022, EMV_RESULT_CODE_CARD_BLOCKED = 0x5023, EMV_RESULT_CODE_LENGTH_INCORRECT = 0x5024,
EMV_RESULT_CODE_CARD_COM_ERROR = 0x5025, EMV_RESULT_CODE_TSC_NOT_INCREASED = 0x5026, EMV_RESULT_CODE_HASH_INCORRECT = 0x5027, EMV_RESULT_CODE_ARC_NOT_PRESENTED = 0x5028,
EMV_RESULT_CODE_ARC_INVALID = 0x5029, EMV_RESULT_CODE_COMM_NO_ONLINE = 0x5030, EMV_RESULT_CODE_TRAN_TYPE_INCORRECT = 0x5031, EMV_RESULT_CODE_APP_NO_SUPPORT = 0x5032,
EMV_RESULT_CODE_APP_NOT_SELECT = 0x5033, EMV_RESULT_CODE_LANG_NOT_SELECT = 0x5034, EMV_RESULT_CODE_TERM_DATA_NOT_PRESENTED = 0x5035, EMV_RESULT_CODE_CVM_TYPE_UNKNOWN = 0x6001,
EMV_RESULT_CODE_CVM_AIP_NOT_SUPPORTED = 0x6002, EMV_RESULT_CODE_CVM_TAG_8E_MISSING = 0x6003, EMV_RESULT_CODE_CVM_TAG_8E_FORMAT_ERROR = 0x6004, EMV_RESULT_CODE_CVM_CODE_IS_NOT_SUPPORTED = 0x6005,
EMV_RESULT_CODE_CVM_COND_CODE_IS_NOT_SUPPORTED = 0x6006, EMV_RESULT_CODE_CVM_NO_MORE = 0x6007, EMV_RESULT_CODE_PIN_BYPASSED_BEFORE = 0x6008, EMV_RESULT_CODE_PIN_UNKNOWN = 0xffff }

```

15.1.1 Enumeration Type Documentation

15.1.1.1 **enum IDTechSDK.CTLS_APPLICATION** [strong]

Define CTLS_APPLICATION.

15.1.1.2 **enum IDTechSDK.EMV_CALLBACK_TYPE** [strong]

Define EMV_CALLBACK_TYPES.

15.1.1.3 **enum IDTechSDK.EMV_LCD_DISPLAY_MODE** [strong]

Define EMV_LCD_DISPLAY_MODE.

15.1.1.4 **enum IDTechSDK.EMV_PIN_MODE** [strong]

Define EMV_PIN_MODE.

15.1.1.5 **enum IDTechSDK.EMV_RESULT_CODE** [strong]

Define EMV_PIN_MODE.

Chapter 16

Class Documentation

16.1 IDTechSDK.EMV_Callback Class Reference

Public Attributes

- int [msr_swipeTimeout](#)
- int [msr_displayMessage](#)
- [EMV_PIN_MODE](#) pin_pinMode
- int [pin_entryStartTimeout](#)
- int [pin_entryInterval](#)
- byte[] [pin_KSN](#)
- byte[] [pin_truncatedPAN](#)
- [EMV_CALLBACK_TYPE](#) callbackType
- [EMV_LCD_DISPLAY_MODE](#) lcd_displayMode
- int [lcd_entryTimeout](#)
- int [lcd_entryTimeoutMinor](#)
- byte[] [language](#)
- byte[] [lcd_messages](#)
- UInt16 [lcd_backlightTimeout](#)
- bool [maskEntry](#)

16.1.1 Detailed Description

Class for LCD Message

16.1.2 Member Data Documentation

16.1.2.1 [EMV_CALLBACK_TYPE](#) IDTechSDK.EMV_Callback.callbackType

Callback Type.

1- [EMV_CALLBACK_TYPE_LCD](#): LCD Display Hardware Event 2- [EMV_CALLBACK_TYPE_PINPAD](#): Pinpad Hardware Event 3- [EMV_CALLBACK_MSR](#): MSR Hardware Event

16.1.2.2 [byte \[\]](#) IDTechSDK.EMV_Callback.language

Message Language

2 Bytes

- EN - English (default)
- ES - Spanish
- ZH - Chinese
- FR – French

16.1.2.3 UInt16 IDTechSDK.EMV_Callback.lcd_backlightTimeout

Backlight Timeout

If Normal Display or Menu Display, Total timeout for keypad entry, in second default is 30 seconds. 0x0000 = backlight off, 0xFFFF = backlight on

16.1.2.4 EMV_LCD_DISPLAY_MODE IDTechSDK.EMV_Callback.lcd_displayMode

Display Mode.

1- LCD_DISPLAY_MODE_MENU: Menu selection, response required with selected menu index #, or 0 to cancel
 2- LCD_DISPLAY_MODE_PROMPT: Message Prompt, response required 'E' for Enter/Accept, or 'C' for cancel
 3- LCD_DISPLAY_MODE_MESSAGE: Display Message, no response required
 8 – LCD_DISPLAY_MODE_LANGUAGE_SELECT: Language selection, response required with selected language index #
 16 - LCD_DISPLAY_MODE_CLEAR_SCREEN: Request to clear LCD screen of information

16.1.2.5 int IDTechSDK.EMV_Callback.lcd_entryTimeout

Keypad Entry Timeout

If Normal Display or Menu Display, Total timeout for keypad entry, in second default is 30 seconds.

16.1.2.6 int IDTechSDK.EMV_Callback.lcd_entryTimeoutMinor

Keypad Entry Timeout Minor

If Normal Display or Menu Display, minor timeout during each keypad entry, in second, little endian, default is 10 seconds. Note: Minor timeout will erase all previous keypad entry.

16.1.2.7 byte [] IDTechSDK.EMV_Callback.lcd_messages

Display Message

repeatable combination of [Line][Message][0x1C] [Line] - Display line number (1-First Line, n-nth Line), Maximum 16 lines. •The lower 7 bits is for line number. •The MSB is to indicate following message is a Message String or Message ID. •MSB – 0: Message String. (It is valid for “Menu Display” and “Language Menu Display”) •MSB – 1: Message ID. (It is only valid for “Menu Display”) [Message] - Message String or Message ID. Message String: •“Menu Display” : character in the range of 0x20 – 0x7f, Maximum 16 characters • “Language Menu Display” : 2 bytes Language ID EN - English (default) ES - Spanish ZH - Chinese FR – French

16.1.2.8 bool IDTechSDK.EMV_Callback.maskEntry

Mask Entry

If True, keypad entry should be masked with '*'

16.1.2.9 int IDTechSDK.EMV_Callback.msr_displayMessage

MSR Message

Message to display during swipe request

16.1.2.10 int IDTechSDK.EMV_Callback.msr_swipeTimeout

Swipe Timeout

Timeout value waiting for MSR Swipe

16.1.2.11 int IDTechSDK.EMV_Callback.pin_entryInterval

PIN Entry Interval Timeout value of interval between input each PIN

16.1.2.12 int IDTechSDK.EMV_Callback.pin_entryStartTimeout

PIN Entry Start Timeout

Timeout value waiting for PIN entry to start

16.1.2.13 byte [] IDTechSDK.EMV_Callback.pin_KSN

PIN KSN

Pairing DUKPT KSN

16.1.2.14 EMV_PIN_MODE IDTechSDK.EMV_Callback.pin_pinMode

PIN Mode.

0- EMV_PIN_MODE_CANCEL: Entry cancel through command. No response required 1- EMV_PIN_MODE_ONLINE_DUKPT: PIN_DUKPT_KEY required as response 2- EMV_PIN_MODE_ONLINE_MKSK: PIN_SESSION_KEY required as response 3 – EMV_PIN_MODE_OFFLINE: PIN_PAIRING_DUKPT_KEY required as response, unless devices does not implement pairing function, then plaintext PIN required as response

16.1.2.15 byte [] IDTechSDK.EMV_Callback.pin_truncatedPAN

Truncated PAN

Truncated PAN

The documentation for this class was generated from the following file:

- Source_Windows/IDT_Transactions.cs

16.2 IDTechSDK.IDT_VP3300 Class Reference

Public Member Functions

- RETURN_CODE [config_getSerialNumber](#) (ref string response)
- RETURN_CODE [device_getFirmwareVersion](#) (ref string response)
- RETURN_CODE [device_sendDataCommand](#) (string cmd, bool calcLRC, ref byte[] response)
- RETURN_CODE [device_sendDataCommand_ext](#) (string cmd, bool calcLRC, ref byte[] response, int timeout, bool noResponse)

- RETURN_CODE [msr_startMSRSwipe](#) (int timeout)
- RETURN_CODE [msr_cancelMSRSwipe](#) ()
- RETURN_CODE [emv_cancelTransaction](#) ()
- RETURN_CODE [ctls_cancelTransaction](#) ()
- RETURN_CODE [emv_startTransaction](#) (double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool forceOnline, bool isFastEMV=false)
- RETURN_CODE [emv_activateTransaction](#) (int timeout, byte[] tags, bool forceOnline, bool isFastEMV=false)
- RETURN_CODE [emv_authenticateTransaction](#) (byte[] updatedTLV)
- RETURN_CODE [ctls_startTransaction](#) (double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool forceOnline, bool isFastEMV=false)
- RETURN_CODE [device_sendPAE](#) (string command, ref string response, int timeout, string ip="")
- RETURN_CODE [ctls_activateTransaction](#) (int timeout, byte[] tags, bool forceOnline, bool isFastEMV=false)
- RETURN_CODE [device_startTransaction](#) (double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool isFastEMV=false)
- RETURN_CODE [device_activateTransaction](#) (int timeout, byte[] tags, bool isFastEMV=false)
- RETURN_CODE [emv_completeTransaction](#) (bool commError, byte[] authCode, byte[] iad, byte[] tlvScripts, byte[] tlv)
- RETURN_CODE [emv_callbackResponseLCD](#) (EMV_LCD_DISPLAY_MODE type, byte selection)
- RETURN_CODE [emv_callbackResponsePIN](#) (EMV_PIN_MODE type, byte[] KSN, byte[] PIN)
- RETURN_CODE [emv_callbackResponseMSR](#) (byte[] MSR)
- RETURN_CODE [emv_getEMVKernelCheckValue](#) (ref string response)
- RETURN_CODE [emv_getEMVConfigurationCheckValue](#) (ref string response)
- RETURN_CODE [emv_getEMVKernelVersion](#) (ref string response)
- RETURN_CODE [emv_retrieveTransactionResult](#) (byte[] tags, ref [IDTTransactionData](#) tlv)
- RETURN_CODE [emv_removeApplicationData](#) (byte[] AID)
- RETURN_CODE [ctls_removeApplicationData](#) (byte[] AID)
- RETURN_CODE [emv_removeAllApplicationData](#) ()
- RETURN_CODE [emv_removeCAPK](#) (byte[] capk)
- RETURN_CODE [ctls_removeCAPK](#) (byte[] capk)
- RETURN_CODE [emv_removeAllCAPK](#) ()
- RETURN_CODE [ctls_removeAllCAPK](#) ()
- RETURN_CODE [emv_removeCRL](#) (byte[] crlList)
- RETURN_CODE [emv_removeAllCRL](#) ()
- RETURN_CODE [emv_retrieveApplicationData](#) (byte[] AID, ref byte[] tlv)
- RETURN_CODE [ctls_retrieveApplicationData](#) (byte[] AID, ref byte[] tlv)
- RETURN_CODE [emv_retrieveAIDList](#) (ref byte[][] response)
- RETURN_CODE [ctls_retrieveAIDList](#) (ref byte[][] response)
- RETURN_CODE [emv_retrieveCAPK](#) (byte[] capk, ref byte[] key)
- RETURN_CODE [ctls_retrieveCAPK](#) (byte[] capk, ref byte[] key)
- RETURN_CODE [emv_retrieveCAPKList](#) (ref byte[] keys)
- RETURN_CODE [ctls_retrieveCAPKList](#) (ref byte[] keys)
- RETURN_CODE [emv_retrieveCRLList](#) (ref byte[] list)
- RETURN_CODE [ctls_retrieveTerminalData](#) (ref byte[] tlv)
- RETURN_CODE [emv_retrieveTerminalData](#) (ref byte[] tlv)
- RETURN_CODE [emv_removeTerminalData](#) ()
- RETURN_CODE [emv_setApplicationData](#) (byte[] name, byte[] tlv)
- RETURN_CODE [ctls_setApplicationData](#) (byte[] tlv)
- RETURN_CODE [ctls_setDefaultConfiguration](#) ()
- RETURN_CODE [ctls_setConfigurationGroup](#) (byte[] tlv)
- RETURN_CODE [emv_setCAPK](#) (byte[] key)
- RETURN_CODE [ctls_setCAPK](#) (byte[] key)
- RETURN_CODE [emv_setCRL](#) (byte[] list)
- RETURN_CODE [emv_getTerminalMajorConfiguration](#) (ref int configuration)
- RETURN_CODE [emv_setTerminalMajorConfiguration](#) (int configuration)
- RETURN_CODE [emv_setTerminalData](#) (byte[] tlv)

- RETURN_CODE [ctls_setTerminalData](#) (byte[] tlv)
- RETURN_CODE [device_pingDevice](#) ()
- RETURN_CODE [device_buzzer](#) ()
- RETURN_CODE [device_cancelTransaction](#) ()
- RETURN_CODE [device_controlLED](#) (byte indexLED, byte control)
- RETURN_CODE [device_controlUserInterface](#) (byte[] values)
- RETURN_CODE [device_sendVivoCommandP2](#) (byte command, byte subCommand, byte[] data, ref byte[] response)
- RETURN_CODE [device_sendVivoCommandP2_ext](#) (byte command, byte subCommand, byte[] data, ref byte[] response, int timeout, bool noResponse)
- RETURN_CODE [ctls_getConfigurationGroup](#) (int group, ref byte[] tlv)
- RETURN_CODE [ctls_removeConfigurationGroup](#) (int group)
- RETURN_CODE [ctls_getAllConfigurationGroups](#) (ref byte[][] response)
- RETURN_CODE [device_setBurstMode](#) (byte mode)
- RETURN_CODE [device_setPollMode](#) (byte mode)
- RETURN_CODE [device_getPollMode](#) (ref byte mode)
- RETURN_CODE [device_setMerchantRecord](#) (int index, bool enabled, string merchantID, string merchantURL)
- RETURN_CODE [device_startRKI](#) ()
- RETURN_CODE [icc_getICCRaderStatus](#) (ref byte status)
- RETURN_CODE [icc_powerOffICC](#) ()
- RETURN_CODE [icc_powerOnICC](#) (ref byte[] ATR)
- RETURN_CODE [icc_exchangeAPDU](#) (string c_APDU, ref byte[] response)
- RETURN_CODE [device_enablePassThrough](#) (bool enablePassThrough)
- string [device_getResponseCodeString](#) (RETURN_CODE eCode)
- RETURN_CODE [device_getTransactionResults](#) (ref [IDTTransactionData](#) results)
- RETURN_CODE [config_getDate](#) (ref int year, ref int month, ref int day)
- RETURN_CODE [config_setDate](#) (int year, int month, int day)
- RETURN_CODE [config_getTime](#) (ref int hour, ref int minute)
- RETURN_CODE [config_setTime](#) (int hour, int minute)

Static Public Member Functions

- static int [getCommandTimeout](#) ()
- static void [setCommandTimeout](#) (int milliseconds)
- static void [setCallback](#) (Callback my_Callback)
- static void [setCallback](#) (IntPtr my_Callback, SynchronizationContext context)
- static String [SDK_Version](#) ()
- static void [emv_autoAuthenticate](#) (bool authenticate)
- static void [emv_autoAuthenticate](#) (bool authenticate, byte[] tags)
- static void [emv_allowFallback](#) (bool allow)
- static RETURN_CODE [device_updateDeviceFirmware](#) (byte[] firmwareData)

Properties

- static [IDT_VP3300 SharedController](#) [get]

16.2.1 Detailed Description

Class for VP4800 reader

16.2.2 Member Function Documentation

16.2.2.1 RETURN_CODE IDTechSDK.IDT_VP3300.config_getDate (ref int *year*, ref int *month*, ref int *day*)

Get Date Gets the date of the Real Time Clock

Parameters

<i>year</i>	Valid values 0 - 9999 (example 2019)
<i>month</i>	Valid values 1-12
<i>day</i>	Valid values 1-31

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`. When no data is available, return code = RETURN_CODE_NO_DATA_AVAILABLE

16.2.2.2 RETURN_CODE IDTechSDK.IDT_VP3300.config_getSerialNumber (ref string *response*)

Polls device for Serial Number

Parameters

<i>response</i>	Returns Serial Number
-----------------	-----------------------

Returns

RETURN_CODE: Values can be parsed with `device.getResponseCodeString`

16.2.2.3 RETURN_CODE IDTechSDK.IDT_VP3300.config_getTime (ref int *hour*, ref int *minute*)

Get Time Gets the time of the Real Time Clock

Parameters

<i>hour</i>	Valid values 0-23
<i>minute</i>	Valid values 0-59

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`. When no data is available, return code = RETURN_CODE_NO_DATA_AVAILABLE

Set Time Sets the time of the Real Time Clock

Parameters

<i>hour</i>	Valid values 0-23
<i>minute</i>	Valid values 0-59

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`. When no data is available, return code = RETURN_CODE_NO_DATA_AVAILABLE

16.2.2.4 RETURN_CODE IDTechSDK.IDT_VP3300.config_setDate (int year, int month, int day)

Set Date Sets the date of the Real Time Clock

Parameters

<i>year</i>	Valid values 0 - 9999 (example 2019)
<i>month</i>	Valid values 1-12
<i>day</i>	Valid values 1-31

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`. When no data is available, return code = RETURN_CODE_NO_DATA_AVAILABLE

16.2.2.5 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_activateTransaction (int timeout, byte[] tags, bool forceOnline, bool isFastEMV = false)

Start a CTLS Transaction Request

Authorizes the CTLS transaction for an CTLS card

The tags will be returned in the callback routine.

Parameters

<i>amount</i>	Transaction amount value (tag value 9F02)
<i>amtOther</i>	Other amount value, if any (tag value 9F03)
<i>exponent</i>	Number of characters after decimile point
<i>type</i>	Transaction type (tag value 9C).
<i>timeout</i>	Timeout value in seconds.
<i>tags</i>	The other tags to be included in the request. Passed as TLV Data. Example, tag 9F02 with amount 0x000000000100 would be 0x9F0206000000000100
<i>forceOnline</i>	TRUE = do not allow offline approval, FALSE = allow ICC to approve offline if terminal capable
<i>isFastEMV</i>	If TRUE, it will populate the IDTTransactionData.fastEMV with ASCII data similar to IDTech FastEMV KB output, after performing an auto-authenticate and auto-complete with ResultCode = Could Not Contact Host

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

NOTE ON APPLEPAY VAS: To enable ApplePay VAS, first a merchant record must be defined in one of the six available index positions (1-6) using `device_setMerchantRecord`, then container tag FFEE06 must be sent as part of the additional tags parameter of `ctls_startTransaction`. Tag FFEE06 must contain tag 9F26 and 9F22, and can optionally contain tags 9F2B and DFO1. Example FFEE06189F220201009F2604000000009F2B050100000000↵DF010101 9F22 = two bytes = ApplePay Terminal Application Version Number. Hard defined as 0100 for now. (required) 9F26 = four bytes = ApplePay Terminal Capabilities Information (required)

- Byte 1 = RFU

- Byte 2 = Terminal Type
- - Bit 8 = VAS Support (1=on, 0 = off)
- - Bit 7 = Touch ID Required (1=on, 0 = off)
- - Bit 6 = RFU
- - Bit 5 = RFU
- - Bit 1,2,3,4
- - - 0 = Payment Terminal
- - - 1 = Transit Terminal
- - - 2 = Access Terminal
- - - 3 = Wireless Handoff Terminal
- - - 4 = App Handoff Terminal
- - - 15 = Other Terminal
- Byte 3 = RFU
- Byte 4 = Terminal Mode
- - 0 = ApplePay VAS OR ApplePay
- - 1 = ApplePay VAS AND ApplePay
- - 2 = ApplePay VAS ONLY
- - 3 = ApplePay ONLY 9F2B = 5 bytes = ApplePay VAS Filter. Each byte filters for that specific merchant index (optional) DF01 = 1 byte = ApplePay VAS Protocol. (optional)
- - Bit 1 : 1 = URL VAS, 0 = Full VAS
- - Bit 2 : 1 = VAS Beeps, 0 = No VAS Beeps
- - Bit 3 : 1 = Silent Comm Error, 2 = EMEA Comm Error
- - Bit 4-8 : RFU

16.2.2.6 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_cancelTransaction ()

Cancel Transaction

Cancels the currently executing EMV or CTLS transaction.

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.7 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_getAllConfigurationGroups (ref byte response[])

Retrieve All Configuration Groups

Returns all the Configuration Groups installed on the terminal for CTLS

Parameters

<i>response</i>	array of CTLS groups as TLV bytes
-----------------	-----------------------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.8 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_getConfigurationGroup (int *group*, ref byte[] *tlv*)**Get Configuration Group**

Retrieves the Configuration for the specified Group. Group 0 = terminal settings.

Parameters

<i>group</i>	Configuration Group
<i>tlv</i>	return data

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.9 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_removeAllCAPK ()**Remove All Certificate Authority Public Key**

Removes all the CAPK for CTLS

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.10 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_removeApplicationData (byte[] *AID*)**Remove Application Data by AID**

Removes the Application Data for CTLS as specified by the AID name passed as a parameter

Parameters

<i>AID</i>	Name of ApplicationID Must be between 5 and 16 bytes
------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.11 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_removeCAPK (byte[] *capk*)**Remove Certificate Authority Public Key**

Removes the CAPK for CTLS as specified by the RID/Index

Parameters

<i>capk</i>	6 byte CAPK = 5 bytes RID + 1 byte INDEX
-------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.12 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_removeConfigurationGroup (int *group*)

Remove Configuration Group

Removes the Configuration as specified by the Group. Must not be group 0

Parameters

<i>group</i>	Configuration Group
--------------	---------------------

Return values

<i>RETURN_CODE</i>	Return codes listed as typedef enum in IDTCommon:RETURN_CODE. Values can be parsed with <code>IDT_BTPay::device_getResponseCodeString()</code>
--------------------	--

16.2.2.13 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_retrieveAIDList (ref byte *response*[])

Retrieve AID list

Returns all the AID names and their assigned groups installed on the terminal for CTLS.

Parameters

<i>response</i>	array of TLV data objects: FFE4 (group name) followed by 9F06 (AID), and DFEE4F (Interface 01 = CTLS, 02 = CONTACT)
-----------------	---

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.14 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_retrieveApplicationData (byte[] *AID*, ref byte[] *tlv*)

Retrieve Application Data by AID

Retrieves the CTLS Application Data as specified by the AID name passed as a parameter.

Parameters

<i>AID</i>	Name of ApplicationID. Must be between 5 and 16 bytes
<i>tlv</i>	The TLV elements of the requested AID

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.15 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_retrieveCAPK (byte[] *capk*, ref byte[] *key*)

Retrieve Certificate Authority Public Key

Retrieves the CAPK for CTLS as specified by the RID/Index passed as a parameter.

Parameters

<i>capk</i>	6 bytes CAPK = 5 bytes RID + 1 byte Index
<i>key</i>	<p>Response returned as a CAKey format: [5 bytes RID][1 byte Index][1 byte Hash Algorithm][1 byte Encryption Algorithm][20 bytes HashValue][4 bytes Public Key Exponent][2 bytes Modulus Length][Variable bytes Modulus] Where:</p> <ul style="list-style-type: none"> • Hash Algorithm: The only algorithm supported is SHA-1. The value is set to 0x01 • Encryption Algorithm: The encryption algorithm in which this key is used. Currently support only one type: RSA. The value is set to 0x01. • HashValue: Which is calculated using SHA-1 over the following fields: RID & Index & Modulus & Exponent • Public Key Exponent: Actually, the real length of the exponent is either one byte or 3 bytes. It can have two values: 3 (Format is 0x00 00 00 03), or 65537 (Format is 0x00 01 00 01) • Modulus Length: LenL LenH Indicated the length of the next field. • Modulus: This is the modulus field of the public key. Its length is specified in the field above.

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.16 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_retrieveCAPKList (ref byte[] keys)

Retrieve the Certificate Authority Public Key list

Returns all the CAPK RID and Index installed on the terminal for CTLS.

Parameters

<i>keys</i>	[key1][key2]...[keyn], each key 6 bytes where key = 5 bytes RID + 1 byte index
-------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.17 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_retrieveTerminalData (ref byte[] tlv)

Retrieve Terminal Data

Retrieves the Terminal Data for CTLS. This is configuration group 0 (Tag FFEE - > FFEE0100). The terminal data can also be retrieved by `ctls_getConfiguraitonGroup(0)`.

Parameters

<i>tlv</i>	Response returned as a TLV
------------	----------------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.18 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_setApplicationData (byte[] tlv)

Set Application Data by AID

Sets the Application Data for CTLS as specified by TLV data

Parameters

<i>tlv</i>	Application data in TLV format The first tag of the TLV data must be the group number (FFE4). The second tag of the TLV data must be the AID (9F06)
------------	---

Example valid TLV, for Group #2, AID a0000000035010: "ffe401029f0607a0000000051010ffe10101ffe50110ffe30114ffe20106"

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.19 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_setCAPK (byte[] key)

Set Certificate Authority Public Key

Sets the CAPK for CTLS as specified by the CAKey structure

Parameters

<i>key</i>	<p>CAKey format: [5 bytes RID][1 byte Index][1 byte Hash Algorithm][1 byte Encryption Algorithm][20 bytes HashValue][4 bytes Public Key Exponent][2 bytes Modulus Length][Variable bytes Modulus] Where:</p> <ul style="list-style-type: none"> • Hash Algorithm: The only algorithm supported is SHA-1. The value is set to 0x01 • Encryption Algorithm: The encryption algorithm in which this key is used. Currently support only one type: RSA. The value is set to 0x01. • HashValue: Which is calculated using SHA-1 over the following fields: RID & Index & Modulus & Exponent • Public Key Exponent: Actually, the real length of the exponent is either one byte or 3 bytes. It can have two values: 3 (Format is 0x00 00 00 03), or 65537 (Format is 0x00 01 00 01) • Modulus Length: LenL LenH Indicated the length of the next field. • Modulus: This is the modulus field of the public key. Its length is specified in the field above.
------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.20 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_setConfigurationGroup (byte[] tlv)

Set Configuration Group

Sets the Configuration Group for CTLS as specified by the TLV data

Parameters

<i>tlv</i>	Configuration Group Data in TLV format The first tag of the TLV data must be the group number (FFE4). A second tag must exist
------------	---

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.21 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_setDefaultConfiguration ()

Set Default Configuration Group

Resets the device to default CTLS configuration group settings

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.22 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_setTerminalData (byte[] tlv)

Set Terminal Data

Sets the Terminal Data for CTLS as specified by the TLV. The first TLV must be Configuration Group Number (Tag FFE4). The terminal global data is group 0, so the first TLV would be FFE40100. Other groups can be defined using this method (1 or greater), and those can be retrieved with `emv_getConfigurationGroup(int group)`, and deleted with `emv_removeConfigurationGroup(int group)`. You cannot delete group 0.

Parameters

<i>tlv</i>	TerminalData configuration data
------------	---------------------------------

Return values

<i>RETURN_CODE</i>	Return codes listed as typedef enum in IDTCommon:RETURN_CODE. Values can be parsed with <code>IDT_BTPay::device_getResponseCodeString()</code>
--------------------	--

16.2.2.23 RETURN_CODE IDTechSDK.IDT_VP3300.ctls_startTransaction (double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool forceOnline, bool isFastEMV = false)

Start a CTLS Transaction Request

Authorizes the CTLS transaction for an CTLS card

The tags will be returned in the callback routine.

Parameters

<i>amount</i>	Transaction amount value (tag value 9F02)
<i>amtOther</i>	Other amount value, if any (tag value 9F03)
<i>exponent</i>	Number of characters after decimile point
<i>type</i>	Transaction type (tag value 9C).
<i>timeout</i>	Timeout value in seconds.

Parameters

<i>tags</i>	Any other tags to be included in the request. Passed as TLV Data. Example, tag 9F02 with amount 0x000000000100 would be 0x9F0206000000000100 If tags 9F02 (amount), 9F03 (other amount), or 9C (transaction type) are included, they will take priority over these values supplied as individual parameters to this method.
<i>forceOnline</i>	TRUE = do not allow offline approval, FALSE = allow ICC to approve offline if terminal capable
<i>isFastEMV</i>	If TRUE, it will populate the IDTTransactionData.fastEMV with ASCII data similar to IDTech FastEMV KB output, after performing an auto-authenticate and auto-complete with ResultCode = Could Not Contact Host

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

NOTE ON APPLEPAY VAS: To enable ApplePay VAS, first a merchant record must be defined in one of the six available index positions (1-6) using `device_setMerchantRecord`, then container tag FFEE06 must be sent as part of the additional tags parameter of `ctls_startTransaction`. Tag FFEE06 must contain tag 9F26 and 9F22, and can optionally contain tags 9F2B and DF01. Example FFEE06189F220201009F2604000000009F2B050100000000DF010101 9F22 = two bytes = ApplePay Terminal Application Version Number. Hard defined as 0100 for now. (required) 9F26 = four bytes = ApplePay Terminal Capabilities Information (required)

- Byte 1 = RFU
- Byte 2 = Terminal Type
 - - Bit 8 = VAS Support (1=on, 0 = off)
 - - Bit 7 = Touch ID Required (1=on, 0 = off)
 - - Bit 6 = RFU
 - - Bit 5 = RFU
 - - Bit 1,2,3,4
 - - - 0 = Payment Terminal
 - - - 1 = Transit Terminal
 - - - 2 = Access Terminal
 - - - 3 = Wireless Handoff Terminal
 - - - 4 = App Handoff Terminal
 - - - 15 = Other Terminal
- Byte 3 = RFU
- Byte 4 = Terminal Mode
 - - 0 = ApplePay VAS OR ApplePay
 - - 1 = ApplePay VAS AND ApplePay
 - - 2 = ApplePay VAS ONLY
 - - 3 = ApplePay ONLY 9F2B = 5 bytes = ApplePay VAS Filter. Each byte filters for that specific merchant index (optional) DF01 = 1 byte = ApplePay VAS Protocol. (optional)
 - - Bit 1 : 1 = URL VAS, 0 = Full VAS
 - - Bit 2 : 1 = VAS Beeps, 0 = No VAS Beeps
 - - Bit 3 : 1 = Silent Comm Error, 2 = EMEA Comm Error
 - - Bit 4-8 : RFU

16.2.2.24 RETURN_CODE IDTechSDK.IDT_VP3300.device_activateTransaction (int *timeout*, byte[] *tags*, bool *isFastEMV* = false)

Start a Transaction Request

Authorizes the transaction CTLS, MSR or Contact EMV

The tags will be returned in the callback routine.

Parameters

<i>timeout</i>	Timeout value in seconds.
<i>tags</i>	The tags to be included in the request. Passed as TLV Data. Example, tag 9F02 with amount 0x000000000100 would be 0x9F0206000000000100
<i>isFastEMV</i>	If TRUE, it will populate the IDTTransactionData.fastEMV with ASCII data similar to IDTech FastEMV KB output, after performing an auto-authenticate and auto-complete with ResultCode = Could Not Contact Host

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

NOTE ON APPLEPAY VAS: To enable ApplePay VAS, first a merchant record must be defined in one of the six available index positions (1-6) using `device_setMerchantRecord`, then container tag FFEE06 must be sent as part of the additional tags parameter of `ctls_startTransaction`. Tag FFEE06 must contain tag 9F26 and 9F22, and can optionally contain tags 9F2B and DFO1. Example FFEE06189F220201009F2604000000009F2B050100000000↵ DF010101 9F22 = two bytes = ApplePay Terminal Application Version Number. Hard defined as 0100 for now. (required) 9F26 = four bytes = ApplePay Terminal Capabilities Information (required)

- Byte 1 = RFU
- Byte 2 = Terminal Type
 - - Bit 8 = VAS Support (1=on, 0 = off)
 - - Bit 7 = Touch ID Required (1=on, 0 = off)
 - - Bit 6 = RFU
 - - Bit 5 = RFU
 - - Bit 1,2,3,4
 - - - 0 = Payment Terminal
 - - - 1 = Transit Terminal
 - - - 2 = Access Terminal
 - - - 3 = Wireless Handoff Terminal
 - - - 4 = App Handoff Terminal
 - - - 15 = Other Terminal
- Byte 3 = RFU
- Byte 4 = Terminal Mode
 - - 0 = ApplePay VAS OR ApplePay
 - - 1 = ApplePay VAS AND ApplePay
 - - 2 = ApplePay VAS ONLY

- - 3 = ApplePay ONLY 9F2B = 5 bytes = ApplePay VAS Filter. Each byte filters for that specific merchant index (optional) DF01 = 1 byte = ApplePay VAS Protocol. (optional)
- - Bit 1 : 1 = URL VAS, 0 = Full VAS
- - Bit 2 : 1 = VAS Beeps, 0 = No VAS Beeps
- - Bit 3 : 1 = Silent Comm Error, 2 = EMEA Comm Error
- - Bit 4-8 : RFU

16.2.2.25 RETURN_CODE IDTechSDK.IDT_VP3300.device_buzzer ()

Buzzer Device

Buzzer the reader. If success can hear one beep. Otherwise, returns timeout.

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.26 RETURN_CODE IDTechSDK.IDT_VP3300.device_cancelTransaction ()

Cancel Transaction

Cancels the currently executing device transaction.

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.27 RETURN_CODE IDTechSDK.IDT_VP3300.device_controlLED (byte *indexLED*, byte *control*)

Control LED

Control the reader. If connected, returns success. Otherwise, returns timeout. *indexLED* description as follows: 00h: LED 0 (Power LED) 01h: LED 1 02h: LED 2 03h: LED 3 10h: Single Tri-Color LED (Unipay III used) FFh: All 4 LEDs + Single Tri-Color LED Where the LEDs are numbered 0, 1, 2, 3 counting from the left. Note: If you are using pass-through mode to control the Power LED (LED 0), it is your responsibility to make sure that it behaves correctly. *control* description as follows: 00h: LED Off (LED 0~4 + Tri-Color LED) 01h: LED On (LED 0~4) 02h: Green Color (Tri-Color LED) 03h: Red Color (Tri-Color LED) 04h: Amber Color (Tri-Color LED)

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.28 RETURN_CODE IDTechSDK.IDT_VP3300.device_controlUserInterface (byte[] *values*)

Control User Interface

Controls the User Interface: Display, Beep, LED

Parameters

<i>values</i>	<p>Four bytes to control the user interface Byte[0] = LCD Message Messages 00-07 are normally controlled by the reader.</p> <ul style="list-style-type: none"> • 00h: Idle Message (Welcome) • 01h: Present card (Please Present Card) • 02h: Time Out or Transaction cancel (No Card) • 03h: Transaction between reader and card is in the middle (Processing...) • 04h: Transaction Pass (Thank You) • 05h: Transaction Fail (Fail) • 06h: Amount (Amount \$ 0.00 Tap Card) • 07h: Balance or Offline Available funds (Balance \$ 0.00) Messages 08-0B are controlled by the terminal • 08h: Insert or Swipe card (Use Chip & PIN) • 09h: Try Again(Tap Again) • 0Ah: Tells the customer to present only one card (Present 1 card only) • 0Bh: Tells the customer to wait for authentication/authorization (Wait) • FFh: indicates the command is setting the LED/Buzzer only. Byte[1] = Beep Indicator • 00h: No beep • 01h: Single beep • 02h: Double beep • 03h: Three short beeps • 04h: Four short beeps • 05h: One long beep of 200 ms • 06h: One long beep of 400 ms • 07h: One long beep of 600 ms • 08h: One long beep of 800 ms Byte[2] = LED Number • 00h: LED 0 (Power LED) 01h: LED 1 • 02h: LED 2 • 03h: LED 3 • FFh: All LEDs Byte[3] = LED Status • 00h: LED Off • 01h: LED On
---------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.29 RETURN_CODE IDTechSDK.IDT_VP3300.device_enablePassThrough (bool *enablePassThrough*)

Enable Pass Through

Enables Pass Through Mode for direct communication with L1 interface (power on icc, send apdu, etc).

Parameters

<i>enablePassThrough</i>	true = pass through ON, false = pass through OFF
--------------------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.30 RETURN_CODE IDTechSDK.IDT_VP3300.device_getFirmwareVersion (ref string *response*)

Polls device for Firmware Version

Parameters

<i>response</i>	Response returned of Firmware Version
-----------------	---------------------------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.31 RETURN_CODE IDTechSDK.IDT_VP3300.device_getPollMode (ref byte *mode*)

Get Poll Mode

Gets the poll mode for the device.

Parameters

<i>mode</i>	: 00h = Auto Poll (USB I/F auto set to USB/HID) 01h = Poll on Demand (USB I/F auto set to USB/HID) 02h = QuickChip (USB I/F auto set to USB KB) 03h = QuickChip (enable QuickChip for CT + MSR) 04h = QuickChip (enable QuickChip for CL + MSR)
-------------	---

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.32 string IDTechSDK.IDT_VP3300.device_getResponseCodeString (RETURN_CODE *eCode*)

Get the description of response result.

Parameters

<i>eCode</i>	the response result.
--------------	----------------------

Return values

<i>the</i>	string for description of response result
------------	---

- case 0: "no error, beginning task";
- case 1: "no response from reader";
- case 2: "invalid response data";
- case 3: "time out for task or CMD";
- case 4: "wrong parameter";
- case 5: "SDK is doing MSR or ICC task";
- case 6: "SDK is doing PINPad task";
- case 7: "SDK is doing CTLS task";
- case 8: "SDK is doing EMV task";
- case 9: "SDK is doing Other task";
- case 10: "err response or data";
- case 11: "no reader attached";
- case 12: "mono audio is enabled";
- case 13: "did connection";
- case 14: "audio volume is too low";
- case 15: "task or CMD be canceled";
- case 16: "UF wrong string format";
- case 17: "UF file not found";
- case 18: "UF wrong file format";
- case 19: "Attempt to contact online host failed";
- case 20: "Attempt to perform RKI failed";
- case 0x300: "Key Type(TDES) of Session Key is not same as the related Master Key.";
- case 0x400: "Related Key was not loaded.";
- case 0x500: "Key Same.";
- case 0x501: "Key is all zero";
- case 0x502: "TR-31 format error";
- case 0x702: "PAN is Error Key.";
- case 0x705: "No Internal MSR PAN (or Internal MSR PAN is erased timeout)";
- case 0X0C01: "Incorrect Frame Tag";
- case 0X0C02: "Incorrect Frame Type";
- case 0X0C03: "Unknown Frame Type";
- case 0X0C04: "Unknown Command";

- case 0X0C05: "Unknown Sub-Command";
- case 0X0C06: "CRC Error";
- case 0X0C07: "Failed";
- case 0X0C08: "Timeout";
- case 0X0C0A: "Incorrect Parameter";
- case 0X0C0B: "Command Not Supported";
- case 0X0C0C: "Sub-Command Not Supported";
- case 0X0C0D: "Parameter Not Supported / Status Abort Command";
- case 0X0C0F: "Sub-Command Not Allowed";
- case 0X0D01: "Incorrect Header Tag";
- case 0X0D02: "Unknown Command";
- case 0X0D03: "Unknown Sub-Command";
- case 0X0D04: "CRC Error in Frame";
- case 0X0D05: "Incorrect Parameter";
- case 0X0D06: "Parameter Not Supported";
- case 0X0D07: "Mal-formatted Data";
- case 0X0D08: "Timeout";
- case 0X0D0A: "Failed / NACK";
- case 0X0D0B: "Command not Allowed";
- case 0X0D0C: "Sub-Command not Allowed";
- case 0X0D0D: "Buffer Overflow (Data Length too large for reader buffer)";
- case 0X0D0E: "User Interface Event";
- case 0X0D11: "Communication type not supported, VT-1, burst, etc.";
- case 0X0D12: "Secure interface is not functional or is in an intermediate state.";
- case 0X0D13: "Data field is not mod 8";
- case 0X0D14: "Pad 0x80 not found where expected";
- case 0X0D15: "Specified key type is invalid";
- case 0X0D1: "Could not retrieve key from the SAM(InitSecureComm)";
- case 0X0D17: "Hash code problem";
- case 0X0D18: "Could not store the key into the SAM(InstallKey)";
- case 0X0D19: "Frame is too large";
- case 0X0D1A: "Unit powered up in authentication state but POS must resend the InitSecureComm command";
- case 0X0D1B: "The EEPROM may not be initialized because SecCommInterface does not make sense";
- case 0X0D1C: "Problem encoding APDU";
- case 0X0D20: "Unsupported Index(ILM) SAM Transceiver error – problem communicating with the SAM(Key Mgr)";

- case 0X0D2: "Unexpected Sequence Counter in multiple frames for single bitmap(ILM) Length error in data returned from the SAM(Key Mgr)";
- case 0X0D22: "Improper bit map(ILM)";
- case 0X0D23: "Request Online Authorization";
- case 0X0D24: "ViVOCard3 raw data read successful";
- case 0X0D25: "Message index not available(ILM) ViVOcomm activate transaction card type(ViVOcomm)";
- case 0X0D26: "Version Information Mismatch(ILM)";
- case 0X0D27: "Not sending commands in correct index message index(ILM)";
- case 0X0D28: "Time out or next expected message not received(ILM)";
- case 0X0D29: "ILM languages not available for viewing(ILM)";
- case 0X0D2A: "Other language not supported(ILM)";
- case 0X0D41: "Unknown Error from SAM";
- case 0X0D42: "Invalid data detected by SAM";
- case 0X0D43: "Incomplete data detected by SAM";
- case 0X0D44: "Reserved";
- case 0X0D45: "Invalid key hash algorithm";
- case 0X0D46: "Invalid key encryption algorithm";
- case 0X0D47: "Invalid modulus length";
- case 0X0D48: "Invalid exponent";
- case 0X0D49: "Key already exists";
- case 0X0D4A: "No space for new RID";
- case 0X0D4B: "Key not found";
- case 0X0D4C: "Crypto not responding";
- case 0X0D4D: "Crypto communication error";
- case 0X0D4E: "Module-specific error for Key Manager";
- case 0X0D4F: "All key slots are full (maximum number of keys has been installed)";
- case 0X0D50: "Auto-Switch OK";
- case 0X0D51: "Auto-Switch failed";
- case 0X0D90: "Account DUKPT Key not exist";
- case 0X0D91: "Account DUKPT Key KSN exhausted";
- case 0x0D00: "This Key had been loaded.";
- case 0x0E00: "Base Time was loaded.";
- case 0x0F00: "Encryption Or Decryption Failed.";
- case 0x1000: "Battery Low Warning (It is High Priority Response while Battery is Low.)";
- case 0x1800: "Send "Cancel Command" after send "Get Encrypted PIN" & "Get Numeric" & "Get Amount";
- case 0x1900: "Press "Cancel" key after send "Get Encrypted PIN" & "Get Numeric" & "Get Amount";

- case 0x30FF: "Security Chip is not connect";
- case 0x3000: "Security Chip is deactivation & Device is In Removal Legally State.";
- case 0x3101: "Security Chip is activation & Device is In Removal Legally State.";
- case 0x5500: "No Admin DUKPT Key.";
- case 0x5501: "Admin DUKPT Key STOP.";
- case 0x5502: "Admin DUKPT Key KSN is Error.";
- case 0x5503: "Get Authentication Code1 Failed.";
- case 0x5504: "Validate Authentication Code Error.";
- case 0x5505: "Encrypt or Decrypt data failed.";
- case 0x5506: "Not Support the New Key Type.";
- case 0x5507: "New Key Index is Error.";
- case 0x5508: "Step Error.";
- case 0x5509: "KSN Error";
- case 0x550A: "MAC Error.";
- case 0x550B: "Key Usage Error.";
- case 0x550C: "Mode Of Use Error.";
- case 0x550F: "Other Error.";
- case 0x6000: "Save or Config Failed / Or Read Config Error.";
- case 0x6200: "No Serial Number.";
- case 0x6900: "Invalid Command - Protocol is right, but task ID is invalid.";
- case 0x6A01: "Unsupported Command – Protocol and task ID are right, but command is invalid – In this State";
- case 0x6A00: "Unsupported Command - Protocol and task ID are right, but command is invalid.";
- case 0x6B00: "Unknown parameter in command - Protocol task ID and command are right, but parameter is invalid.";
- case 0x6C00: "Unknown parameter in command – Protocol task ID and command are right, but length is out of the requirement.";
- case 0x7200: "Device is suspend (MKSK suspend or press password suspend).";
- case 0x7300: "PIN DUKPT is STOP (21 bit 1).";
- case 0x7400: "Device is Busy.";
- case 0xE100: "Can not enter sleep mode";
- case 0xE200: "File has existed";
- case 0xE300: "File has not existed";
- case 0xE313: "IO line low -- Card error after session start";
- case 0xE400: "Open File Error";
- case 0xE500: "SmartCard Error";
- case 0xE600: "Get MSR Card data is error";

- case 0xE700: "Command time out";
- case 0xE800: "File read or write is error";
- case 0xE900: "Active 1850 error!";
- case 0xEA00: "Load bootloader error";
- case 0xEF00: "Protocol Error- STX or ETX or check error.";
- case 0xEB00: "Picture is not exist";
- case 0x2C02: "No Microprocessor ICC seated";
- case 0x2C06: "no card seated to request ATR";
- case 0x2D01: "Card Not Supported,";
- case 0x2D03: "Card Not Supported, wants CRC";
- case 0x690D: "Command not supported on reader without ICC support";
- case 0x8100: "ICC error time out on power-up";
- case 0x8200: "invalid TS character received - Wrong operation step";
- case 0x8300: "Decode MSR Error";
- case 0x8400: "TriMagII no Response";
- case 0x8500: "No Swipe MSR Card";
- case 0x8510: "No Financial Card";
- case 0x8600: "Unsupported F, D, or combination of F and D";
- case 0x8700: "protocol not supported EMV TD1 out of range";
- case 0x8800: "power not at proper level";
- case 0x8900: "ATR length too long";
- case 0x8B01: "EMV invalid TA1 byte value";
- case 0x8B02: "EMV TB1 required";
- case 0x8B03: "EMV Unsupported TB1 only 00 allowed";
- case 0x8B04: "EMV Card Error, invalid BWI or CWI";
- case 0x8B06: "EMV TB2 not allowed in ATR";
- case 0x8B07: "EMV TC2 out of range";
- case 0x8B08: "EMV TC2 out of range";
- case 0x8B09: "per EMV96 TA3 must be > 0xF";
- case 0x8B10: "ICC error on power-up";
- case 0x8B11: "EMV T=1 then TB3 required";
- case 0x8B12: "Card Error, invalid BWI or CWI";
- case 0x8B13: "Card Error, invalid BWI or CWI";
- case 0x8B17: "EMV TC1/TB3 conflict-";
- case 0x8B20: "EMV TD2 out of range must be T=1";
- case 0x8C00: "TCK error";

- case 0xA304: "connector has no voltage setting";
- case 0xA305: "ICC error on power-up invalid (SBLK(IFSD) exchange";
- case 0xE301: "ICC error after session start";
- case 0xFF00: "Request to go online";
- case 0xFF01: "EMV: Accept the offline transaction";
- case 0xFF02: "EMV: Decline the offline transaction";
- case 0xFF03: "EMV: Accept the online transaction";
- case 0xFF04: "EMV: Decline the online transaction";
- case 0xFF05: "EMV: Application may fallback to magstripe technology";
- case 0xFF06: "EMV: ICC detected tah the conditions of use are not satisfied";
- case 0xFF07: "EMV: ICC didn't accept transaction";
- case 0xFF08: "EMV: Transaction was cancelled";
- case 0xFF09: "EMV: Application was not selected by kernel or ICC format error or ICC missing data error";
- case 0xFF0A: "EMV: Transaction is terminated";
- case 0xFF0B: "EMV: Other EMV Error";
- case 0xFFFF: "NO RESPONSE";
- case 0xF002: "ICC communication timeout";
- case 0xF003: "ICC communication Error";
- case 0xF00F: "ICC Card Seated and Highest Priority, disable MSR work request";
- case 0xF200: "AID List / Application Data is not exist";
- case 0xF201: "Terminal Data is not exist";
- case 0xF202: "TLV format is error";
- case 0xF203: "AID List is full";
- case 0xF204: "Any CA Key is not exist";
- case 0xF205: "CA Key RID is not exist";
- case 0xF206: "CA Key Index it not exist";
- case 0xF207: "CA Key is full";
- case 0xF208: "CA Key Hash Value is Error";
- case 0xF209: "Transaction format error";
- case 0xF20A: "The command will not be processing";
- case 0xF20B: "CRL is not exist";
- case 0xF20C: "CRL number exceed max number";
- case 0xF20D: "Amount,Other Amount,Trasaction Type are missing";
- case 0xF20E: "The Identification of algorithm is mistake";
- case 0xF20F: "No Financial Card";
- case 0xF210: "In Encrypt Result state, TLV total Length is greater than Max Length";

- case 0x1001: "INVALID ARG";
- case 0x1002: "FILE_OPEN_FAILED";
- case 0x1003: "FILE OPERATION_FAILED";
- case 0x2001: "MEMORY_NOT_ENOUGH";
- case 0x3002: "SMARTCARD_FAIL";
- case 0x3003: "SMARTCARD_INIT_FAILED";
- case 0x3004: "FALLBACK_SITUATION";
- case 0x3005: "SMARTCARD_ABSENT";
- case 0x3006: "SMARTCARD_TIMEOUT";
- case 0x5001: "EMV_PARSING_TAGS_FAILED";
- case 0x5002: "EMV_DUPLICATE_CARD_DATA_ELEMENT";
- case 0x5003: "EMV_DATA_FORMAT_INCORRECT";
- case 0x5004: "EMV_NO_TERM_APP";
- case 0x5005: "EMV_NO_MATCHING_APP";
- case 0x5006: "EMV_MISSING_MANDATORY_OBJECT";
- case 0x5007: "EMV_APP_SELECTION_RETRY";
- case 0x5008: "EMV_GET_AMOUNT_ERROR";
- case 0x5009: "EMV_CARD_REJECTED";
- case 0x5010: "EMV_AIP_NOT_RECEIVED";
- case 0x5011: "EMV_AFL_NOT_RECEIVED";
- case 0x5012: "EMV_AFL_LEN_OUT_OF_RANGE";
- case 0x5013: "EMV_SFI_OUT_OF_RANGE";
- case 0x5014: "EMV_AFL_INCORRECT";
- case 0x5015: "EMV_EXP_DATE_INCORRECT";
- case 0x5016: "EMV_EFF_DATE_INCORRECT";
- case 0x5017: "EMV_ISS_COD_TBL_OUT_OF_RANGE";
- case 0x5018: "EMV_CRYPTOGAM_TYPE_INCORRECT";
- case 0x5019: "EMV_PSE_NOT_SUPPORTED_BY_CARD";
- case 0x5020: "EMV_USER_SELECTED_LANGUAGE";
- case 0x5021: "EMV_SERVICE_NOT_ALLOWED";
- case 0x5022: "EMV_NO_TAG_FOUND";
- case 0x5023: "EMV_CARD_BLOCKED";
- case 0x5024: "EMV_LEN_INCORRECT";
- case 0x5025: "CARD_COM_ERROR";
- case 0x5026: "EMV_TSC_NOT_INCREASED";
- case 0x5027: "EMV_HASH_INCORRECT";

- case 0x5028: "EMV_NO_ARC";
- case 0x5029: "EMV_INVALID_ARC";
- case 0x5030: "EMV_NO_ONLINE_COMM";
- case 0x5031: "TRAN_TYPE_INCORRECT";
- case 0x5032: "EMV_APP_NO_SUPPORT";
- case 0x5033: "EMV_APP_NOT_SELECT";
- case 0x5034: "EMV_LANG_NOT_SELECT";
- case 0x5035: "EMV_NO_TERM_DATA";
- case 0x6001: "CVM_TYPE_UNKNOWN";
- case 0x6002: "CVM_AIP_NOT_SUPPORTED";
- case 0x6003: "CVM_TAG_8E_MISSING";
- case 0x6004: "CVM_TAG_8E_FORMAT_ERROR";
- case 0x6005: "CVM_CODE_IS_NOT_SUPPORTED";
- case 0x6006: "CVM_COND_CODE_IS_NOT_SUPPORTED";
- case 0x6007: "NO_MORE_CVM";
- case 0x6008: "PIN_BYPASSED_BEFORE";
- case 0x7001: "PK_BUFFER_SIZE_TOO_BIG";
- case 0x7002: "PK_FILE_WRITE_ERROR";
- case 0x7003: "PK_HASH_ERROR";
- case 0x8001: "NO_CARD_HOLDER_CONFIRMATION";
- case 0x8002: "GET_ONLINE_PIN";
- case 0xD000: "Data not exist";
- case 0xD001: "Data access error";
- case 0xD100: "RID not exist";
- case 0xD101: "RID existed";
- case 0xD102: "Index not exist";
- case 0xD200: "Maximum exceeded";
- case 0xD201: "Hash error";
- case 0xD205: "System Busy";
- case 0x0E01: "Unable to go online";
- case 0x0E02: "Technical Issue";
- case 0x0E03: "Declined";
- case 0x0E04: "Issuer Referral transaction";
- case 0x0F01: "Decline the online transaction";
- case 0x0F02: "Request to go online";
- case 0x0F03: "Transaction is terminated";

- case 0x0F05: "Application was not selected by kernel or ICC format error or ICC missing data error";
- case 0x0F07: "ICC didn't accept transaction";
- case 0x0F0A: "Application may fallback to magstripe technology";
- case 0x0F0C: "Transaction was cancelled";
- case 0x0F0D: "Timeout";
- case 0x0F0F: "Other EMV Error";
- case 0x0F10: "Accept the offline transaction";
- case 0x0F11: "Decline the offline transaction";
- case 0x0F21: "ICC detected tah the conditions of use are not satisfied";
- case 0x0F22: "No app were found on card matching terminal configuration";
- case 0x0F23: "Terminal file does not exist";
- case 0x0F24: "CAPK file does not exist";
- case 0x0F25: "CRL Entry does not exist";
- case 0x0FFE: "code when blocking is disabled";
- case 0x0FFF: "code when command is not applicable on the selected device";
- case 0xF005: "ICC Encrypted C-APDU Data Structure Length Error Or Format Error.";
- case 0xBBE0: "CM100 Success";
- case 0xBBE1: "CM100 Parameter Error";
- case 0xBBE2: "CM100 Low Output Buffer";
- case 0xBBE3: "CM100 Card Not Found";
- case 0xBBE4: "CM100 Collision Card Exists";
- case 0xBBE5: "CM100 Too Many Cards Exist";
- case 0xBBE6: "CM100 Saved Data Does Not Exist";
- case 0xBBE8: "CM100 No Data Available";
- case 0xBBE9: "CM100 Invalid CID Returned";
- case 0xBBEA: "CM100 Invalid Card Exists";
- case 0xBBEC: "CM100 Command Unsupported";
- case 0xBBED: "CM100 Error In Command Process";
- case 0xBBEE: "CM100 Invalid Command";
- case 0X9031: "Unknown command";
- case 0X9032: "Wrong parameter (such as the length of the command is incorrect)";
- case 0X9038: "Wait (the command couldn't be finished in BWT)";
- case 0X9039: "Busy (a previously command has not been finished)";
- case 0X903A: "Number of retries over limit";
- case 0X9040: "Invalid Manufacturing system data";
- case 0X9041: "Not authenticated";

- case 0X9042: "Invalid Master DUKPT Key";
- case 0X9043: "Invalid MAC Key";
- case 0X9044: "Reserved for future use";
- case 0X9045: "Reserved for future use";
- case 0X9046: "Invalid DATA DUKPT Key";
- case 0X9047: "Invalid PIN Pairing DUKPT Key";
- case 0X9048: "Invalid DATA Pairing DUKPT Key";
- case 0X9049: "No nonce generated";
- case 0X9949: "No GUID available. Perform getVersion first.";
- case 0X9950: "MAC Calculation unsuccessful. Check BDK value.";
- case 0X904A: "Not ready";
- case 0X904B: "Not MAC data";
- case 0X9050: "Invalid Certificate";
- case 0X9051: "Duplicate key detected";
- case 0X9052: "AT checks failed";
- case 0X9053: "TR34 checks failed";
- case 0X9054: "TR31 checks failed";
- case 0X9055: "MAC checks failed";
- case 0X9056: "Firmware download failed";
- case 0X9060: "Log is full";
- case 0X9061: "Removal sensor unengaged";
- case 0X9062: "Any hardware problems";
- case 0X9070: "ICC communication timeout";
- case 0X9071: "ICC data error (such check sum error)";
- case 0X9072: "Smart Card not powered up";

16.2.2.33 RETURN_CODE IDTechSDK.IDT_VP3300.device_getTransactionResults (ref IDTTransactionData *results*)

Get Transaction Results Gets the transaction results when the reader is functioning in "Auto Poll" mode

Parameters

<i>results</i>	The transaction results
----------------	-------------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`. When no data is available, return code = RETURN_CODE_NO_DATA_AVAILABLE

16.2.2.34 RETURN_CODE IDTechSDK.IDT_VP3300.device_pingDevice ()

Ping Device

Pings the reader. If connected, returns success. Otherwise, returns timeout.

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.35 RETURN_CODE IDTechSDK.IDT_VP3300.device_sendDataCommand (string cmd, bool calcLRC, ref byte[] response)

Send a data command to the device

Sends a command to the device.

Parameters

<i>cmd</i>	String representation of command to execute
<i>calcLRC</i>	If TRUE, this will wrap command with start/length/lrc/sum/end: '{STX}{Len_Low}{Len_High} data {CheckLRC} {CheckSUM} {ETX}'
<i>response</i>	Response data

Returns

RETURN_CODE: Values can be parsed with `device_getResponseCodeString`

16.2.2.36 RETURN_CODE IDTechSDK.IDT_VP3300.device_sendDataCommand_ext (string cmd, bool calcLRC, ref byte[] response, int timeout, bool noResponse)

Send a data command to the device - extended

Sends a command to the device.

Parameters

<i>cmd</i>	String representation of command to execute
<i>calcLRC</i>	If TRUE, this will wrap command as NGA with start/length/lrc/sum/end: '{STX}{Len_Low}{Len_High} data {CheckLRC} {CheckSUM} {ETX}'
<i>response</i>	Response data
<i>timeout</i>	Timeout value waiting for response, in milliseconds (1000 = 1 second)
<i>noResponse</i>	if TRUE, this will not wait for a response and immediately return SUCCESS
<i>calcITP</i>	If TRUE, this will wrap command as ITP with start/end/lrc: '{STX} data {ETX}{CheckLRC}'

Returns

RETURN_CODE: Values can be parsed with `device_getResponseCodeString`

16.2.2.37 RETURN_CODE IDTechSDK.IDT_VP3300.device_sendPAE (string command, ref string response, int timeout, string ip = " ")

Send Payment Application Engine Command

Executes a PAE command

Parameters

<i>command</i>	ASCII command string, should start with "*PAE"
<i>response</i>	command response
<i>timeout</i>	timeout waiting for PAE response
<i>ip</i>	Optional IP address when connected via TCP/IP

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.38 RETURN_CODE IDTechSDK.IDT_VP3300.device_sendVivoCommandP2 (byte *command*, byte *subCommand*, byte[] *data*, ref byte[] *response*)

Send Vivo Command Protocol 2

Sends a protocol 2 command to Vivo readers (IDG/NEO)

Parameters

<i>command</i>	Command
<i>subCommand</i>	Sub-Command
<i>data</i>	Data. May be null
<i>response</i>	Response

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.39 RETURN_CODE IDTechSDK.IDT_VP3300.device_sendVivoCommandP2_ext (byte *command*, byte *subCommand*, byte[] *data*, ref byte[] *response*, int *timeout*, bool *noResponse*)

Send Vivo Command Protocol 2 Extended

Sends a protocol 2 command to Vivo readers (IDG/NEO)

Parameters

<i>command</i>	Command
<i>subCommand</i>	Sub-Command
<i>data</i>	Data. May be null
<i>response</i>	Response
<i>timeout</i>	Timeout, in milliseconds (3000 = 3 seconds)
<i>noResponse</i>	TRUE = don't wait for response, FALSE = wait for response defined by timeout

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.40 RETURN_CODE IDTechSDK.IDT_VP3300.device_setBurstMode (byte mode)

Send Burst Mode

Sets the burst mode for the device.

Parameters

<i>mode</i>	0 = OFF, 1 = Always On, 2 = Auto Exit
-------------	---------------------------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.41 RETURN_CODE IDTechSDK.IDT_VP3300.device_setMerchantRecord (int index, bool enabled, string merchantID, string merchantURL)

Set Merchant Record Sets the merchant record for ApplePay VAS

Parameters

<i>index</i>	Merchant Record index, valid values 1-6
<i>enabled</i>	Merchant Enabled/Valid flag
<i>merchantID</i>	Merchant unique identifier registered with Apple. Example com.idtechproducts.applePay
<i>merchantURL</i>	Merchant URL, when applicable

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.42 RETURN_CODE IDTechSDK.IDT_VP3300.device_setPollMode (byte mode)

Set Poll Mode

Sets the poll mode for the device. Auto Poll keeps reader active, Poll On Demand only polls when requested by terminal

Parameters

<i>mode</i>	: 00h = Auto Poll (USB I/F auto set to USB/HID) 01h = Poll on Demand (USB I/F auto set to USB/HID) 02h = QuickChip (USB I/F auto set to USB KB) 03h = QuickChip (enable QuickChip for CT + MSR) 04h = QuickChip (enable QuickChip for CL + MSR)
-------------	---

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.43 RETURN_CODE IDTechSDK.IDT_VP3300.device_startRKI ()

Start Remote Key Injection

Starts a remote key injection request with IDTech RKI servers.

Returns

RETURN_CODE: Values can be parsed with `device_getResponseCodeString`

16.2.2.44 `RETURN_CODE IDTechSDK.IDT_VP3300.device_startTransaction (double amount, double amtOther, int exponent, int type, int timeout, byte[] tags, bool isFastEMV = false)`

Start a Transaction Request

Authorizes the transaction CTLS, MSR or Contact EMV

The tags will be returned in the callback routine.

Parameters

<i>amount</i>	Transaction amount value (tag value 9F02)
<i>amtOther</i>	Other amount value, if any (tag value 9F03)
<i>exponent</i>	Number of characters after decimile point
<i>type</i>	Transaction type (tag value 9C).
<i>timeout</i>	Timeout value in seconds.
<i>tags</i>	Any other tags to be included in the request. Passed as TLV Data. Example, tag 9F02 with amount 0x000000000100 would be 0x9F0206000000000100 If tags 9F02 (amount), 9F03 (other amount), or 9C (transaction type) are included, they will take priority over these values supplied as individual parameters to this method.
<i>isFastEMV</i>	If TRUE, it will populate the IDTTransactionData.fastEMV with ASCII data similar to IDTech FastEMV KB output, after performing an auto-authenticate and auto-complete with ResultCode = Could Not Contact Host

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

NOTE ON APPLEPAY VAS: To enable ApplePay VAS, first a merchant record must be defined in one of the six available index positions (1-6) using `device_setMerchantRecord`, then container tag FFEE06 must be sent as part of the additional tags parameter of `ctls_startTransaction`. Tag FFEE06 must contain tag 9F26 and 9F22, and can optionally contain tags 9F2B and DFO1. Example FFEE06189F220201009F2604000000009F2B050100000000DF010101 9F22 = two bytes = ApplePay Terminal Application Version Number. Hard defined as 0100 for now. (required) 9F26 = four bytes = ApplePay Terminal Capabilities Information (required)

- Byte 1 = RFU
- Byte 2 = Terminal Type
- - Bit 8 = VAS Support (1=on, 0 = off)
- - Bit 7 = Touch ID Required (1=on, 0 = off)
- - Bit 6 = RFU
- - Bit 5 = RFU
- - Bit 1,2,3,4
- - - 0 = Payment Terminal
- - - 1 = Transit Terminal
- - - 2 = Access Terminal
- - - 3 = Wireless Handoff Terminal

- - - 4 = App Handoff Terminal
- - - 15 = Other Terminal
- Byte 3 = RFU
- Byte 4 = Terminal Mode
- - 0 = ApplePay VAS OR ApplePay
- - 1 = ApplePay VAS AND ApplePay
- - 2 = ApplePay VAS ONLY
- - 3 = ApplePay ONLY 9F2B = 5 bytes = ApplePay VAS Filter. Each byte filters for that specific merchant index (optional) DF01 = 1 byte = ApplePay VAS Protocol. (optional)
- - Bit 1 : 1 = URL VAS, 0 = Full VAS
- - Bit 2 : 1 = VAS Beeps, 0 = No VAS Beeps
- - Bit 3 : 1 = Silent Comm Error, 2 = EMEA Comm Error
- - Bit 4-8 : RFU

16.2.2.45 `static RETURN_CODE IDTechSDK.IDT_VP3300.device_updateDeviceFirmware (byte[] firmwareData) [static]`

Update Firmware

Updates the firmware .

Parameters

<i>firmwareData</i>	Signed binary data of a firmware file provided by IDTech
---------------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

After you pass the `firmwareData` file, a new thread will start to execute the firmware download. You will receive status of the progress through callbacks to the `IDTechSDK.Callback()` delegate. The following parameters will be passed back:

- `sender = IDT_DEVICE_Types.IDT_DEVICE_AUGUSTA`
- `state = DeviceState.FirmwareUpdate`
- `transactionResultCode = status of the firmware update (starting, entering bootloader, applying update, block success, firmware success)`
- `data = File Progress. Four bytes, with bytes [0][1] = current block, and bytes [2][3] = total blocks. 0x00030010 = block 3 of 16`

Example code starting a firmware update

```
OpenFileDialog diag = new OpenFileDialog();

diag.Filter = "NGA FW Files|*.fm";

if (diag.ShowDialog() == DialogResult.OK)
{
    byte[] file = File.ReadAllBytes(diag.FileName);
}
```



```

RETURN_CODE rt = IDT_Device.SharedController.device_updateDeviceFirmware(file);
if (rt == RETURN_CODE.RETURN_CODE_DO_SUCCESS)
{
    //Was a success
}
else
{
    //Error starting firmware download
}
}

```

Example monitoring firmware update status / success

```

private void MessageCallBack(IDTechSDK.IDT_DEVICE_Types type, DeviceState state, byte[] data,
    IDTTransactionData cardData, EMV_Callback emvCallback, RETURN_CODE transactionResultCode)
{
    switch (state)
    {
        case DeviceState.FirmwareUpdate:
            switch (transactionResultCode)
            {
                case RETURN_CODE.RETURN_CODE_FW_STARTING_UPDATE:
                    SetOutputText("Starting Firmware Update\n");
                    break;
                case RETURN_CODE.RETURN_CODE_DO_SUCCESS:
                    SetOutputText("Firmware Update Successful\n");
                    break;
                case RETURN_CODE.RETURN_CODE_APPLYING_FIRMWARE_UPDATE:
                    SetOutputText("Applying Firmware Update...\n");
                    break;
                case RETURN_CODE.RETURN_CODE_ENTERING_BOOTLOADER_MODE:
                    SetOutputText("Entering Bootloader Mode...\n");
                    break;
                case RETURN_CODE.RETURN_CODE_BLOCK_TRANSFER_SUCCESS:
                    int start = data[0] * 0x100 + data[1];
                    int end = data[2] * 0x100 + data[3];

                    SetOutputText("Sent block " + start.ToString() + " of " + end.ToString() + "\n");
                    break;
                default:
                    SetOutputText("Firmware Update Error Code: " + "0x" + String.Format("{0:X}", (ushort)
transactionResultCode) + ": " + IDTechSDK.errorCode.getErrorString(transactionResultCode) + "\r\n");
                    break;
            }
            break;
    }
}

```

16.2.2.46 RETURN_CODE IDTechSDK.IDT_VP3300.emv_activateTransaction (int timeout, byte[] tags, bool forceOnline, bool isFastEMV = false)

Start EMV Transaction Request

Authorizes the EMV transaction for an ICC card

The tags will be returned in the callback routine.

Parameters

<i>timeout</i>	Timeout value in seconds.
<i>tags</i>	The tags to be included in the request. Passed as TLV Data. Example, tag 9F02 with amount 0x0000000000100 would be 0x9F02060000000000100
<i>forceOnline</i>	TRUE = do not allow offline approval, FALSE = allow ICC to approve offline if terminal capable Note: To request tags to be included in default response, use tag DFEE1A, and specify tag list. Example four tags 9F02, 9F36, 95, 9F37 to be included in response = DFEE1A079F029F369f9F37
<i>isFastEMV</i>	If TRUE, it will populate the IDTTransactionData.fastEMV with ASCII data similar to IDTech FastEMV KB output, after performing an auto-authenticate and auto-complete with ResultCode = Could Not Contact Host

Returns

RETURN_CODE: Values can be parsed with device_getResponseCodeString

16.2.2.47 static void IDTechSDK.IDT_VP3300.emv_allowFallback (bool *allow*) [static]

Allow fallback for EMV transactions. Default is TRUE

Parameters

<i>allow</i>	TRUE = allow fallback, FALSE = don't allow fallback
--------------	---

16.2.2.48 RETURN_CODE IDTechSDK.IDT_VP3300.emv_authenticateTransaction (byte[] *updatedTLV*)

Authenticate EMV Transaction Request

Authenticates the EMV transaction for an ICC card. Execute this after receiving response with result code 0x10 to emv_startTransaction

The tags will be returned in the callback routine.

@param updatedTLV TLV stream that can be used to update the following values:

- 9F02: Amount
- 9F03: Other amount
- 9C: Transaction type
- 5F57: Account type

In addition tag DFEE1A can be sent to specify tag list to include in results. Example four tags 9F02, 9F36, 95

@return RETURN_CODE: Values can be parsed with device_getResponseCodeString

16.2.2.49 static void IDTechSDK.IDT_VP3300.emv_autoAuthenticate (bool *authenticate*) [static]

Enables authenticate for EMV transactions. If a startEMVTransaction results in code 0x0010 (start transaction success), then emv_authenticateEMVTransaction can automatically execute if parameter is set to TRUE

Parameters

<i>authenticate</i>	TRUE = auto authenticate, FALSE = manually authenticate
---------------------	---

16.2.2.50 static void IDTechSDK.IDT_VP3300.emv_autoAuthenticate (bool *authenticate*, byte[] *tags*) [static]

Enables authenticate for EMV transactions. If a startEMVTransaction results in code 0x0010 (start transaction success), then emv_authenticateEMVTransaction can automatically execute if parameter is set to TRUE

Parameters

<i>authenticate</i>	TRUE = auto authenticate, FALSE = manually authenticate
<i>tags</i>	Tags to pass during authentication stage;

16.2.2.51 RETURN_CODE IDTechSDK.IDT_VP3300.emv_callbackResponseLCD (EMV_LCD_DISPLAY_MODE *type*, byte *selection*)

Callback Response LCD Display

Provides menu selection responses to the kernel after a callback was received with DeviceState.EMVCallback, and callbackType = EMV_CALLBACK_TYPE.EMV_CALLBACK_TYPE_LCD, and lcd_displayMode = EMV_LCD_DISPLAY_MODE_MENU, EMV_LCD_DISPLAY_MODE_PROMPT, or EMV_LCD_DISPLAY_MODE_LANGUAGE_SELECT

Parameters

<i>type</i>	If Cancel key pressed during menu selection, then value is EMV_LCD_DISPLAY_MODE_CANCEL. Otherwise, value can be EMV_LCD_DISPLAY_MODE_MENU, EMV_LCD_DISPLAY_MODE_PROMPT, or EMV_LCD_DISPLAY_MODE_LANGUAGE_SELECT
<i>selection</i>	If type = EMV_LCD_DISPLAY_MODE_MENU or EMV_LCD_DISPLAY_MODE_LANGUAGE_SELECT, provide the selection ID line number. Otherwise, if type = EMV_LCD_DISPLAY_MODE_PROMPT supply either 0x43 ('C') for Cancel, or 0x45 ('E') for Enter/accept

Returns

RETURN_CODE: Values can be parsed with errorCode.getErrorString()

16.2.2.52 RETURN_CODE IDTechSDK.IDT_VP3300.emv_callbackResponseMSR (byte[] MSR)

Callback Response MSR Entry

Provides MSR information to kernel after a callback was received with DeviceState.EMVCallback, and callbackType = EMV_CALLBACK_MSR

Parameters

<i>MSR</i>	Swiped track data
------------	-------------------

Returns

RETURN_CODE: Values can be parsed with errorCode.getErrorString()

16.2.2.53 RETURN_CODE IDTechSDK.IDT_VP3300.emv_callbackResponsePIN (EMV_PIN_MODE type, byte[] KSN, byte[] PIN)

Callback Response PIN Entry

Provides (or cancels) PIN entry information to kernel after a callback was received with DeviceState.EMVCallback, and callbackType = EMV_CALLBACK_TYPE_PINPAD

Parameters

<i>type</i>	If Cancel key pressed during PIN entry, then value is EMV_PIN_MODE_CANCEL. Otherwise, value can be EMV_PIN_MODE_ONLINE_DUKPT, EMV_PIN_MODE_ONLINE_MKSK, or EMV_PIN_MODE_OFFLINE
<i>KSN</i>	If enciphered PIN, this is either the PIN DUKPT Key (EMV_PIN_MODE_ONLINE_DUKPT) or PIN Session Key (EMV_PIN_MODE_ONLINE_MKSK), or PIN Pairing DUKPT key (EMV_PIN_MODE_OFFLINE)
<i>PIN</i>	If enciphered PIN, this is encrypted PIN block. If device does not implement pairing function, this is plaintext PIN

Returns

RETURN_CODE: Values can be parsed with device_getResponseCodeString

16.2.2.54 RETURN_CODE IDTechSDK.IDT_VP3300.emv_cancelTransaction ()

Cancel Transaction

Cancels the currently executing EMV or CTLS transaction.

Returns

RETURN_CODE: Values can be parsed with errorCode.getErrorString()

16.2.2.55 RETURN_CODE IDTechSDK.IDT_VP3300.emv_completeTransaction (bool *commError*, byte[] *authCode*, byte[] *iad*, byte[] *tlvScripts*, byte[] *tlv*)

Complete EMV Transaction Request

Completes the EMV transaction for an ICC card when online authorization request is received from emv_↔ authenticateTransaction

The tags will be returned in the callback routine.

Parameters

<i>commError</i>	Communication error with host. Set to TRUE if host was unreachable, or FALSE if host response received. If Communication error, authCode, iad, tlvScripts can be null.
<i>authCode</i>	Authorization code from host. Two bytes. Example 0x3030. (Tag value 8A). Required
<i>iad</i>	Issuer Authentication Data, if any. Example 0x11223344556677883030 (tag value 91).
<i>tlvScripts</i>	71/72 scripts, if any
<i>tlv</i>	Additional TVL data to return with transaction results (if any)

Returns

RETURN_CODE: Values can be parsed with device_getResponseCodeString

NOTE: There are three possible outcomes for Authorization Code: Approval, Refer To Bank, Decline. The kernel maps these three outcomes to valid authorization response codes using tag DFEE1B through 8 bytes: {2 bytes Approval Code}{2 bytes Referral Code}{2 bytes Decline Code}{2 bytes RFU} If your gateway uses "00" for Approval, "01" for Referral, and "05" for Decline, then DFEE1B 08 3030 3031 3035 0000 If you use an authorization code value that that is not defined in DFEE1B, the kernel will use the DECLINE value of DFEE1B by default.

16.2.2.56 RETURN_CODE IDTechSDK.IDT_VP3300.emv_getEMVConfigurationCheckValue (ref string *response*)

Polls device for EMV Configuration Check Value

Parameters

<i>response</i>	Response returned of Check Value of Configuration
-----------------	---

Returns

RETURN_CODE: Values can be parsed with errorCode.getErrorString()

16.2.2.57 RETURN_CODE IDTechSDK.IDT_VP3300.emv_getEMVKernelCheckValue (ref string *response*)

Polls device for EMV Kernel Check Value

Parameters

<i>response</i>	Response returned of Check Value of Kernel
-----------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.58 RETURN_CODE IDTechSDK.IDT_VP3300.emv_getEMVKernelVersion (ref string *response*)

Polls device for EMV Kernel Version

Parameters

<i>response</i>	Response returned of Kernel Version
-----------------	-------------------------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.59 RETURN_CODE IDTechSDK.IDT_VP3300.emv_getTerminalMajorConfiguration (ref int *configuration*)

Get Terminal Major Configuration

Gets the Terminal Data Major Configuration setting

Parameters

<i>configuration</i>	The configuration that is set (1-5)
----------------------	-------------------------------------

Return values

<i>RETURN_CODE</i>	Return codes listed as typedef enum in IDTCommon:RETURN_CODE. Values can be parsed with <code>IDT_NEO2::device_getResponseCodeString()</code>
--------------------	---

16.2.2.60 RETURN_CODE IDTechSDK.IDT_VP3300.emv_removeAllApplicationData ()

Remove All Application Data

Removes all the Application Data for EMV Kernel

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.61 RETURN_CODE IDTechSDK.IDT_VP3300.emv_removeAllCAPK ()

Remove All Certificate Authority Public Key

Removes all the CAPK for EMV Kernel

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.62 RETURN_CODE IDTechSDK.IDT_VP3300.emv_removeAllCRL ()

Remove All Certificate Revocation List Entries

Removes all CRLentry entries

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.63 RETURN_CODE IDTechSDK.IDT_VP3300.emv_removeApplicationData (byte[] AID)

Remove Application Data by AID

Removes the Application Data for EMV Kernel as specified by the AID name passed as a parameter

Parameters

<i>AID</i>	Name of ApplicationID Must be between 5 and 16 bytes
------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.64 RETURN_CODE IDTechSDK.IDT_VP3300.emv_removeCAPK (byte[] capk)

Remove Certificate Authority Public Key

Removes the CAPK for EMV Kernel as specified by the RID/Index

Parameters

<i>capk</i>	6 byte CAPK = 5 bytes RID + 1 byte INDEX
-------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.65 RETURN_CODE IDTechSDK.IDT_VP3300.emv_removeCRL (byte[] crlList)

Remove Certificate Revocation List Entries

Removes CRLentries as specified by the RID and Index and serial number passed as 9 bytes

Parameters

<i>crlList</i>	containing the list of CRL to remove: [CRL1][CRL2]...[CRLn] where each [CRL] is 9 bytes: [5 bytes RID][1 byte CAPK Index][3 bytes serial number]
----------------	--

Returns

RETURN_CODE: Values can be parsed with device_getResponseCodeString

16.2.2.66 RETURN_CODE IDTechSDK.IDT_VP3300.emv_removeTerminalData ()

Remove Terminal Data

Removes the Terminal Data

Returns

RETURN_CODE: Values can be parsed with device_getResponseCodeString

16.2.2.67 RETURN_CODE IDTechSDK.IDT_VP3300.emv_retrieveAIDList (ref byte response[])

Retrieve AID list

Returns all the AID names installed on the terminal for EMV Kernel.

Parameters

<i>response</i>	array of AID name byte arrays
-----------------	-------------------------------

Returns

RETURN_CODE: Values can be parsed with errorCode.getErrorString()

16.2.2.68 RETURN_CODE IDTechSDK.IDT_VP3300.emv_retrieveApplicationData (byte[] AID, ref byte[] tlv)

Retrieve Application Data by AID

Retrieves the Application Data for EMV Kernel as specified by the AID name passed as a parameter.

Parameters

<i>AID</i>	Name of ApplicationID. Must be between 5 and 16 bytes
<i>tlv</i>	The TLV elements of the requested AID

Returns

RETURN_CODE: Values can be parsed with errorCode.getErrorString()

16.2.2.69 RETURN_CODE IDTechSDK.IDT_VP3300.emv_retrieveCAPK (byte[] capk, ref byte[] key)

Retrieve Certificate Authority Public Key

Retrieves the CAPK for EMV Kernel as specified by the RID/Index passed as a parameter.

Parameters

<i>capk</i>	6 bytes CAPK = 5 bytes RID + 1 byte Index
<i>key</i>	<p>Response returned as a CAKey format: [5 bytes RID][1 byte Index][1 byte Hash Algorithm][1 byte Encryption Algorithm][20 bytes HashValue][4 bytes Public Key Exponent][2 bytes Modulus Length][Variable bytes Modulus] Where:</p> <ul style="list-style-type: none"> • Hash Algorithm: The only algorithm supported is SHA-1. The value is set to 0x01 • Encryption Algorithm: The encryption algorithm in which this key is used. Currently support only one type: RSA. The value is set to 0x01. • HashValue: Which is calculated using SHA-1 over the following fields: RID & Index & Modulus & Exponent • Public Key Exponent: Actually, the real length of the exponent is either one byte or 3 bytes. It can have two values: 3 (Format is 0x00 00 00 03), or 65537 (Format is 0x00 01 00 01) • Modulus Length: LenL LenH Indicated the length of the next field. • Modulus: This is the modulus field of the public key. Its length is specified in the field above.

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.70 RETURN_CODE IDTechSDK.IDT_VP3300.emv_retrieveCAPKList (ref byte[] keys)

Retrieve the Certificate Authority Public Key list

Returns all the CAPK RID and Index installed on the terminal for EMV Kernel.

Parameters

<i>keys</i>	[key1][key2]...[keyn], each key 6 bytes where key = 5 bytes RID + 1 byte index
-------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.71 RETURN_CODE IDTechSDK.IDT_VP3300.emv_retrieveCRLList (ref byte[] list)

Retrieve the Certificate Revocation List

Returns the CRL entries on the terminal.

Parameters

<i>list</i>	[CRL1][CRL2]...[CRLn], each CRL 9 bytes where CRL = 5 bytes RID + 1 byte index + 3 bytes serial number
-------------	--

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.72 RETURN_CODE IDTechSDK.IDT_VP3300.emv_retrieveTerminalData (ref byte[] *tlv*)

Retrieve Terminal Data

Retrieves the Terminal Data for EMV Kernel.

Parameters

<i>tlv</i>	Response returned as a TLV
------------	----------------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.73 RETURN_CODE IDTechSDK.IDT_VP3300.emv_retrieveTransactionResult (byte[] *tags*, ref IDTTransactionData *tlv*)

Retrieve Transaction Results

Retrieves specified EMV tags from the currently executing transaction.

Parameters

<i>tags</i>	Tags to be retrieved. Example 0x9F028A will retrieve tags 9F02 and 8A
<i>tlv</i>	All requested tags returned as unencrypted, encrypted and masked TLV data in IDTTransactionData object

Returns

RETURN_CODE: Values can be parsed with `device.getResponseCodeString`

16.2.2.74 RETURN_CODE IDTechSDK.IDT_VP3300.emv_setApplicationData (byte[] *name*, byte[] *tlv*)

Set Application Data by AID

Sets the Application Data for EMV Kernel as specified by the application name and TLV data

Parameters

<i>name</i>	Application name, 10-32 ASCII hex characters representing 5-16 bytes Example "a0000000031010"
<i>tlv</i>	Application data in TLV format

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.75 RETURN_CODE IDTechSDK.IDT_VP3300.emv_setCAPK (byte[] *key*)

Set Certificate Authority Public Key

Sets the CAPK for EMV Kernel as specified by the CAKey structure

Parameters

<i>key</i>	CAKey format: [5 bytes RID][1 byte Index][1 byte Hash Algorithm][1 byte Encryption Algorithm][20 bytes HashValue][4 bytes Public Key Exponent][2 bytes Modulus Length][Variable bytes Modulus] Where: <ul style="list-style-type: none"> • Hash Algorithm: The only algorithm supported is SHA-1. The value is set to 0x01 • Encryption Algorithm: The encryption algorithm in which this key is used. Currently support only one type: RSA. The value is set to 0x01. • HashValue: Which is calculated using SHA-1 over the following fields: RID & Index & Modulus & Exponent • Public Key Exponent: Actually, the real length of the exponent is either one byte or 3 bytes. It can have two values: 3 (Format is 0x00 00 00 03), or 65537 (Format is 0x00 01 00 01) • Modulus Length: LenL LenH Indicated the length of the next field. • Modulus: This is the modulus field of the public key. Its length is specified in the field above.
------------	---

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.76 RETURN_CODE IDTechSDK.IDT_VP3300.emv_setCRL (byte[] *list*)

Set Certificate Revocation List

Sets the CRL

Parameters

<i>list</i>	CRL Entries containing the RID, Index, and serial numbers to set [CRL1][CRL2]...[CRLn] where each [CRL] is 9 bytes: [5 bytes RID][1 byte CAPK Index][3 bytes serial number]
-------------	---

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.77 RETURN_CODE IDTechSDK.IDT_VP3300.emv_setTerminalData (byte[] *t/v*)

Set Terminal Data

Sets the Terminal Data for EMV Kernel

Parameters

<i>t/v</i>	TerminalData configuration data
------------	---------------------------------

Return values

<i>RETURN_CODE</i>	Return codes listed as typedef enum in IDTCommon:RETURN_CODE. Values can be parsed with <code>IDT_BTPay::device_getResponseCodeString()</code>
--------------------	--

16.2.2.78 RETURN_CODE IDTechSDK.IDT_VP3300.emv_setTerminalMajorConfiguration (int *configuration*)

Set Terminal Major Configuration

Sets the Terminal Data Major Configuration setting

Parameters

<i>configuration</i>	The configuration to set (1-5)
----------------------	--------------------------------

Return values

RETURN_CODE	Return codes listed as typedef enum in IDTCommon:RETURN_CODE. Values can be parsed with IDT_BTPay::device_getResponseCodeString:()
-------------	--

16.2.2.79 RETURN_CODE IDTechSDK.IDT_VP3300.emv_startTransaction (double *amount*, double *amtOther*, int *exponent*, int *type*, int *timeout*, byte[] *tags*, bool *forceOnline*, bool *isFastEMV* = false)

Start EMV Transaction Request

Authorizes the EMV transaction for an ICC card

The tags will be returned in the callback routine.

Parameters

<i>amount</i>	Transaction amount value (tag value 9F02)
<i>amtOther</i>	Other amount value, if any (tag value 9F03)
<i>exponent</i>	Number of characters after decimile point
<i>type</i>	Transaction type (tag value 9C).
<i>timeout</i>	Timeout value in seconds.
<i>tags</i>	Any other tags to be included in the request. Passed as TLV Data. Example, tag 9F02 with amount 0x000000000100 would be 0x9F0206000000000100 If tags 9F02 (amount),9F03 (other amount), or 9C (transaction type) are included, they will take priority over these values supplied as individual parameters to this method.
<i>forceOnline</i>	TRUE = do not allow offline approval, FALSE = allow ICC to approve offline if terminal capable Note: To request tags to be included in default response, use tag DFEE1A, and specify tag list. Example four tags 9F02, 9F36, 95, 9F37 to be included in response = DFEE1A079F029F369F9F37
<i>isFastEMV</i>	If TRUE, it will populate the IDTTransactionData.fastEMV with ASCII data similar to IDTech FastEMV KB output, after performing an auto-authenticate and auto-complete with ResultCode = Could Not Contact Host

Returns

RETURN_CODE: Values can be parsed with device_getResponseCodeString

16.2.2.80 static int IDTechSDK.IDT_VP3300.getCommandTimeout () [static]

Get Command Timeout

Gets the default timeout (in milliseconds) waiting for a blocking command response

Return values

<i>time</i>	Time
-------------	------

16.2.2.81 RETURN_CODE IDTechSDK.IDT_VP3300.icc_exchangeAPDU (string *c_APDU*, ref byte[] *response*)

Exchange APDU

Sends an APDU packet to the ICC. If successful, response is returned in APDUResult class instance in response parameter.

Parameters

<i>c_APDU</i>	APDU data packet
<i>response</i>	Unencrypted/encrypted parsed APDU response

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.82 RETURN_CODE IDTechSDK.IDT_VP3300.icc_getICReaderStatus (ref byte *status*)

Get Reader Status

Returns the reader status

Parameters

<i>status</i>	Pointer that will return with the ICReaderStatus results. bit 0: 0 = ICC Power Not Ready, 1 = ICC Powered bit 1: 0 = Card not seated, 1 = card seated
---------------	---

Returns

RETURN_CODE: Values can be parsed with `device_getResponseCodeString`

16.2.2.83 RETURN_CODE IDTechSDK.IDT_VP3300.icc_powerOffICC ()

Power Off ICC

Powers down the ICC

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

If Success, empty If Failure, ASCII encoded data of error string

16.2.2.84 RETURN_CODE IDTechSDK.IDT_VP3300.icc_powerOnICC (ref byte[] *ATR*)

Power On ICC

Power up the currently selected microprocessor card in the ICC reader

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.85 RETURN_CODE IDTechSDK.IDT_VP3300.msr_cancelMSRSwipe ()

Disable MSR Swipe Cancels MSR swipe request.

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.86 RETURN_CODE IDTechSDK.IDT_VP3300.msr_startMSRSwipe (int *timeout*)

Enable MSR Swipe

Enables MSR, waiting for swipe to occur.

Parameters

<i>timeout</i>	Swipe Timeout Value
----------------	---------------------

Returns

RETURN_CODE: Values can be parsed with `errorCode.getErrorString()`

16.2.2.87 static String IDTechSDK.IDT_VP3300.SDK_Version () [static]

SDK Version

- All Devices

Returns the current version of SDK

Returns

Framework version

16.2.2.88 static void IDTechSDK.IDT_VP3300.setCallback (Callback *my_Callback*) [static]

Set Callback

Sets the class callback

16.2.2.89 static void IDTechSDK.IDT_VP3300.setCallback (IntPtr *my_Callback*, SynchronizationContext *context*) [static]

Set Callback

Sets the class callback

Parameters

<i>my_Callback</i>	The callback function to receive the response message from device. defined as follows. public unsafe delegate void MFCCallBack(Parameters parameters);
<i>context</i>	The context of the UI thread

16.2.2.90 `static void IDTechSDK.IDT_VP3300.SetCommandTimeout (int milliseconds)` `[static]`

Set Command Timeout

Sets the default timeout (in milliseconds) waiting for a blocking command response

Parameters

<i>milliseconds</i>	Time
---------------------	------

16.2.3 Property Documentation

16.2.3.1 `IDT_VP3300 IDTechSDK.IDT_VP3300.SharedController` `[static], [get]`

Singleton Instance

Establishes an singleton instance of [IDT_VP3300](#) class.

Returns

Instance of [IDT_VP3300](#)

The documentation for this class was generated from the following file:

- Source_Windows/IDT_VP3300.cs

16.3 IDTechSDK.IDTCryptoData Class Reference

Public Attributes

- byte[] [BDK](#)
- byte[] [KSN](#)
- byte[] [IPEK](#)
- byte[] [DEK](#)
- byte[] [DataVariant](#)
- byte[] [PINVariant](#)
- byte[] [MACVariant](#)
- bool [isTDES](#)
- int [keyVariant](#)
- bool [isDecryption](#)
- byte[] [dataToProcess](#)
- byte[] [dataResults](#)
- byte[] [pinBlock](#)
- byte[] [clearPinBlock](#)
- string [PAN](#)
- string [PIN](#)

- int [PINBlockType](#)
- string [errorString](#)
- bool [MAC_Command](#)
- byte[] [finalPAN](#)

16.3.1 Detailed Description

Class used when Encrypting/Decrypting DUKPT data Used in Common.processDUKPT(ref IDTCryptoData data)

16.3.2 Member Data Documentation

16.3.2.1 byte [] IDTechSDK.IDTCryptoData.BDK

Base Derivation Key.

16.3.2.2 byte [] IDTechSDK.IDTCryptoData.clearPinBlock

Decrypted Pin Block

16.3.2.3 byte [] IDTechSDK.IDTCryptoData.dataResults

Data that has been Decrypted (isDecryption = TRUE), or Data that has been encrypted (isDecryption = FALSE), or Data that has been MAC (isMAC_Command = TRUE)

16.3.2.4 byte [] IDTechSDK.IDTCryptoData.dataToProcess

Data to encrypt (isDecryption = false) or data to decrypt (isDecryption = true)

16.3.2.5 byte [] IDTechSDK.IDTCryptoData.DataVariant

Data Encryption Key (variant of DEK).

16.3.2.6 byte [] IDTechSDK.IDTCryptoData.DEK

Derived Encryption Key.

16.3.2.7 string IDTechSDK.IDTCryptoData.errorString

Encryption/Decryption Error.

16.3.2.8 byte [] IDTechSDK.IDTCryptoData.finalPAN

Final PAN

16.3.2.9 byte [] IDTechSDK.IDTCryptoData.IPEK

Initial Public Encryption Key.

16.3.2.10 bool IDTechSDK.IDTCryptoData.isDecryption

TRUE = Decrypt Data. FALSE = Encrypt Data

16.3.2.11 bool IDTechSDK.IDTCryptoData.isTDES

TRUE = Use TDES. FALSE = Use AES

16.3.2.12 int IDTechSDK.IDTCryptoData.keyVariant

0 = Use Data Variant. 1 = Use PIN Variant. 2 = Use MAC Variant

16.3.2.13 byte [] IDTechSDK.IDTCryptoData.KSN

Key Serial Number.

16.3.2.14 bool IDTechSDK.IDTCryptoData.MAC_Command

FALSE = Don't MAC (use encryption/decryption setting), TRUE = Return MAC (override encryption/decryption setting)

16.3.2.15 byte [] IDTechSDK.IDTCryptoData.MACVariant

Message Authentication Challenge Key (variant of DEK).

16.3.2.16 string IDTechSDK.IDTCryptoData.PAN

Primary Account Number used with clearPinBlock to derive/encode PIN

16.3.2.17 string IDTechSDK.IDTCryptoData.PIN

PIN derived from clearPinBlock, or used to create clearPinBlock

16.3.2.18 byte [] IDTechSDK.IDTCryptoData.pinBlock

Encrypted Pin Block

16.3.2.19 int IDTechSDK.IDTCryptoData.PINBlockType

PIN Block Type. TDES can be 0 or 3. AES will be 4.

16.3.2.20 byte [] IDTechSDK.IDTCryptoData.PINVariant

PIN Encryption Key (variant of DEK).

The documentation for this class was generated from the following file:

- Source_Windows/IDT_Transactions.cs

16.4 IDTechSDK.IDTTransactionData Class Reference

Static Public Member Functions

- static void **setTransactionAttributes** (byte attribute, ref [IDTTransactionData](#) data, byte attribute2=0)

Public Attributes

- EVENT_TRANSACTION_DATA_Types [Event](#)
- EVENT_NOTIFICATION_Types [Notification](#)
- byte[] [msr_rawData](#)
- byte[] [msr_encTrack1](#)
- byte[] [msr_encTrack2](#)
- byte[] [msr_encTrack3](#)
- String [msr_track1](#)
- String [msr_track2](#)
- String [msr_track3](#)
- String [device_RSN](#)
- byte[] [msr_KSN](#)
- int [msr_track1Length](#)
- int [msr_track2Length](#)
- int [msr_track3Length](#)
- CAPTURE_ENCODE_TYPE [msr_cardType](#)
- byte [msr_captureEncodeStatus](#)
- CAPTURE_ENCRYPT_TYPE [captureEncryptType](#)
- CAPTURE_ENCRYPT_TYPE [captureEncryptTypeEMV](#)
- CAPTURE_CARD_TYPE [captureCardType](#)
- int [msr_errorCode](#)
- int [emv_rfStateCode](#)
- int [iccPresent](#)
- byte[] [msr_sessionID](#)
- byte[] [msr_hashTrack1](#)
- byte[] [msr_hashTrack2](#)
- byte[] [msr_hashTrack3](#)
- KEY_VARIANT_TYPE [msr_keyVariantType](#)
- byte[] [msr_extendedField](#)
- int [isCTLS](#)
- [CTLS_APPLICATION](#) [ctlsApplication](#)
- byte[] [emv_clearingRecord](#)

- byte[] [emv_encryptedTags](#)
- byte[] [emv_unencryptedTags](#)
- [EMV_RESULT_CODE](#) [emv_resultCode](#)
- byte[] [emv_maskedTags](#)
- byte[] [emv_encipheredOnlinePIN](#)
- bool [emv_hasAdvise](#)
- bool [emv_hasReversal](#)
- string [pin_pinblock](#)
- string [pin_KSN](#)
- string [pin_KeyEntry](#)
- byte [SW1](#)
- byte [SW2](#)
- byte[] [mac](#)
- byte[] [macKSN](#)
- bool [hasMACVerificationData](#)
- [TRANS_ERROR_CODE](#) [emv_transaction_Error_Code](#)
- [RF_STATE](#) [emv_RF_State](#)
- [EXTENDED_STATUS_CODES](#) [emv_ESC](#)
- [CEMV_APP_ERROR_FN](#) [emv_appErrorFn](#)
- [CEMV_APP_ERROR_STATE](#) [emv_appErrorState](#)
- byte[] [captured_PAN](#)
- byte[] [captured_KSN](#)
- string [captured_firstPANDigits](#)
- string [captured_lastPANDigits](#)
- byte[] [captured_Expiry](#)
- byte[] [captured_CSC](#)
- bool [captured_SHA256](#)
- byte[] [captured_MACValue](#)
- byte[] [captured_MACKSN](#)
- byte[] [captured_InitialVector](#)
- string [fastEMV](#)
- string [message](#)
- string [msr_KBOutput](#)

16.4.1 Detailed Description

Class for swipe data

16.4.2 Member Data Documentation

16.4.2.1 [CAPTURE_CARD_TYPE](#) [IDTechSDK.IDTTransactionData.captureCardType](#)

Get the captured card type, please see [CAPTURE_CARD_TYPE](#) for more information.

```
CAPTURE_CARD_TYPE_UNKNOWN;
CAPTURE_CARD_TYPE_CONTACT;
CAPTURE_CARD_TYPE_CTL5_EMV;
CAPTURE_CARD_TYPE_CTL5_MSD;
CAPTURE_CARD_TYPE_MSR;
```

16.4.2.2 [byte \[\]](#) [IDTechSDK.IDTTransactionData.captured_CSC](#)

Captured Customer Service Code

16.4.2.3 byte [] IDTechSDK.IDTTransactionData.captured_Expiry

Captured Expiry Date

16.4.2.4 string IDTechSDK.IDTTransactionData.captured_firstPANDigits

First plaintext PAN Digits

16.4.2.5 byte [] IDTechSDK.IDTTransactionData.captured_InitialVector

This initial vector is used for all encryptions in this command. If encryption is off this field will be filled with zeros (00h).

16.4.2.6 byte [] IDTechSDK.IDTTransactionData.captured_KSN

KSN used to encrypt manually captured PAN from keyed input

16.4.2.7 string IDTechSDK.IDTTransactionData.captured_lastPANDigits

Last plaintext PAN digits

16.4.2.8 byte [] IDTechSDK.IDTTransactionData.captured_MACKSN

KSN for MAC DUKPT key.

16.4.2.9 byte [] IDTechSDK.IDTTransactionData.captured_MACValue

Authenticate message from "Initial Vector" field to "MAC Value Length" field

16.4.2.10 byte [] IDTechSDK.IDTTransactionData.captured_PAN

Manually captured PAN from keyed input

16.4.2.11 bool IDTechSDK.IDTTransactionData.captured_SHA256

TRUE = SHA-256, FALSE = SHA-1

16.4.2.12 CAPTURE_ENCRYPT_TYPE IDTechSDK.IDTTransactionData.captureEncryptType

Get the encrypted type, please see CAPTURE_ENCRYPT_TYPE for more information.

CAPTURE_ENCRYPT_TYPE_UNKNOWN;
CAPTURE_ENCRYPT_TYPE_TDES;
CAPTURE_ENCRYPT_TYPE_AES;
CAPTURE_ENCRYPT_TYPE_NONE;
CAPTURE_ENCRYPT_TRANS_ARMOR_PKI;
CAPTURE_ENCRYPT_VOLTAGE;
CAPTURE_ENCRYPT_VISA_FPE;
CAPTURE_ENCRYPT_VERIFONE_FPE;
CAPTURE_ENCRYPT_DESJARDIN

16.4.2.13 CAPTURE_ENCRYPT_TYPE IDTechSDK.IDTTransactionData.captureEncryptTypeEMV

Get the encrypted type for EMV, please see CAPTURE_ENCRYPT_TYPE for more information.

CAPTURE_ENCRYPT_TYPE_UNKNOWN;
CAPTURE_ENCRYPT_TYPE_TDES;
CAPTURE_ENCRYPT_TYPE_AES;
CAPTURE_ENCRYPT_TYPE_NONE;
CAPTURE_ENCRYPT_TRANS_ARMOR_PKI;
CAPTURE_ENCRYPT_VOLTAGE;
CAPTURE_ENCRYPT_VISA_FPE;
CAPTURE_ENCRYPT_VERIFONE_FPE;
CAPTURE_ENCRYPT_DESJARDIN

16.4.2.14 CTLS_APPLICATION IDTechSDK.IDTTransactionData.ctlsApplication

CTLS Application

16.4.2.15 String IDTechSDK.IDTTransactionData.device_RSN

Get the Reader Serial Number.

16.4.2.16 CEMV_APP_ERROR_FN IDTechSDK.IDTTransactionData.emv_appErrorFn

EMV App Error Function (select AR products)

16.4.2.17 CEMV_APP_ERROR_STATE IDTechSDK.IDTTransactionData.emv_appErrorState

EMV App Error State (select AR products)

16.4.2.18 byte [] IDTechSDK.IDTTransactionData.emv_clearingRecord

clearing record TLV

16.4.2.19 byte [] IDTechSDK.IDTTransactionData.emv_encipheredOnlinePIN

enciphered Online Pin

16.4.2.20 byte [] IDTechSDK.IDTTransactionData.emv_encryptedTags

Encrypted Tags TLV

16.4.2.21 EXTENDED_STATUS_CODES IDTechSDK.IDTTransactionData.emv_ESC

Extended Status Code (select AR products)

16.4.2.22 bool IDTechSDK.IDTTransactionData.emv_hasAdvise

Advise

16.4.2.23 `bool IDTechSDK.IDTTransactionData.emv_hasReversal`

Reversal

16.4.2.24 `byte [] IDTechSDK.IDTTransactionData.emv_maskedTags`

Masked Tags TLV

16.4.2.25 `EMV_RESULT_CODE IDTechSDK.IDTTransactionData.emv_resultCode`

EMV Result Code

16.4.2.26 `RF_STATE IDTechSDK.IDTTransactionData.emv_RF_State`

RF_State (select AR products)

16.4.2.27 `int IDTechSDK.IDTTransactionData.emv_rfStateCode`

For some Error Codes, the RF State Code indicates the exact Reader-Card command that failed. This helps determine the exact place where the failure occurred.

16.4.2.28 `TRANS_ERROR_CODE IDTechSDK.IDTTransactionData.emv_transaction_Error_Code`

Transaction Error Code (select AR products)

16.4.2.29 `byte [] IDTechSDK.IDTTransactionData.emv_unencryptedTags`

Unencrypted Tags TLV

16.4.2.30 `EVENT_TRANSACTION_DATA_Types IDTechSDK.IDTTransactionData.Event`

Transaction Data type, please see `EVENT_TRANSACTION_DATA_Types` for more information.

16.4.2.31 `string IDTechSDK.IDTTransactionData.fastEMV`

if a Fast EMV transaction was specified, this field will contain the ASCII version of the data similar to IDTech FastEMV KB output format.

16.4.2.32 `bool IDTechSDK.IDTTransactionData.hasMACVerificationData`

Existence of MAC Verification Data for Encrypted Data

16.4.2.33 `int IDTechSDK.IDTTransactionData.iccPresent`

Get the swiped card ICC Status.
0 = Unknown 1 = True 2 = False

16.4.2.34 int IDTechSDK.IDTTransactionData.isCTLS

Track data was captured via CTLS interface 0 = Unknown 1 = True 2 = False

16.4.2.35 byte [] IDTechSDK.IDTTransactionData.mac

Message Authentication Code

16.4.2.36 byte [] IDTechSDK.IDTTransactionData.macKSN

Message Authentication Code Key Serial Number

16.4.2.37 string IDTechSDK.IDTTransactionData.message

if a Notification == EVENT_NOTIFICATION_Types.EVENT_NOTIFICATION_Message, this will contain the string message.

16.4.2.38 byte IDTechSDK.IDTTransactionData.msr_captureEncodeStatus

Get the swiped card decoded status.

0x00:decoded data success;

Bit0:1-track1 data error;

Bit1:1-track2 data error;

Bit2:1-track3 data error;

Bit3:1-track1 encrypted data error;

Bit4:1-track2 encrypted data error;

Bit5:1-track3 encrypted data error;

Bit6:1-KSN error;

16.4.2.39 CAPTURE_ENCODE_TYPE IDTechSDK.IDTTransactionData.msr_cardType

Get the swiped card type, please see CAPTURE_ENCODE_TYPE for more information.

MSR card type:

CAPTURE_ENCODE_TYPE_ISOABA:ISO/ABA format

CAPTURE_ENCODE_TYPE_AAMVA:AAMVA format

CAPTURE_ENCODE_TYPE_Other:Other

CAPTURE_ENCODE_TYPE_Raw:Raw; undecoded format

CAPTURE_ENCODE_TYPE_JisI_II:JIS I or JIS II

16.4.2.40 byte [] IDTechSDK.IDTTransactionData.msr_encTrack1

Get the swiped card Track1 encrypted data.

A byte array containing Track1 encrypted data.

16.4.2.41 byte [] IDTechSDK.IDTTransactionData.msr_encTrack2

Get the swiped card Track2 encrypted data.

A byte array containing Track2 encrypted data.

16.4.2.42 byte [] IDTechSDK.IDTTransactionData.msr_encTrack3

Get the swiped card Track3 encrypted data.
A byte array containing Track3 encrypted data.

16.4.2.43 int IDTechSDK.IDTTransactionData.msr_errorCode

Contains error code when data is not returned

16.4.2.44 byte [] IDTechSDK.IDTTransactionData.msr_extendedField

Extended Field Data. Byte 0: 1 = Hash-SHA256

16.4.2.45 byte [] IDTechSDK.IDTTransactionData.msr_hashTrack1

Get the swiped card Track1 hash data.
A byte array containing Track1 hash data.

16.4.2.46 byte [] IDTechSDK.IDTTransactionData.msr_hashTrack2

Get the swiped card Track2 hash data.
A byte array containing Track2 hash data.

16.4.2.47 byte [] IDTechSDK.IDTTransactionData.msr_hashTrack3

Get the swiped card Track3 hash data.
A byte array containing Track3 hash data.

16.4.2.48 string IDTechSDK.IDTTransactionData.msr_KBOutput

String data of IDTech Enhanced MSR Format that would output if MSR data was captured by Keyboard

16.4.2.49 KEY_VARIANT_TYPE IDTechSDK.IDTTransactionData.msr_keyVariantType

KEY_VARIANT_TYPE_DATA = Data Variant key used
KEY_VARIANT_TYPE_PIN = PIN Variant key used

16.4.2.50 byte [] IDTechSDK.IDTTransactionData.msr_KSN

Get the swiped card KSN (Key Serial Number).
A byte array containing 10 bytes.

16.4.2.51 byte [] IDTechSDK.IDTTransactionData.msr_rawData

Get the card data raw data.
Containing complete unparsed transaction data as received from device.

16.4.2.52 byte [] IDTechSDK.IDTTransactionData.msr_sessionID

Get the swiped card Session ID.
A byte array to get session ID, if exists.

16.4.2.53 String IDTechSDK.IDTTransactionData.msr_track1

Get the swiped card Track1 data.

A string containing Track1 masked data expressed as hex characters.

16.4.2.54 int IDTechSDK.IDTTransactionData.msr_track1Length

Get the swiped card length of Track1 data.

16.4.2.55 String IDTechSDK.IDTTransactionData.msr_track2

Get the swiped card Track2 data.

A string containing Track2 masked data expressed as hex characters.

16.4.2.56 int IDTechSDK.IDTTransactionData.msr_track2Length

Get the swiped card length of Track2 data.

16.4.2.57 String IDTechSDK.IDTTransactionData.msr_track3

Get the swiped card Track3 data.

A string containing Track3 masked data expressed as hex characters.

16.4.2.58 int IDTechSDK.IDTTransactionData.msr_track3Length

Get the swiped card length of Track3 data.

16.4.2.59 EVENT_NOTIFICATION_Types IDTechSDK.IDTTransactionData.Notification

Event Notification type, please see EVENT_NOTIFICATION_Types for more information.

16.4.2.60 string IDTechSDK.IDTTransactionData.pin_KeyEntry

KSN for Pinblock

16.4.2.61 string IDTechSDK.IDTTransactionData.pin_KSN

KSN for Pinblock

16.4.2.62 string IDTechSDK.IDTTransactionData.pin_pinblock

PIN block from PINPAD

16.4.2.63 byte IDTechSDK.IDTTransactionData.SW1

SW1

16.4.2.64 byte IDTechSDK.IDTTransactionData.SW2

SW2

The documentation for this class was generated from the following file:

- Source_Windows/IDT_Transactions.cs

Index

BDK

IDTechSDK::IDTCryptoData, [117](#)

CTLS_APPLICATION

IDTechSDK, [68](#)

callbackType

IDTechSDK::EMV_Callback, [70](#)

captureCardType

IDTechSDK::IDTTransactionData, [120](#)

captureEncryptType

IDTechSDK::IDTTransactionData, [121](#)

captureEncryptTypeEMV

IDTechSDK::IDTTransactionData, [121](#)

captured_CSC

IDTechSDK::IDTTransactionData, [120](#)

captured_Expiry

IDTechSDK::IDTTransactionData, [120](#)

captured_InitialVector

IDTechSDK::IDTTransactionData, [121](#)

captured_KSN

IDTechSDK::IDTTransactionData, [121](#)

captured_MACKSN

IDTechSDK::IDTTransactionData, [121](#)

captured_MACValue

IDTechSDK::IDTTransactionData, [121](#)

captured_PAN

IDTechSDK::IDTTransactionData, [121](#)

captured_SHA256

IDTechSDK::IDTTransactionData, [121](#)

captured_firstPANDigits

IDTechSDK::IDTTransactionData, [121](#)

captured_lastPANDigits

IDTechSDK::IDTTransactionData, [121](#)

clearPinBlock

IDTechSDK::IDTCryptoData, [117](#)

config_getDate

IDTechSDK::IDT_VP3300, [75](#)

config_getSerialNumber

IDTechSDK::IDT_VP3300, [75](#)

config_getTime

IDTechSDK::IDT_VP3300, [75](#)

config_setDate

IDTechSDK::IDT_VP3300, [76](#)

ctls_activateTransaction

IDTechSDK::IDT_VP3300, [76](#)

ctls_cancelTransaction

IDTechSDK::IDT_VP3300, [77](#)

ctls_getAllConfigurationGroups

IDTechSDK::IDT_VP3300, [77](#)

ctls_getConfigurationGroup

IDTechSDK::IDT_VP3300, [78](#)

ctls_removeAllCAPK

IDTechSDK::IDT_VP3300, [78](#)

ctls_removeApplicationData

IDTechSDK::IDT_VP3300, [78](#)

ctls_removeCAPK

IDTechSDK::IDT_VP3300, [78](#)

ctls_removeConfigurationGroup

IDTechSDK::IDT_VP3300, [79](#)

ctls_retrieveAIDList

IDTechSDK::IDT_VP3300, [79](#)

ctls_retrieveApplicationData

IDTechSDK::IDT_VP3300, [79](#)

ctls_retrieveCAPKList

IDTechSDK::IDT_VP3300, [80](#)

ctls_retrieveCAPK

IDTechSDK::IDT_VP3300, [79](#)

ctls_retrieveTerminalData

IDTechSDK::IDT_VP3300, [80](#)

ctls_setApplicationData

IDTechSDK::IDT_VP3300, [81](#)

ctls_setCAPK

IDTechSDK::IDT_VP3300, [81](#)

ctls_setConfigurationGroup

IDTechSDK::IDT_VP3300, [81](#)

ctls_setDefaultConfiguration

IDTechSDK::IDT_VP3300, [82](#)

ctls_setTerminalData

IDTechSDK::IDT_VP3300, [82](#)

ctls_startTransaction

IDTechSDK::IDT_VP3300, [82](#)

ctlsApplication

IDTechSDK::IDTTransactionData, [122](#)

DEK

IDTechSDK::IDTCryptoData, [117](#)

dataResults

IDTechSDK::IDTCryptoData, [117](#)

dataToProcess

IDTechSDK::IDTCryptoData, [117](#)

DataVariant

IDTechSDK::IDTCryptoData, [117](#)

device_RSN

IDTechSDK::IDTTransactionData, [122](#)

device_activateTransaction

IDTechSDK::IDT_VP3300, [83](#)

device_buzzer

IDTechSDK::IDT_VP3300, [85](#)

device_cancelTransaction

IDTechSDK::IDT_VP3300, [85](#)

- device_controlLED
 - IDTechSDK::IDT_VP3300, [85](#)
- device_controlUserInterface
 - IDTechSDK::IDT_VP3300, [85](#)
- device_enablePassThrough
 - IDTechSDK::IDT_VP3300, [86](#)
- device_getFirmwareVersion
 - IDTechSDK::IDT_VP3300, [87](#)
- device_getPollMode
 - IDTechSDK::IDT_VP3300, [87](#)
- device_getResponseCodeString
 - IDTechSDK::IDT_VP3300, [87](#)
- device_getTransactionResults
 - IDTechSDK::IDT_VP3300, [97](#)
- device_pingDevice
 - IDTechSDK::IDT_VP3300, [97](#)
- device_sendDataCommand
 - IDTechSDK::IDT_VP3300, [98](#)
- device_sendDataCommand_ext
 - IDTechSDK::IDT_VP3300, [98](#)
- device_sendPAE
 - IDTechSDK::IDT_VP3300, [98](#)
- device_sendVivoCommandP2
 - IDTechSDK::IDT_VP3300, [99](#)
- device_sendVivoCommandP2_ext
 - IDTechSDK::IDT_VP3300, [99](#)
- device_setBurstMode
 - IDTechSDK::IDT_VP3300, [99](#)
- device_setMerchantRecord
 - IDTechSDK::IDT_VP3300, [100](#)
- device_setPollMode
 - IDTechSDK::IDT_VP3300, [100](#)
- device_startRKI
 - IDTechSDK::IDT_VP3300, [100](#)
- device_startTransaction
 - IDTechSDK::IDT_VP3300, [101](#)
- device_updateDeviceFirmware
 - IDTechSDK::IDT_VP3300, [102](#)
- EMV_CALLBACK_TYPE
 - IDTechSDK, [69](#)
- EMV_LCD_DISPLAY_MODE
 - IDTechSDK, [69](#)
- EMV_PIN_MODE
 - IDTechSDK, [69](#)
- EMV_RESULT_CODE
 - IDTechSDK, [69](#)
- emv_ESC
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_RF_State
 - IDTechSDK::IDTTransactionData, [123](#)
- emv_activateTransaction
 - IDTechSDK::IDT_VP3300, [103](#)
- emv_allowFallback
 - IDTechSDK::IDT_VP3300, [104](#)
- emv_appErrorFn
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_appErrorState
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_authenticateTransaction
 - IDTechSDK::IDT_VP3300, [104](#)
- emv_autoAuthenticate
 - IDTechSDK::IDT_VP3300, [104](#)
- emv_callbackResponseLCD
 - IDTechSDK::IDT_VP3300, [104](#)
- emv_callbackResponseMSR
 - IDTechSDK::IDT_VP3300, [105](#)
- emv_callbackResponsePIN
 - IDTechSDK::IDT_VP3300, [105](#)
- emv_cancelTransaction
 - IDTechSDK::IDT_VP3300, [106](#)
- emv_clearingRecord
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_completeTransaction
 - IDTechSDK::IDT_VP3300, [106](#)
- emv_encipheredOnlinePIN
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_encryptedTags
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_getEMVConfigurationCheckValue
 - IDTechSDK::IDT_VP3300, [106](#)
- emv_getEMVKernelCheckValue
 - IDTechSDK::IDT_VP3300, [106](#)
- emv_getEMVKernelVersion
 - IDTechSDK::IDT_VP3300, [107](#)
- emv_getTerminalMajorConfiguration
 - IDTechSDK::IDT_VP3300, [107](#)
- emv_hasAdvise
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_hasReversal
 - IDTechSDK::IDTTransactionData, [122](#)
- emv_maskedTags
 - IDTechSDK::IDTTransactionData, [123](#)
- emv_removeAllApplicationData
 - IDTechSDK::IDT_VP3300, [107](#)
- emv_removeAllCAPK
 - IDTechSDK::IDT_VP3300, [107](#)
- emv_removeAllCRL
 - IDTechSDK::IDT_VP3300, [108](#)
- emv_removeApplicationData
 - IDTechSDK::IDT_VP3300, [108](#)
- emv_removeCAPK
 - IDTechSDK::IDT_VP3300, [108](#)
- emv_removeCRL
 - IDTechSDK::IDT_VP3300, [108](#)
- emv_removeTerminalData
 - IDTechSDK::IDT_VP3300, [109](#)
- emv_resultCode
 - IDTechSDK::IDTTransactionData, [123](#)
- emv_retrieveAIDList
 - IDTechSDK::IDT_VP3300, [109](#)
- emv_retrieveApplicationData
 - IDTechSDK::IDT_VP3300, [109](#)
- emv_retrieveCAPKList
 - IDTechSDK::IDT_VP3300, [110](#)
- emv_retrieveCAPK
 - IDTechSDK::IDT_VP3300, [109](#)

- emv_retrieveCRLList
 - IDTechSDK::IDT_VP3300, 110
- emv_retrieveTerminalData
 - IDTechSDK::IDT_VP3300, 110
- emv_retrieveTransactionResult
 - IDTechSDK::IDT_VP3300, 111
- emv_rfStateCode
 - IDTechSDK::IDTTransactionData, 123
- emv_setApplicationData
 - IDTechSDK::IDT_VP3300, 111
- emv_setCAPK
 - IDTechSDK::IDT_VP3300, 111
- emv_setCRL
 - IDTechSDK::IDT_VP3300, 112
- emv_setTerminalData
 - IDTechSDK::IDT_VP3300, 112
- emv_setTerminalMajorConfiguration
 - IDTechSDK::IDT_VP3300, 112
- emv_startTransaction
 - IDTechSDK::IDT_VP3300, 113
- emv_transaction_Error_Code
 - IDTechSDK::IDTTransactionData, 123
- emv_unencryptedTags
 - IDTechSDK::IDTTransactionData, 123
- errorString
 - IDTechSDK::IDTCryptoData, 117
- Event
 - IDTechSDK::IDTTransactionData, 123
- fastEMV
 - IDTechSDK::IDTTransactionData, 123
- finalPAN
 - IDTechSDK::IDTCryptoData, 117
- getCommandTimeout
 - IDTechSDK::IDT_VP3300, 113
- hasMACVerificationData
 - IDTechSDK::IDTTransactionData, 123
- IDTechSDK.EMV_Callback, 70
- IDTechSDK.IDT_VP3300, 72
- IDTechSDK.IDTCryptoData, 116
- IDTechSDK.IDTTransactionData, 119
- IDTechSDK::EMV_Callback
 - callbackType, 70
 - language, 70
 - lcd_backlightTimeout, 71
 - lcd_displayMode, 71
 - lcd_entryTimeout, 71
 - lcd_entryTimeoutMinor, 71
 - lcd_messages, 71
 - maskEntry, 71
 - msr_displayMessage, 71
 - msr_swipeTimeout, 72
 - pin_KSN, 72
 - pin_entryInterval, 72
 - pin_entryStartTimeout, 72
 - pin_pinMode, 72
 - pin_truncatedPAN, 72
- IDTechSDK::IDT_VP3300
 - config_getDate, 75
 - config_getSerialNumber, 75
 - config_getTime, 75
 - config_setDate, 76
 - ctls_activateTransaction, 76
 - ctls_cancelTransaction, 77
 - ctls_getAllConfigurationGroups, 77
 - ctls_getConfigurationGroup, 78
 - ctls_removeAllCAPK, 78
 - ctls_removeApplicationData, 78
 - ctls_removeCAPK, 78
 - ctls_removeConfigurationGroup, 79
 - ctls_retrieveAIDList, 79
 - ctls_retrieveApplicationData, 79
 - ctls_retrieveCAPKList, 80
 - ctls_retrieveCAPK, 79
 - ctls_retrieveTerminalData, 80
 - ctls_setApplicationData, 81
 - ctls_setCAPK, 81
 - ctls_setConfigurationGroup, 81
 - ctls_setDefaultConfiguration, 82
 - ctls_setTerminalData, 82
 - ctls_startTransaction, 82
 - device_activateTransaction, 83
 - device_buzzer, 85
 - device_cancelTransaction, 85
 - device_controlLED, 85
 - device_controlUserInterface, 85
 - device_enablePassThrough, 86
 - device_getFirmwareVersion, 87
 - device_getPollMode, 87
 - device_getResponseCodeString, 87
 - device_getTransactionResults, 97
 - device_pingDevice, 97
 - device_sendDataCommand, 98
 - device_sendDataCommand_ext, 98
 - device_sendPAE, 98
 - device_sendVivoCommandP2, 99
 - device_sendVivoCommandP2_ext, 99
 - device_setBurstMode, 99
 - device_setMerchantRecord, 100
 - device_setPollMode, 100
 - device_startRKI, 100
 - device_startTransaction, 101
 - device_updateDeviceFirmware, 102
 - emv_activateTransaction, 103
 - emv_allowFallback, 104
 - emv_authenticateTransaction, 104
 - emv_autoAuthenticate, 104
 - emv_callbackResponseLCD, 104
 - emv_callbackResponseMSR, 105
 - emv_callbackResponsePIN, 105
 - emv_cancelTransaction, 106
 - emv_completeTransaction, 106
 - emv_getEMVConfigurationCheckValue, 106
 - emv_getEMVKernelCheckValue, 106

- emv_getEMVKernelVersion, [107](#)
- emv_getTerminalMajorConfiguration, [107](#)
- emv_removeAllApplicationData, [107](#)
- emv_removeAllCAPK, [107](#)
- emv_removeAllCRL, [108](#)
- emv_removeApplicationData, [108](#)
- emv_removeCAPK, [108](#)
- emv_removeCRL, [108](#)
- emv_removeTerminalData, [109](#)
- emv_retrieveAIDList, [109](#)
- emv_retrieveApplicationData, [109](#)
- emv_retrieveCAPKList, [110](#)
- emv_retrieveCAPK, [109](#)
- emv_retrieveCRLList, [110](#)
- emv_retrieveTerminalData, [110](#)
- emv_retrieveTransactionResult, [111](#)
- emv_setApplicationData, [111](#)
- emv_setCAPK, [111](#)
- emv_setCRL, [112](#)
- emv_setTerminalData, [112](#)
- emv_setTerminalMajorConfiguration, [112](#)
- emv_startTransaction, [113](#)
- getCommandTimeout, [113](#)
- icc_exchangeAPDU, [114](#)
- icc_getICCRReaderStatus, [114](#)
- icc_powerOffICC, [114](#)
- icc_powerOnICC, [114](#)
- msr_cancelMSRSwipe, [115](#)
- msr_startMSRSwipe, [115](#)
- SDK_Version, [115](#)
- setCallback, [115](#)
- setCommandTimeout, [116](#)
- SharedController, [116](#)
- IDTechSDK::IDTCryptoData
 - BDK, [117](#)
 - clearPinBlock, [117](#)
 - DEK, [117](#)
 - dataResults, [117](#)
 - dataToProcess, [117](#)
 - DataVariant, [117](#)
 - errorString, [117](#)
 - finalPAN, [117](#)
 - IPEK, [117](#)
 - isDecryption, [118](#)
 - isTDES, [118](#)
 - KSN, [118](#)
 - keyVariant, [118](#)
 - MAC_Command, [118](#)
 - MACVariant, [118](#)
 - PAN, [118](#)
 - PINBlockType, [118](#)
 - PINVariant, [119](#)
 - PIN, [118](#)
 - pinBlock, [118](#)
- IDTechSDK::IDTTransactionData
 - captureCardType, [120](#)
 - captureEncryptType, [121](#)
 - captureEncryptTypeEMV, [121](#)
 - captured_CSC, [120](#)
 - captured_Expiry, [120](#)
 - captured_InitialVector, [121](#)
 - captured_KSN, [121](#)
 - captured_MACKSN, [121](#)
 - captured_MACValue, [121](#)
 - captured_PAN, [121](#)
 - captured_SHA256, [121](#)
 - captured_firstPANDigits, [121](#)
 - captured_lastPANDigits, [121](#)
 - ctlsApplication, [122](#)
 - device_RSN, [122](#)
 - emv_ESC, [122](#)
 - emv_RF_State, [123](#)
 - emv_appErrorFn, [122](#)
 - emv_appErrorState, [122](#)
 - emv_clearingRecord, [122](#)
 - emv_encipheredOnlinePIN, [122](#)
 - emv_encryptedTags, [122](#)
 - emv_hasAdvise, [122](#)
 - emv_hasReversal, [122](#)
 - emv_maskedTags, [123](#)
 - emv_resultCode, [123](#)
 - emv_rfStateCode, [123](#)
 - emv_transaction_Error_Code, [123](#)
 - emv_unencryptedTags, [123](#)
 - Event, [123](#)
 - fastEMV, [123](#)
 - hasMACVerificationData, [123](#)
 - iccPresent, [123](#)
 - isCTLS, [123](#)
 - mac, [124](#)
 - macKSN, [124](#)
 - message, [124](#)
 - msr_KBOutput, [125](#)
 - msr_KSN, [125](#)
 - msr_captureEncodeStatus, [124](#)
 - msr_cardType, [124](#)
 - msr_encTrack1, [124](#)
 - msr_encTrack2, [124](#)
 - msr_encTrack3, [124](#)
 - msr_errorCode, [125](#)
 - msr_extendedField, [125](#)
 - msr_hashTrack1, [125](#)
 - msr_hashTrack2, [125](#)
 - msr_hashTrack3, [125](#)
 - msr_keyVariantType, [125](#)
 - msr_rawData, [125](#)
 - msr_sessionID, [125](#)
 - msr_track1, [125](#)
 - msr_track1Length, [126](#)
 - msr_track2, [126](#)
 - msr_track2Length, [126](#)
 - msr_track3, [126](#)
 - msr_track3Length, [126](#)
 - Notification, [126](#)
 - pin_KSN, [126](#)
 - pin_KeyEntry, [126](#)

- pin_pinblock, 126
- SW1, 126
- SW2, 126
- IDTechSDK, 67
 - CTLS_APPLICATION, 68
 - EMV_CALLBACK_TYPE, 69
 - EMV_LCD_DISPLAY_MODE, 69
 - EMV_PIN_MODE, 69
 - EMV_RESULT_CODE, 69
- IPEK
 - IDTechSDK::IDTCryptoData, 117
- icc_exchangeAPDU
 - IDTechSDK::IDT_VP3300, 114
- icc_getICCReaderStatus
 - IDTechSDK::IDT_VP3300, 114
- icc_powerOffICC
 - IDTechSDK::IDT_VP3300, 114
- icc_powerOnICC
 - IDTechSDK::IDT_VP3300, 114
- iccPresent
 - IDTechSDK::IDTTransactionData, 123
- isCTLS
 - IDTechSDK::IDTTransactionData, 123
- isDecryption
 - IDTechSDK::IDTCryptoData, 118
- isTDDES
 - IDTechSDK::IDTCryptoData, 118
- KSN
 - IDTechSDK::IDTCryptoData, 118
- keyVariant
 - IDTechSDK::IDTCryptoData, 118
- language
 - IDTechSDK::EMV_Callback, 70
- lcd_backlightTimeout
 - IDTechSDK::EMV_Callback, 71
- lcd_displayMode
 - IDTechSDK::EMV_Callback, 71
- lcd_entryTimeout
 - IDTechSDK::EMV_Callback, 71
- lcd_entryTimeoutMinor
 - IDTechSDK::EMV_Callback, 71
- lcd_messages
 - IDTechSDK::EMV_Callback, 71
- MAC_Command
 - IDTechSDK::IDTCryptoData, 118
- MACVariant
 - IDTechSDK::IDTCryptoData, 118
- mac
 - IDTechSDK::IDTTransactionData, 124
- macKSN
 - IDTechSDK::IDTTransactionData, 124
- maskEntry
 - IDTechSDK::EMV_Callback, 71
- message
 - IDTechSDK::IDTTransactionData, 124
- msr_KBOutput
 - IDTechSDK::IDTTransactionData, 125
- msr_KSN
 - IDTechSDK::IDTTransactionData, 125
- msr_cancelMSRSwipe
 - IDTechSDK::IDT_VP3300, 115
- msr_captureEncodeStatus
 - IDTechSDK::IDTTransactionData, 124
- msr_cardType
 - IDTechSDK::IDTTransactionData, 124
- msr_displayMessage
 - IDTechSDK::EMV_Callback, 71
- msr_encTrack1
 - IDTechSDK::IDTTransactionData, 124
- msr_encTrack2
 - IDTechSDK::IDTTransactionData, 124
- msr_encTrack3
 - IDTechSDK::IDTTransactionData, 124
- msr_errorCode
 - IDTechSDK::IDTTransactionData, 125
- msr_extendedField
 - IDTechSDK::IDTTransactionData, 125
- msr_hashTrack1
 - IDTechSDK::IDTTransactionData, 125
- msr_hashTrack2
 - IDTechSDK::IDTTransactionData, 125
- msr_hashTrack3
 - IDTechSDK::IDTTransactionData, 125
- msr_keyVariantType
 - IDTechSDK::IDTTransactionData, 125
- msr_rawData
 - IDTechSDK::IDTTransactionData, 125
- msr_sessionID
 - IDTechSDK::IDTTransactionData, 125
- msr_startMSRSwipe
 - IDTechSDK::IDT_VP3300, 115
- msr_swipeTimeout
 - IDTechSDK::EMV_Callback, 72
- msr_track1
 - IDTechSDK::IDTTransactionData, 125
- msr_track1Length
 - IDTechSDK::IDTTransactionData, 126
- msr_track2
 - IDTechSDK::IDTTransactionData, 126
- msr_track2Length
 - IDTechSDK::IDTTransactionData, 126
- msr_track3
 - IDTechSDK::IDTTransactionData, 126
- msr_track3Length
 - IDTechSDK::IDTTransactionData, 126
- Notification
 - IDTechSDK::IDTTransactionData, 126
- PAN
 - IDTechSDK::IDTCryptoData, 118
- PINBlockType
 - IDTechSDK::IDTCryptoData, 118
- PINVariant
 - IDTechSDK::IDTCryptoData, 119

PIN
 IDTechSDK::IDTCryptoData, [118](#)
pin_KSN
 IDTechSDK::EMV_Callback, [72](#)
 IDTechSDK::IDTTransactionData, [126](#)
pin_KeyEntry
 IDTechSDK::IDTTransactionData, [126](#)
pin_entryInterval
 IDTechSDK::EMV_Callback, [72](#)
pin_entryStartTimeout
 IDTechSDK::EMV_Callback, [72](#)
pin_pinMode
 IDTechSDK::EMV_Callback, [72](#)
pin_pinblock
 IDTechSDK::IDTTransactionData, [126](#)
pin_truncatedPAN
 IDTechSDK::EMV_Callback, [72](#)
pinBlock
 IDTechSDK::IDTCryptoData, [118](#)

SDK_Version
 IDTechSDK::IDT_VP3300, [115](#)
SW1
 IDTechSDK::IDTTransactionData, [126](#)
SW2
 IDTechSDK::IDTTransactionData, [126](#)
setCallback
 IDTechSDK::IDT_VP3300, [115](#)
setCommandTimeout
 IDTechSDK::IDT_VP3300, [116](#)
SharedController
 IDTechSDK::IDT_VP3300, [116](#)