Universal SDK Demo App QuickStart Guide

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1. Overview

This document provides a detailed description of and instructions for using the ID TECH Universal SDK Demo app.

ID TECH provides the Universal SDK, a Software Development Kit, to customers to develop payment applications around various ID TECH products. The Universal SDK (available from the product pages on the [Knowledge Base](#)) offers developers a unified API for communicating with ID TECH devices and enables the rapid development of applications written in a high-level language (C# on Windows, Java on Android, and Objective C or Swift for iOS).

Using the Universal SDK, a developer can work with built-in connectivity modules, avoiding any need to write USB or serial I/O routines, and take advantage of convenience classes that aid in data-parsing, event handling, transaction flow, error detection, and so forth. Because the same APIs are used across multiple products, code written for one ID TECH device can often be used with other ID TECH devices, greatly reducing the time spent writing one-off code to support individual devices.

The Universal SDK comes with sample code showing how to use the SDK to conduct MSR, contact EMV, and contactless transactions. One of the apps included is the USDK Demo app, also available as a standalone download on [ID TECH Knowledge Base](#).

The USDK Demo app offers a quick, easy way to establish communication with an ID TECH reader, query its firmware version (and key status), send low-level commands, initiate transactions, and so on. Using the USDK Demo app's graphical user interface, users can quickly run various Universal SDK commands in a point-and-click manner, then see detailed log messages to understand the kinds of messages that are sent back and forth from the card reader.

Familiarity with the USDK Demo app aids not only learning how to work with ID TECH hardware but also in dealing with various types of support issues. For example, for issues requiring technical support, ID TECH's Tech Support department may ask a user to run the **Get Firmware** command (or other commands) to aid the troubleshooting process.

ID TECH recommends that all customers become familiar with the USDK Demo app. This document will get users up to speed quickly in using this important utility.

2. How to Obtain the USDK Demo App

The latest version of the USDK Demo app is always available on the [ID TECH Knowledge Base](#). The app is free for download and does not require users to download the entire SDK. No registration is required. It is supported only on Windows.

To obtain the Universal SDK for a specific product (plus source code for platform-specific demo apps for Windows, Android, or iOS), check the Product page for the product in question, as listed in the [Knowledge Base](#).

3. Applicable Products

The Universal SDK Demo app currently supports the following devices, using USB connectivity:

- UniPay
- Vendi
- Vendi III
- Kiosk III and IV
- MiniSmart II
- Spectrum Pro
- L100
- CM100
- Augusta
- Augusta KB
- UniPay 1.5
- VP3300
- VP8800
- SecureMag
- K100
- TMS
- SecureKey
- SREDKey 2

The Universal SDK Demo app also supports RS-232 communication with the following products:

- Vendi
- Vendi III
- MiniSmart II
- Spectrum Pro
- Kiosk III and IV
- L100
- BT Mag
- VP8800
- SecureMag
- K100
- NEO2 devices

These lists can and will change as more products become supported. Refer to the download URL given above for the latest version of the app.

This document assumes users are running version 1.2.173.3 of the demo (or later).

4. Installation

The Universal SDK Demo app comes with a Window installer.

4.1. Installation Requirements

- Windows 7 or later (the Universal SDK Demo app requires a minimum version of Microsoft .NET 4.5 or later, which is only supported from Windows 7 on)
- 13 megabytes of disk space

Note: Uninstall any previous versions of the Universal SDK Demo app before installing a newer version.

5. Launching the Program

If a shortcut is not available, double-click the **UniversalSDKDemo.exe** file in the **USDK_Setup** folder where the application was installed.

6. Connecting a Device

USB
- ○ UniPay
- ○ Vendi
- ○ Vend III
- ○ Kiosk III/IV
- ○ MiniSmart II
- ○ Spectrum Pro
- ○ L100
- ○ CM100
- ○ Augusta
- ○ Augusta KB
- ○ UniPay 1.5
- ○ VP3300
- ● VP8800
- ○ SecureMag
- ○ K100
- ○ NEO2
- ○ TMS
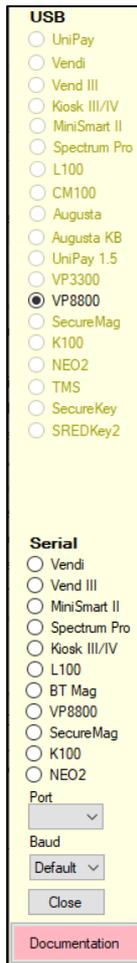- ○ SecureKey
- ○ SREDKey2

Serial
- ○ Vendi
- ○ Vend III
- ○ MiniSmart II
- ○ Spectrum Pro
- ○ Kiosk III/IV
- ○ L100
- ○ BT Mag
- ○ VP8800
- ○ SecureMag
- ○ K100
- ○ NEO2

Port

Baud
Default ∨

Close

Documentation
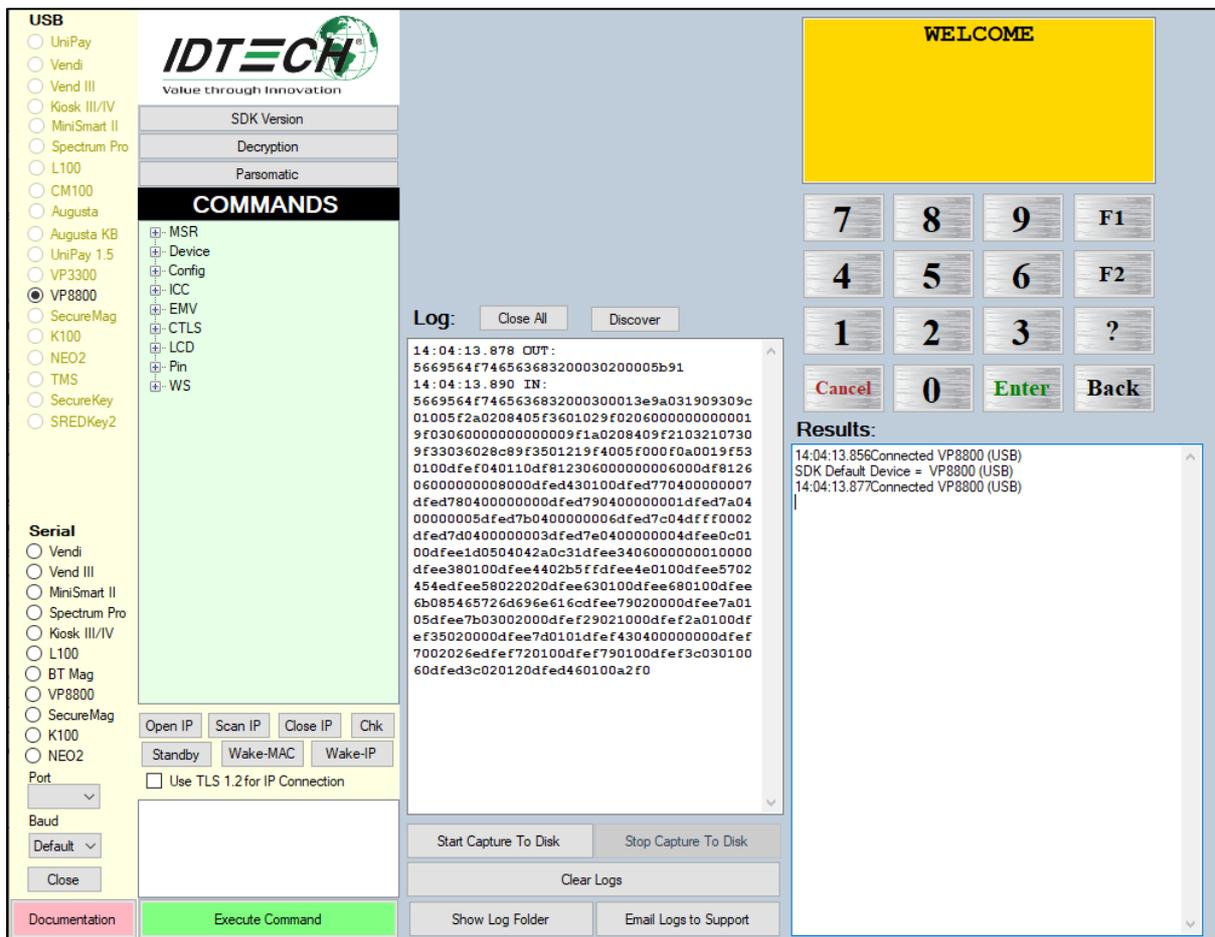
The Universal SDK Demo app supports hot-swapping and will auto-detect any compatible device a few seconds after the device is plugged in. Allow several seconds for the device to appear in the USB or Serial list (with radio buttons) on the left side of the main UI window.

Note: When connecting to a USB device for the first time, Windows may pause to search for a device driver. This may cause a delay of up to a minute before the device registers as "connected" on the UI. In most instances, ID TECH devices do not require special drivers. No user action of any kind is needed; simply wait for the device to appear.

Serial (RS-232) devices may require a **Port** number (shown in the text control in the lower left area of the window) or **Baud Rate** different than the default.

When a device connects, the **Results** pane displays a result in the following format with the name of the connected device:

```
12:34:56.789Connected VP8800 (USB)
SDK Default Device =  VP8800 (USB)
```

6.1. Troubleshooting Device Connections

If the Universal SDK Demo app does not connect to the device:
1. Unplug it and plug it back in.
2. Re-launch the Universal SDK Demo app.
3. Check the **Windows Device Manager** (or **Devices and Printers**) to make sure the device is listed.
4. If the device requires power, make sure the appropriate power supply is connected.

7. Main Window Overview

Refer to the screenshot below.
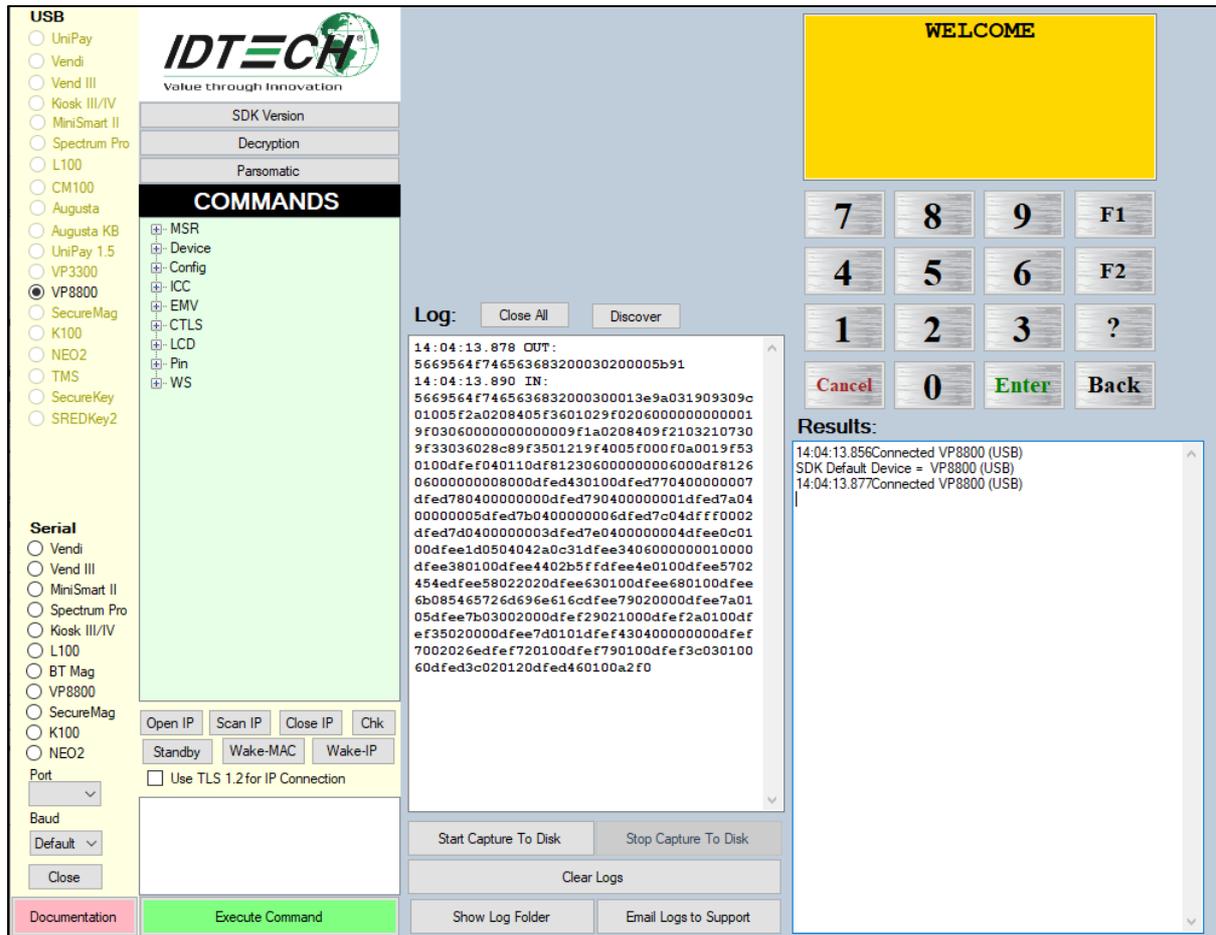
7.1. Principal Sections

The Universal SDK Demo app window is divided into several main sections.

- The connectivity strip (along the left edge of the window) shows connection info, including the type of device to which the program is connected.
- The COMMANDS pane contains a tree of available commands. The tree-based lists in this control update dynamically according to the type of device connected; not all commands are the same for all devices. For example, the CTLS tree node is available only for devices that support Contactless transactions. It will not appear for other connected devices.
- Executes any command listed in the command tree by first highlighting (single-clicking) the command name, then clicking the **Execute Command** button (or double-click a command name in the tree to execute it).
- The top of the COMMANDS pane has three buttons:
  - o **SDK Version**: when clicked, this button displays detailed version info (applicable to the SDK itself) in the **Results** pane.
  - o **Decryption:** when clicked, this button displays a dialog within where users can insert data values that will allow the Universal SDK Demo app to derive DUKPT keys and decrypt transaction data.
  - o **Parsomatic**: when clicked, this button opens the ID TECH Parsomatic in a web

browser; use this tool to parse ID TECH card-reader data streams from AR, GR, NGA, NEO I and NEO II devices.

- The **Log** pane shows log messages representing message traffic going from the Universal SDK Demo app to the card reader (OUT), and messages from the card reader demo app (IN).
- Click the Clear Logs button at any time to erase **Log** and **Results** messages.
- The PIN Pad emulator simulates PIN pad functionality and includes an LCD window for showing EMV "LCD messages".
- The **Results** pane displays notifications that go beyond the raw message data of the **Log** pane such as status messages, error codes, track data, and TLVs.

8. Context-Sensitive Area

The area immediately above the **Log** pane is context sensitive. When selected commands have no extra fields, it remains grayed out or hidden. When relevant, it displays text areas and control elements for commands. For example, when the viewing the list of EMV-related commands, selecting the **Get Terminal Data** command shows extra controls labeled **CONFIG** and **TLV**:
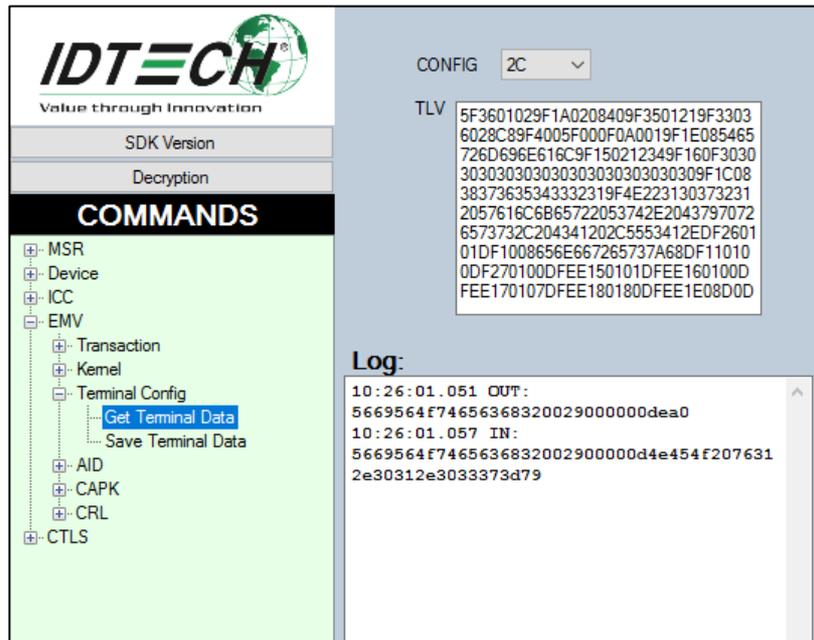
In general, any context-sensitive controls that appear in this special area change (or specify) parameters to the command in question.

9. Common Commands

9.1. Get Serial Number

This command exists under the **Config** node of the command tree. Run to see the device's serial number in the **Results** pane.
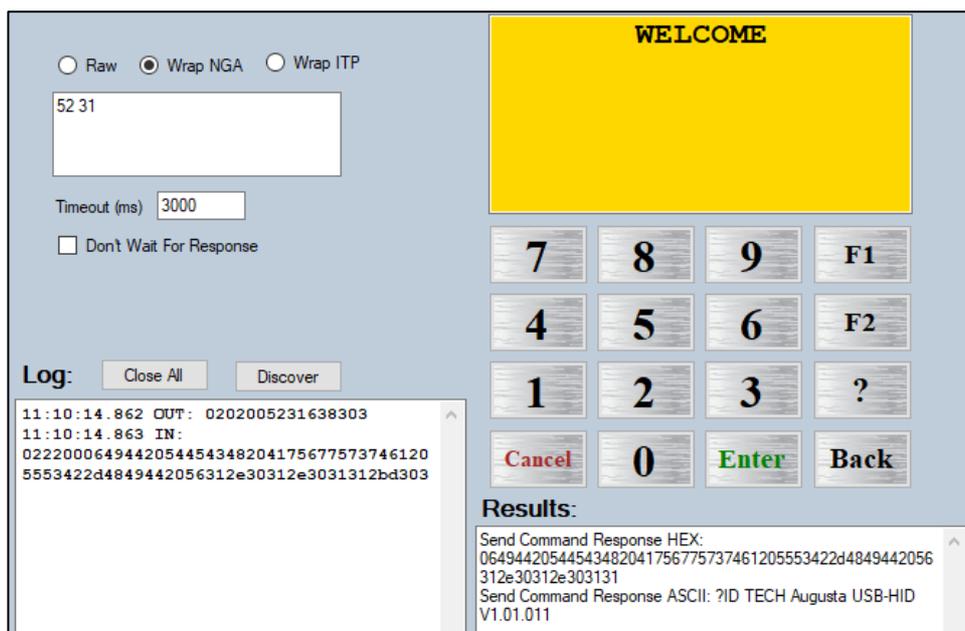
9.2. Get Firmware Version

ID TECH Support often asks users for their device's firmware version. Obtain this by running the Firmware Version command, located under the **Device** node of the command tree. Click the **+** symbol to open the **Device** node, then double-click the **Firmware Version** command. Check the message in the **Results** pane to see the firmware version.

Note: To retrieve the extended firmware version number in the format of X.YY.ZZZ (for example, 1.00.037) instead of the short version, run the appropriate low-level command using the **Send Data Command** feature below.

9.3. Send Data Command

One of the most important context-sensitive commands is **Send Data Command**, listed under the **Device** node of the command tree. This command provides a fast way to test any firmware command in the Universal SDK Demo app environment without writing or compiling code.

The **Send Data Command** sends any supported raw firmware command to the target device (consult the integrator's guide for the device in question to see available commands). This offers a way to send commands to the device that aren't yet exposed in the high-level API of the Universal SDK (or that are exposed but not implemented in the GUI of the Universal SDK Demo app).

In the screen shot above:
- The connected device is an Augusta card reader sending the **Get Extended Firmware Version** command, which is **52 31** for Augusta card readers communicating in USB-KB mode (the same command is **78 31** for Augusta readers using HID mode).
- The user has entered the command **52 31** in the text box (note: spaces don't matter).
- Above the box, the **Wrap as NGA** checkbox has been checked, which tells the USDK Demo app to create an NGA-format protocol wrapper around the command before sending it to Augusta.
- As a result, when the user executes **Send Data Command**, the actual byte string that gets sent over the wire is **0202005231638303**.

In this example, the response from Augusta is:

```
0222000649442054454348204175677573746120555 3422d484
9442056312e30312e3031312bd303
```

The response contains the ASCII string "ID TECH Augusta USB-HID V1.01.011," wrapped in an NGA protocol wrapper.

9.4. Get Key Status

This command exists under the **Device** node of the commands tree for most ID TECH devices. Run it to see which cryptographic keys, if any, have already been injected into the device. Note that the presence of a key doesn't necessarily mean the device is in an encrypting mode unless it is an SRED device. Users may still have to turn on encryption with the **Set Encryption Control** command found under **Device.**

Note: After encryption is enabled, it cannot be disabled.

Note that there is no dedicated **Get Key Status** command for the Spectrum Pro. Instead, use the **Poll Card Reader** command (under **Device**), which returns six bytes of status information, with eight bit-flags per byte, including information not only on key status but PIN Pad connection status, tamper status, and more.

9.5. Get ICC Status (ATR)

Users can query a seated chip card for ATR information (Answer to Reset). The exact command may differ slightly from product to product. For example, if an Augusta unit is connected, use the **Power On ICC** command under **ICC** and check the **Results** pane. The USDK Demo app should display a message similar to:

```
ATR:4944205445434820417567757374612055534 22D4849442
056312E3031
ICC Powered On successfully
```

For a Spectrum Pro unit, use the **Get ICC Status** command under **ICC.** The USDK Demo app should display a message similar to:

```
ICC Powered On successfully
ICC Reader Status : [ICC Powered] [Card Seated] ICC
    Status : 21030000000a00000000
ATR : 3b6800000073c84013009000
```

9.6. Get Terminal Data and Set Terminal Data

This command returns a block of TLV data corresponding to terminal settings stored in the device. These settings, and their significance, are discussed in greater detail in the Which Terminal Settings Am I Allowed to Change? article on the ID TECH Knowledge Base. Consult that article to learn which TLVs are considered major and should not be changed versus which TLVs are considered minor and can be configured to tailor a device to meet specific needs.

Use the **Save Terminal Data** command to save TLVs (as a block) after making changes to various values. This is generally a one-time setup event that users do not need to repeat after a unit goes into production (although in practice, users may change values dynamically if needed).

Tech Support may ask users may to provide the output of the **Get Terminal Data** command in certain situations. After running this command, the **Results** pane displays a complete listing of TLVs.

9.7. Save AID, List AID, and Load Default AID

The **List AID** command under the **EMV** node enumerates all Application Identifiers known to the card reader and displays them in the **Results** pane, regardless of which AIDs are present in a given chip card.

Conversely, the Universal SDK Demo app can load AIDs into a reader by means of the **Load Default AID** command. Using the **Load Default AID** command loads a hard-coded list of AIDs. This is a potentially time-consuming command; allow 10 seconds or more for it to complete.

To force a reader to load a specific AID and its associated TLV data, use the **Save AID** command and supply the necessary parameter data in the context-sensitive UI.

When attempting to perform EMV transactions in the Universal SDK Demo app, if transactions fail with a message of "Transaction Failed: No AID or No Application Data," run the **Load Default AID** command, then retry the transaction. The transaction should finish normally. If it doesn't, the card used for transactions may require a specific AID.

9.8. Save CAPK (and Related Commands)

The **EMV n**ode of the command tree contains several commands related to certification authority public keys (CAPKs), including **Save CAPK**, **Remove CAPK**, **Remove All CAPK**, **Load Default CAPK**, and **List CAPK**. Use these commands to load or query individual CAPKs as well as to list all CAPKs (using **List CAPK**) or remove all CAPKs. The Universal SDK (and Universal SDK Demo app) ships with over two dozen CAPKs, but make sure to check that none have expired (the 7th and 8th bytes of a CAPK give the expiration date as MM and YY).

Consult [EMV Book 2](#) for detailed information about CAPKs.

9.9. Send APDU

The Universal SDK provides convenience methods for exchanging APDUs with chip cards; this functionality is exposed for certain products (such as Augusta) in the Universal SDK Demo app via the **Send APDU** command under the **ICC** node of the command tree. Note that this low-level functionality is not currently exposed for every ID TECH product.

APDU-based communication with chip cards is an advanced subject. Ordinarily, users should not need this level of access to ICCs when working with the Universal SDK because the ID TECH EMV L2 kernel automatically handles application selection, data object list exchange, Gen AC requests, and other low-level card interactions without programmer intervention. Before attempting APDU-level I/O with a card, check to see if the desired functionality is already done via high-level-language routines in the regular Universal SDK API.

10. Executing EMV Transactions with Universal SDK Demo app

The Universal SDK Demo app exposes **Start EMV Transaction**, **Authenticate EMV Transaction**, and **Complete EMV Transaction** (as well as **Cancel EMV Transaction**) methods in the UI. Look under the **EMV** node of the command tree to find these commands and make sure to read about them in the SDK documentation.

Each of the above commands are context sensitive. Selecting any of them in the EMV list of commands changes the appearance context-sensitive area of the UI.

Optionally, enable **Auto-Authentication** and **Auto-Completion** by checking the appropriate checkboxes, or change the primary **Amount** of the transaction (the default is $1.00), and set the response code of Tag 8A (for example, test "unable to go online" by setting the value here to **5A 33**).

Individual text areas allow users to specify which additional TLV tags to receive after each transaction step (**Start**, **Authenticate**, or **Complete**). Note that any tags specified here override the normal set of tags the respective transaction steps return.

Also note that tags 5A (PAN) and 57 (Track 2) are usually provided by default in the data the **Start Transaction** command returns (though they may not be available in later steps). To see data for tags 5A and 57, leave **Auto-Authenticate** and **Auto-Complete** unchecked (note: these tags normally contain encrypted data).

10.1. Running a Contact-EMV Transaction

To run a contact-EMV transaction in the Universal SDK Demo app:

1. Make sure the terminal data configuration is set as desired (see Get Terminal Data and Set Terminal Data above).
2. Make sure to load any AIDs and CAPKs necessary for the transaction.
3. Insert a card in the reader.
4. Execute the **Start EMV Transaction** command.

IMPORTANT: When requesting **Additional Tags** using the text areas shown above, please note that users must retrieve this data manually with the **Retrieve Tags** command (under **EMV**), after the transaction finishes. Also note that transaction data, as a rule, is available for only 15 seconds after a transaction; for security reasons, such data is purged after that period of time. Therefore, execute **Retrieve Tags** promptly.

The Universal SDK Demo app can run all phases of an EMV transaction (and simulate an online authorization) while testing various CVMs, parameter options (for example: allow or don't allow fallback to MSR), and error conditions. In real-world applications custom program logic would need to pause at some point to go online to receive the actual authorization response from the acquirer or issuer (typically via calls to a web service). The Universal SDK Demo app can only simulate this portion of the transaction cycle.

The Universal SDK Demo app itself cannot actually "call out" to a web API; users must build this functionality into apps on their own.

For more information, see the ID TECH white paper, "EMV Transactions with the Universal SDK," available on the ID TECH Knowledge Base.

10.2. Tips

- Before running **Start Transaction**, make sure to load default AIDs (or, at a minimum, load the specific AID the card needs).
- Check to make sure the terminal Configuration is set properly for the anticipated environment (for example, chip-and-PIN environments may require the use of a different configuration than chip-and-signature). Check this area when experiencing CVM-related issues.
- Check to make sure any needed CAPKs are loaded; if transactions fail at the level of SDA, DDA, or CDA—which is to say the offline data authentication phase—this is something to check.
- Be aware that some TLVs will contain encrypted data, but only if a reader has been injected with the necessary keys, and only if encryption has been turned on. Consult "ID TECH Encrypted Data Output Formats" for information on which tags contain encrypted data and which do not. Obtain the latest version of this document from the Knowledge Base.
  NOTE: If a gateway needs encrypted Track 2 data conforming to particular specifications, investigate the use of ID TECH tags DFEF4B, DFEF4C, and DFEF4D. These are described in Tech Note 011: "Tags for Obtaining Encrypted Track Data," available for download at the

[Knowledge Base](#).
- To control the behavior of the kernel with respect to authorization response codes, investigate the use of ID TECH proprietary tag DFEE1B. Find information about this tag, and other proprietary ID TECH tags in the "ID TECH TLV Tag Reference Guide," available for download at the [Knowledge Base](#). Also see the Knowledge Base article [Why is Tag 8A Giving a Z3 Response Code?](#)
- Remember that tags 5A and 57 are available after **Start Transaction** but may not be available after **Authenticate Transaction** or **Complete Transaction**. These tags contain sensitive data that will be encrypted.
- When requesting additional tags in any transaction step, remember to call **Retrieve Tags** to obtain them within 15 seconds after the transaction phase in question.
- When requesting additional tags in any transaction step, those tags (and only those tags) will be returned for that step.

11. For More Information

For more information on the Universal SDK, first obtain the specific SDK build for a particular device and operating system from the appropriate product page on the ID TECH [Knowledge Base](#), then consult the **docs** folder of the installed SDK.

EMV Transactions with the Universal SDK, available on the [Downloads page](#) at the ID TECH Knowledge Base, is a good starting point for learning about EMV in general as well as the steps involved in carrying out EMV transactions with the Universal SDK.

To open a support ticket, use the [Customer Support Portal](#) or contact Tech Support via email at [support@idtechproducts.com](#) (emailing this address automatically opens a support ticket).