uDynamo, Dynamag, DynaMAX, eDynamo, mDynamo, Insert, DynaWave, iDynamo 6, iDynamo 5 (Gen III)

Secure Card Reader Authenticator

Programmer's Manual (.NET/Universal Windows)

June 2024

Manual Part Number:
D99875723-500

REGISTERED TO ISO 9001:2015

Table 1.1 Revisions

Rev Number	Date	Notes
10	02/25/2015	Initial Release
20	12/03/2015	Updates for EMV devices
30	05/17/2016	Added DynaPro format for EMV transaction messages.
40	06/20/2016	Added getCardPAN.
50	10/28/2016	Added support for mDynamo.
51	June 9, 2017	Fix table in section **5.6** listing values for card events; misc. formatting cleanup.
52	10/16/2017	Updates for Universal Windows. Enhanced the code examples.
53	05/23/2018	Added isDeviceOEM
54	01/31/2019	Updated to correctly reference Bluetooth LE. Added getDeviceFeatures() and getPowerManagementValue().
55	10/08/2019	Updated events for the event onTransactionStatus(), and result codes for the event onEMVCommandResult(). Updated the method startTransaction(): cardType, options. and transactionType.

Rev Number	Date	Notes
500	06/03/2024	Added EMV transaction flow as Appendix F. Added support for iDynamo 5 Gen III at sections 4.2, 4.61, and Appendix E.

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1 Table of Contents

2 Introduction

This document provides instructions for software developers who want to create software solutions that include a MagTek Secure Card Reader / Authenticator (SCRA) device connected to a Windows PC, Windows tablet device or Windows Phone mobile device.

2.1 About MTSCRA Library

Custom Windows software installed on a host PC can communicate with MagTek SCRA devices via the Audio/Headset Interface, Bluetooth, Bluetooth LE, or USB using the MTSCRA library.

The supported platforms for .NET projects include Windows 7, Windows 8/8.1, and Windows 10. The .NET project should contain references to these files: **`MTSCRANET.dll`** and **`MTLIB.dll`**.

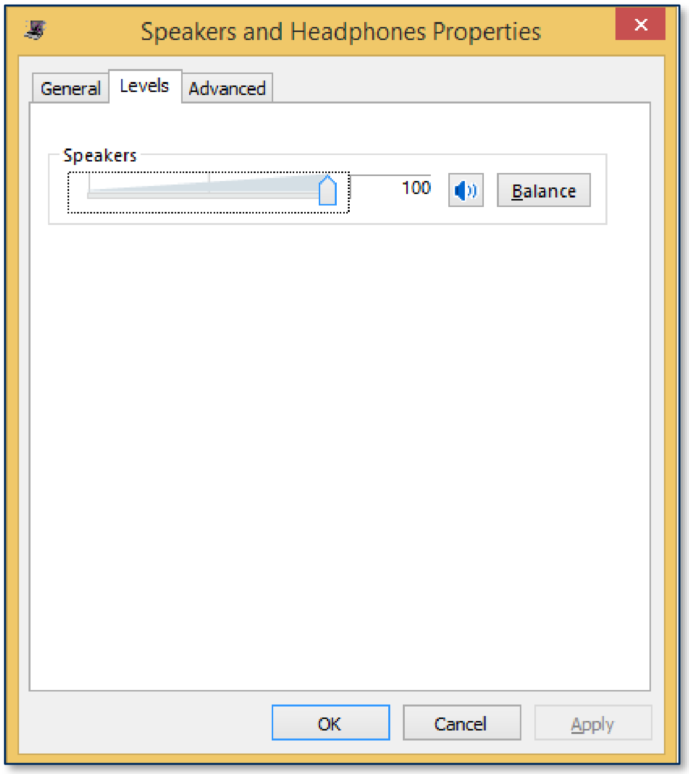
For Universal Windows projects, the supported platforms include all Windows 10 devices. The Universal/Windows Store project should contain references to **`MTSCRAUWP.dll`** file.

3 How to Set Up

3.1 How to Set Up Headset Interface on Windows PC on Windows PC

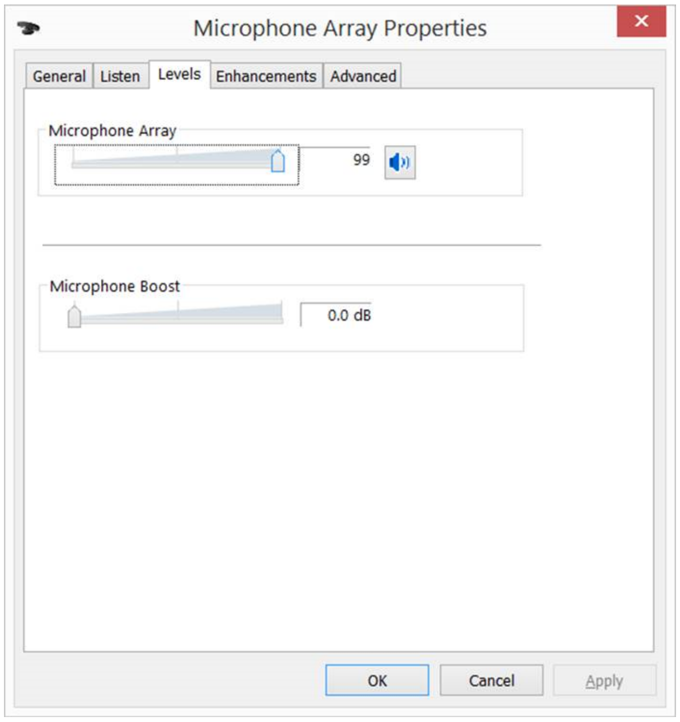
To set up the headset interface on Windows PC to communicate with the MagTek SCRA device, follow these steps:

1) Connect the device to the headset jack of the Windows PC.
2) Open the Windows Control Panel.
3) Open **Sound**.
4) Select the **Playback** tab.
5) Select the playback device that is connected to the SCRA device (for example, **Speakers and Headphones**).
6) Press the **Properties** button to launch the **[device name] Properties** window.
7) Select the **Levels** tab.
8) Set the volume to maximum. See Figure 3-1 for an example.
9) Select the **Recording** tab.
10) Select the headset interface that is connected to the SCRA device (for example, **Headset Mic**).
11) Press the **Properties** button to launch the **[device name] Properties** window.
12) Select the **Levels** tab.
13) Turn any boost settings or other special volume settings completely off (for example, set **Microphone Boost**) to 0.0dB). See Figure 3-2 for an example.
14) If the **[device name] Properties** window has an **Enhancements** tab, select it.
15) Make sure all checkboxes in the **Enhancements** tab are turned off. See Figure 3-3 for an example.
16) If the **[device name] Properties** window has an **Effects** tab, select it.
17) If the **Enhancements** tab has a **Disable System Effects** checkbox, turn it ON. Turn all other effects off. See Figure 3-4 for an example.


Speakers and Headphones Properties

Speakers 100

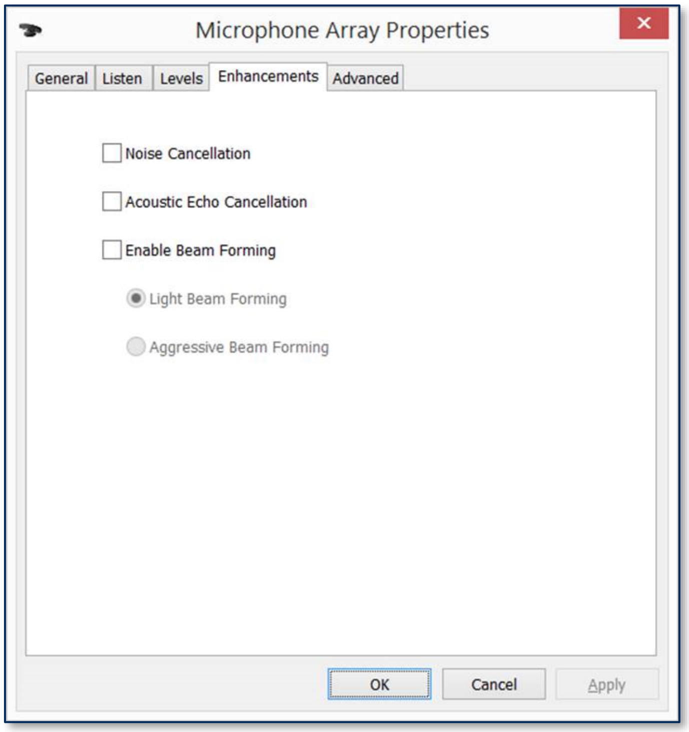
Figure 3-1 Device Volume Level Set to 100


Microphone Array Properties

Microphone Array 99

Microphone Boost 0.0 dB

Figure 3-2 Microphone Boost Turned Off



☐ Noise Cancellation

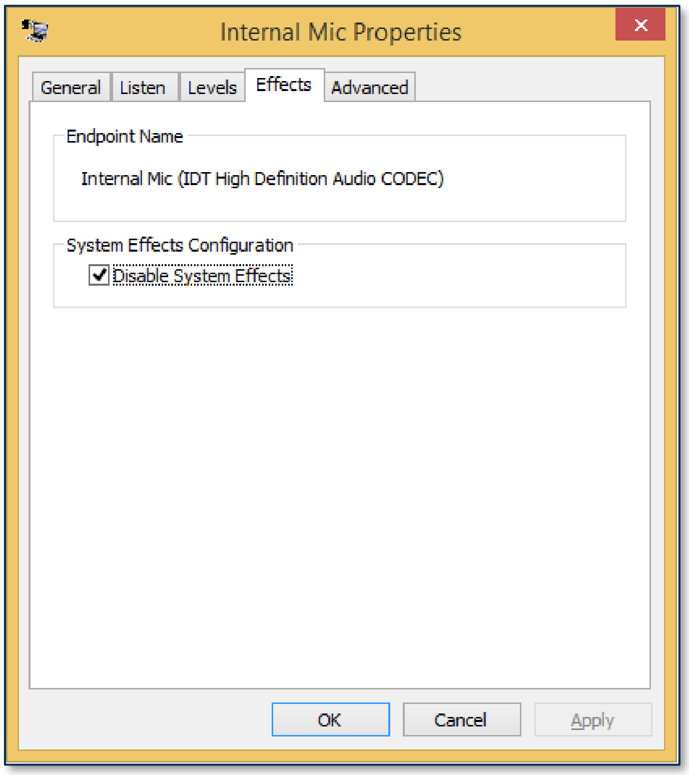
☐ Acoustic Echo Cancellation

☐ Enable Beam Forming

● Light Beam Forming

○ Aggressive Beam Forming

Figure 3-3 Enhancements Turned Off



Endpoint Name

Internal Mic (IDT High Definition Audio CODEC)

System Effects Configuration

☑ Disable System Effects

Figure 3-4 Effects Turned Off

3.2 How to Set Up Headset Interface on Windows Phone

To set up the headset interface on Windows Phone to communicate with the MagTek SCRA device, follow these steps:

1) Connect the device to the headset jack of the Windows Phone.
2) Adjust the audio output to the maximum level using the physical volume buttons of the Windows Phone.

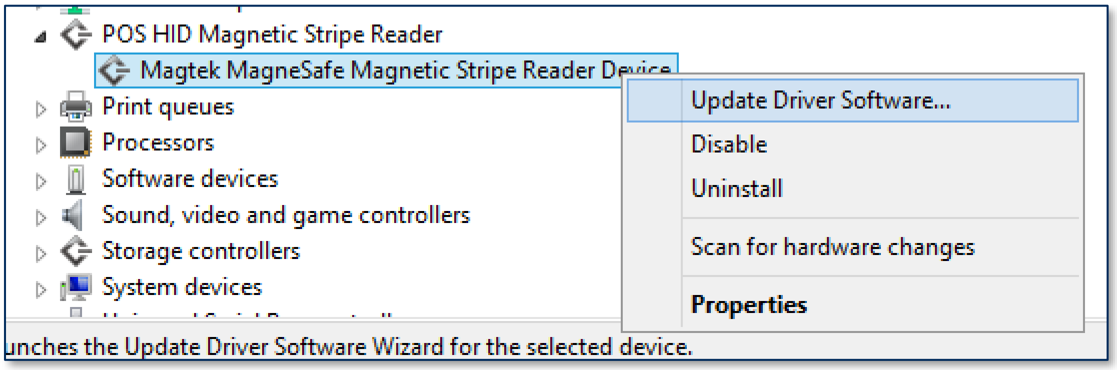
3.3 How to Set Up the MagTek SCRA SDK for .NET Projects

To add the MagTek SCRA libraries to a .NET project in Microsoft Visual Studio, follow these steps:

1) Create or open your .NET project in Visual Studio.
2) Copy the following DLL files from the **MTNETDemo** folders to the library folder of your software project:
   - `MTDevice.dll`
   - `MTLIB.dll`
   - `MTSCRANET.dll`
   - `MTService.dll`
3) In the Visual Studio Solution Explorer, right-click the project and select **Add Reference** to show the **Add Reference** window.
4) Select the **Browse** tab and press the **Browse…** button.
5) Navigate to your library folder, select **`MTSCRANET.dll`** and **`MTLIB.dll`**, then press the **Add** button.
6) In your custom software, create an instance of **`MTSCRA`**. For examples, see the source code included with the **MTNETDemo** project and/or **Appendix A** Code Examples.
7) Begin using the features provided by the MagTekSCRA library. Details about each method are provided in section **How to remove** POS HID Magnetic Stripe Reader

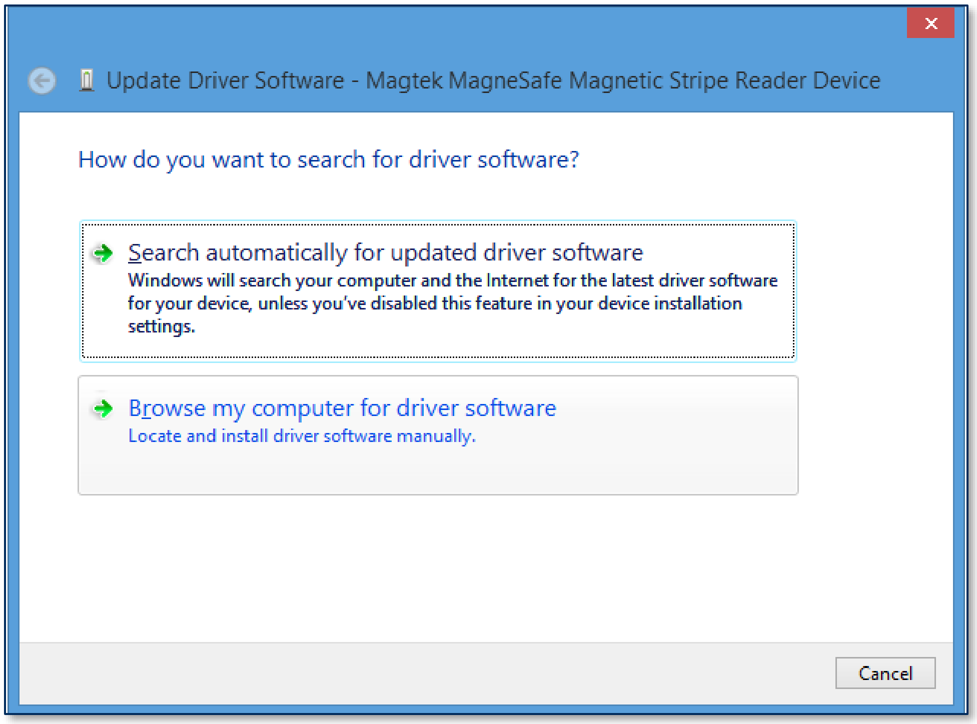
In order to use the MagTek USB card readers with PID 0011, follow these steps:

1. Open **Device Manager**.
2. Right Click on **MagTek MagneSafe Magnetic Stripe Reader Device**.
3. Select **Update Driver Software**.


POS HID Magnetic Stripe Reader
Magtek MagneSafe Magnetic Stripe Reader Device
Print queues
Processors
Software devices
Sound, video and game controllers
Storage controllers
System devices
Update Driver Software...
Disable
Uninstall
Scan for hardware changes
Properties

unches the Update Driver Software Wizard for the selected device.

4. Select **Browse My Computer for driver software**.

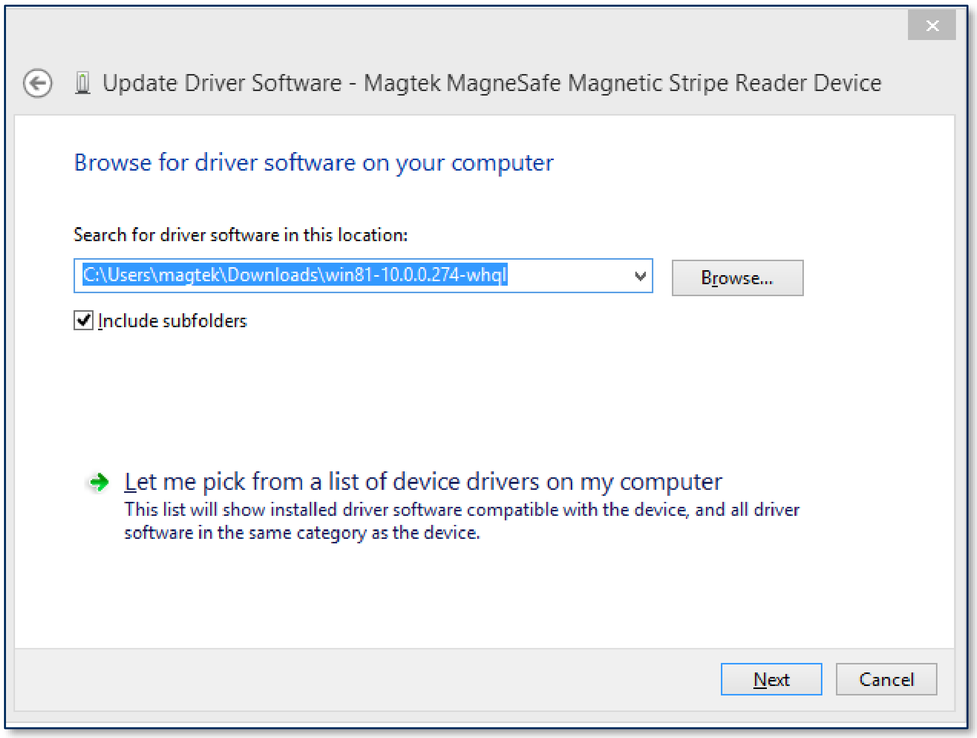

Update Driver Software - Magtek MagneSafe Magnetic Stripe Reader Device

How do you want to search for driver software?

Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.

Browse my computer for driver software
Locate and install driver software manually.

4. Select **Let me pick from a list of device drivers on my computer**.


Update Driver Software - Magtek MagneSafe Magnetic Stripe Reader Device

Browse for driver software on your computer

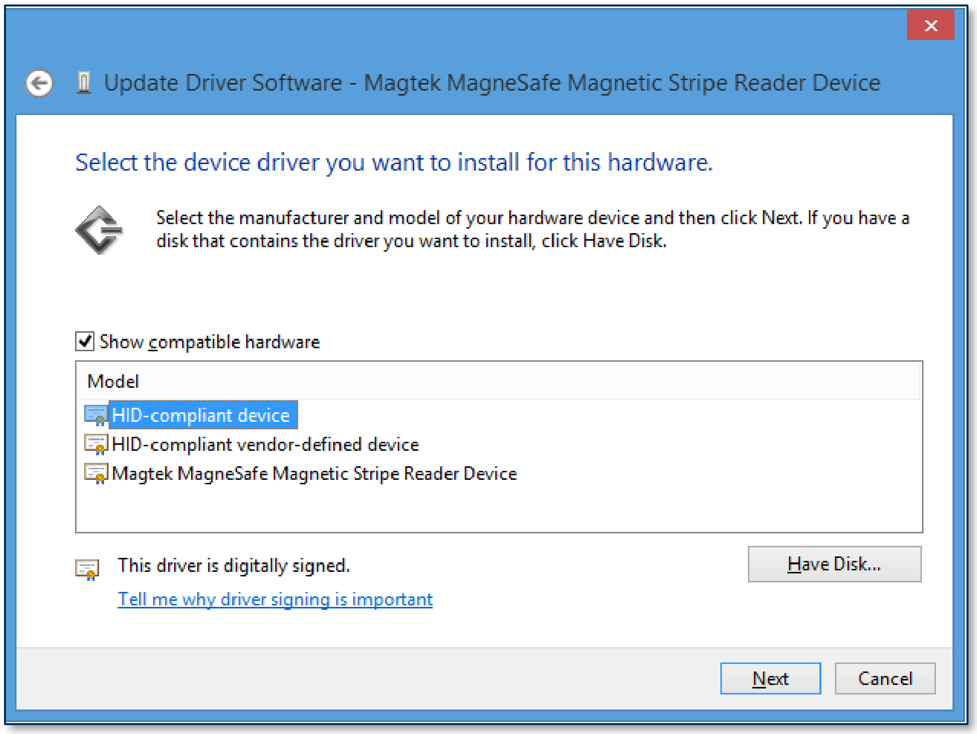
Search for driver software in this location:

C:\Users\magtek\Downloads\win81-10.0.0.274-whql

[✓] Include subfolders

Let me pick from a list of device drivers on my computer
This list will show installed driver software compatible with the device, and all driver software in the same category as the device.

5. Select **HID-Compliant Device** then click **Next**.


Update Driver Software - Magtek MagneSafe Magnetic Stripe Reader Device

Select the device driver you want to install for this hardware.

Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.

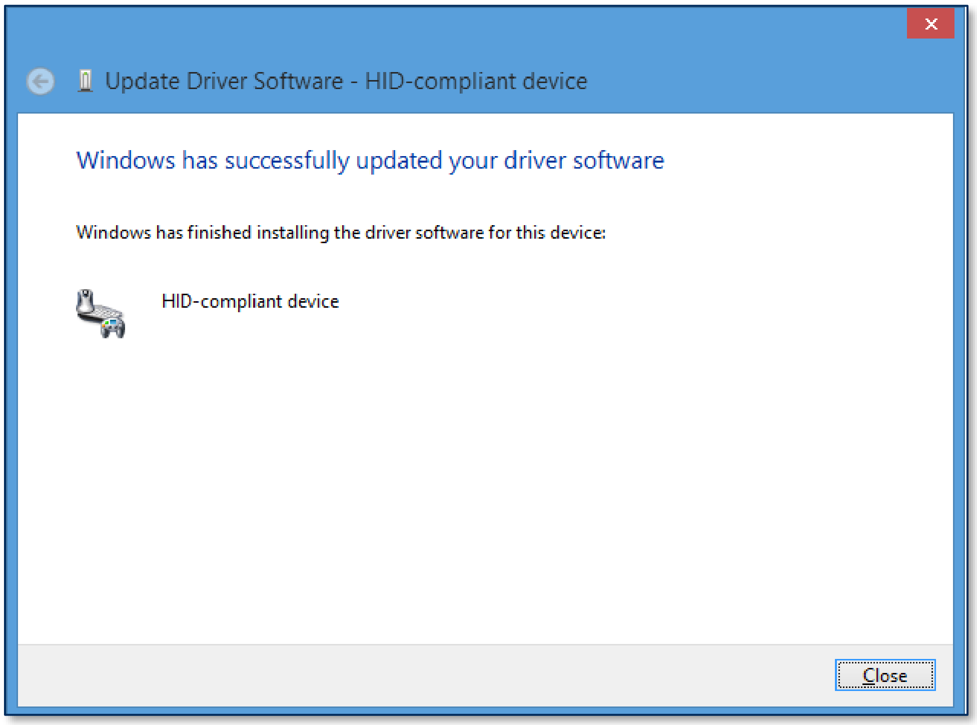
☑ Show compatible hardware

Model
HID-compliant device
HID-compliant vendor-defined device
Magtek MagneSafe Magnetic Stripe Reader Device

This driver is digitally signed.

Tell me why driver signing is important

6. Windows will pop up a message saying successfully updated your driver. Click **Close** to finish.


Update Driver Software - HID-compliant device

Windows has successfully updated your driver software

Windows has finished installing the driver software for this device:

HID-compliant device

8) MTSCRA Class Methods.

3.4 How to Set Up the MagTek SCRA SDK for Universal Windows Projects

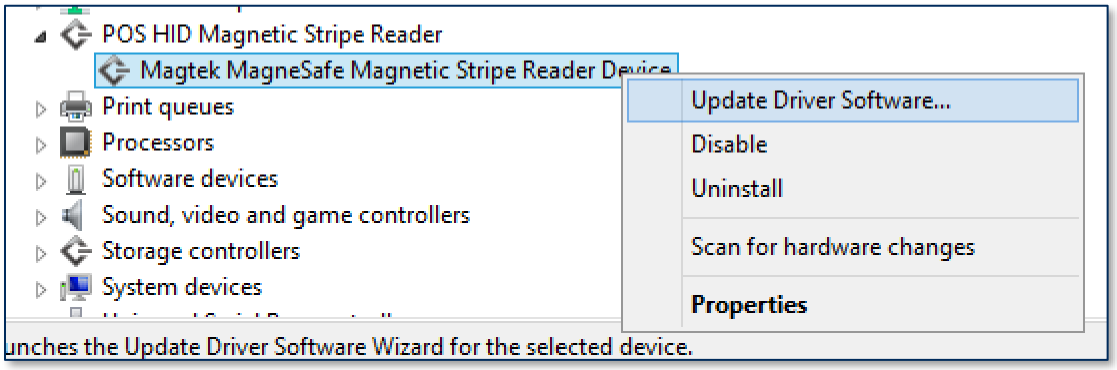
To add the MagTek SCRA libraries to a Universal Windows project in Microsoft Visual Studio, follow these steps:

1) Create or open your Universal Windows project in Visual Studio.
2) Copy the following DLL file from the SDK library folder to the library folder of your software project:
   - `MTSCRAUWP.dll`
3) In the Visual Studio Solution Explorer, right-click the project and select **Add Reference** to show the **Add Reference** window.
4) Select the **Browse** tab and press the **Browse…** button.
5) Navigate to your library folder, select **`MTSCRAUWP.dll`**, then press the **Add** button.
6) In your custom software, create an instance of **`MTSCRA`**. For examples, see the source code included with the **MTSCRAWindowsStoreApp** project and/or **Appendix A** Code Examples.
7) Begin using the features provided by the MagTekSCRA library. Details about each methods are provided in section **4 MTSCRA Class Methods**.

3.5 How to remove POS HID Magnetic Stripe Reader

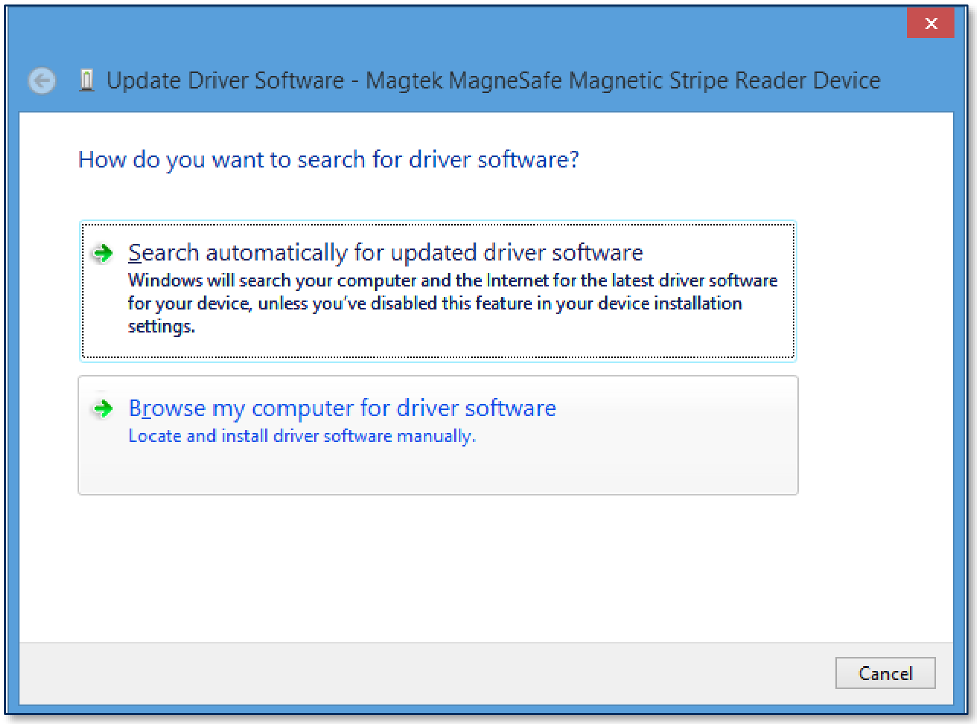
In order to use the MagTek USB card readers with PID 0011, follow these steps:

7. Open **Device Manager**.
8. Right Click on **MagTek MagneSafe Magnetic Stripe Reader Device**.
9. Select **Update Driver Software**.


POS HID Magnetic Stripe Reader
Magtek MagneSafe Magnetic Stripe Reader Device
Print queues
Processors
Software devices
Sound, video and game controllers
Storage controllers
System devices
Update Driver Software...
Disable
Uninstall
Scan for hardware changes
Properties

unches the Update Driver Software Wizard for the selected device.

4. Select **Browse My Computer for driver software**.



Update Driver Software - Magtek MagneSafe Magnetic Stripe Reader Device

How do you want to search for driver software?

Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.

Browse my computer for driver software
Locate and install driver software manually.

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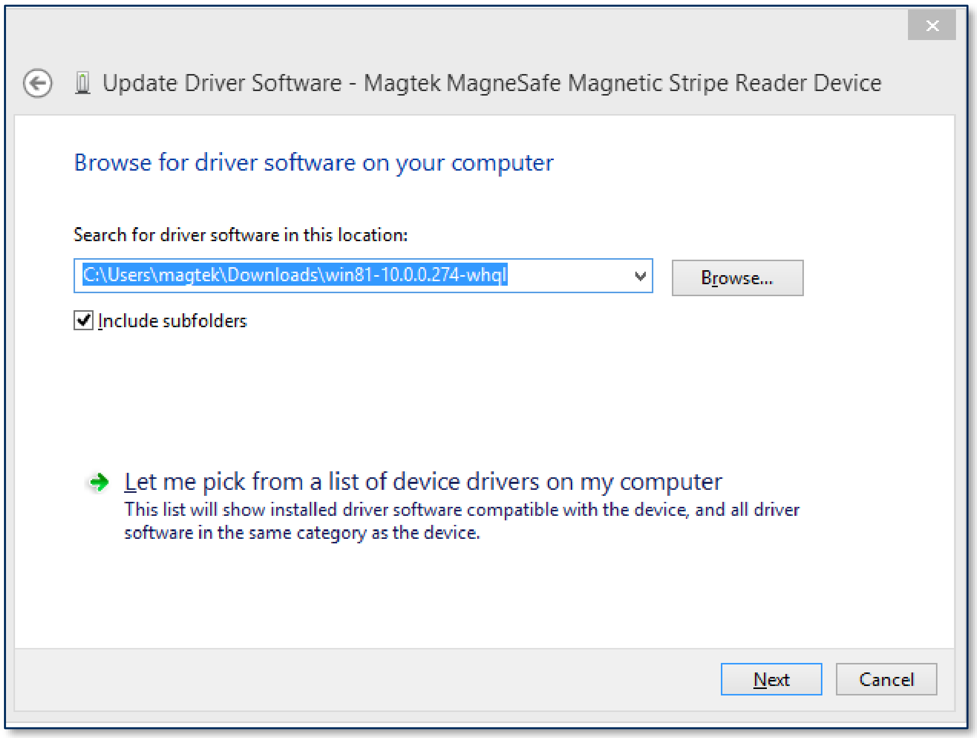


Update Driver Software - Magtek MagneSafe Magnetic Stripe Reader Device

Browse for driver software on your computer

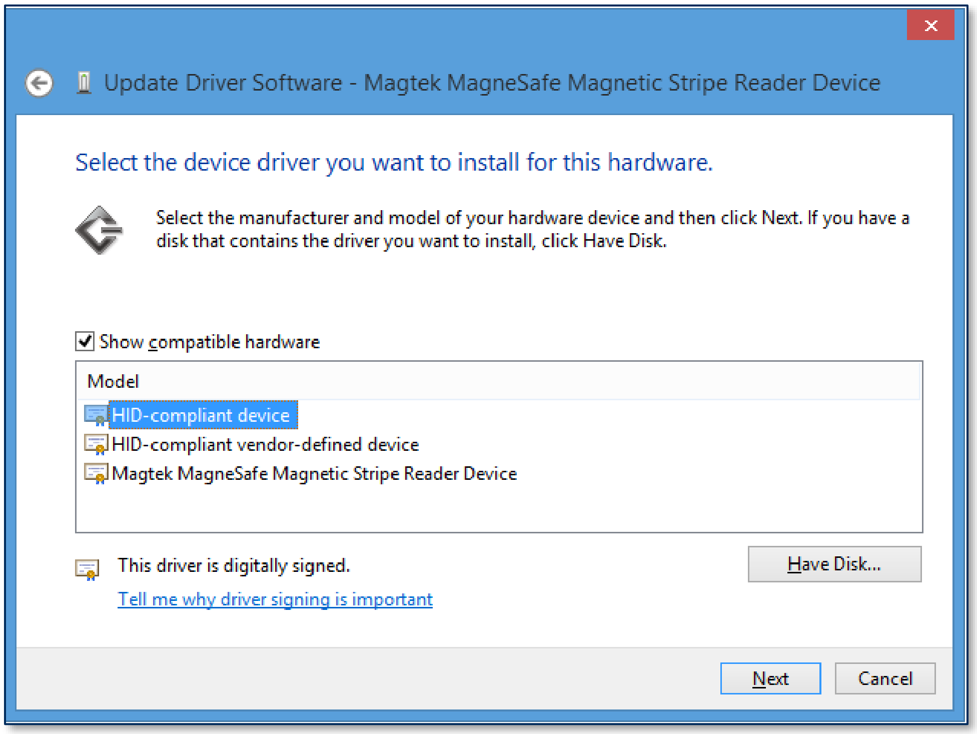
Search for driver software in this location:

C:\Users\magtek\Downloads\win81-10.0.0.274-whql

[✓] Include subfolders

Let me pick from a list of device drivers on my computer
This list will show installed driver software compatible with the device, and all driver software in the same category as the device.

11. Select **HID-Compliant Device** then click **Next**.



Update Driver Software - Magtek MagneSafe Magnetic Stripe Reader Device

Select the device driver you want to install for this hardware.

Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.

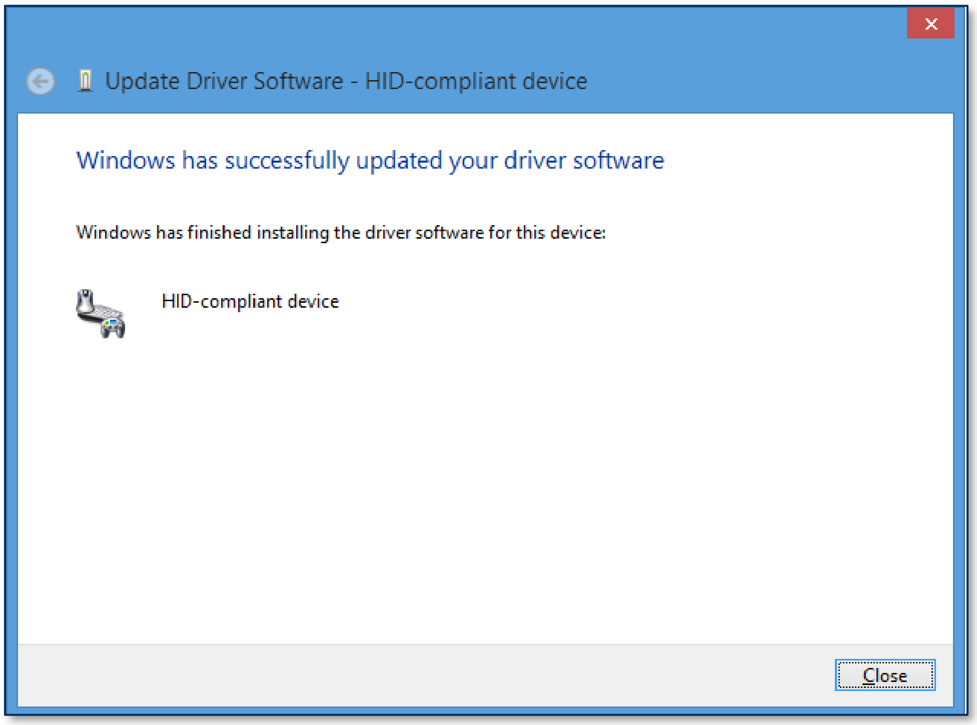
☑ Show compatible hardware

Model
HID-compliant device
HID-compliant vendor-defined device
Magtek MagneSafe Magnetic Stripe Reader Device

This driver is digitally signed.

Tell me why driver signing is important

12. Windows will pop up a message saying successfully updated your driver. Click **Close** to finish.



Update Driver Software - HID-compliant device

Windows has successfully updated your driver software

Windows has finished installing the driver software for this device:

HID-compliant device

4 MTSCRA Class Methods

After creating an instance of the MTSCRA class in your custom software project, use the methods described in this section to communicate with SCRA device.

4.1 requestDeviceList

This method initiates the discovery of devices that are visible to the host using the specified connection interface. The DeviceListReceived() event will provide information regarding the available devices once the discovery process is completed.

```
public void requestDeviceList(MTConnectionType connectionType)
```

Parameters:

Parameter	Description

connectionType	MTConnectionType value:
	`MTConnectionType.Audio,`
	`MTConnectionType.BLE,`
	`MTConnectionType.BLEEMV,`
	`MTConnectionType.Bluetooth,`
	`MTConnectionType.USB,`
	`MTConnectionType.Serial,`
	`MTConnectionType.Net,`
	`MTConnectionType.Net_TLS12,`
	`MTConnectionType.Net_TLS12_Trust_All`

Return Value: None

4.2 setConnectionType

This method sets the connection type of the device.

```
public void setConnectionType(MTConnectionType connectionType)
```

Parameters:

Parameter	Description

connectionType	MTConnectionType value:
	`MTConnectionType.Audio,`
	`MTConnectionType.BLE,`
	`MTConnectionType.BLEEMV,`
	`MTConnectionType.Bluetooth,`
	`MTConnectionType.USB,`
	`MTConnectionType.Serial,`
	`MTConnectionType.Net,`
	`MTConnectionType.Net_TLS12,`
	`MTConnectionType.Net_TLS12_Trust_All`

The following table shows the connection types supported by the various programming interfaces:

Connection Type / Programming Interface	Audio	Bluetooth LE	Bluetooth LE EMV	Bluetooth	USB	UART
.NET Framework	X	X	X		X	X
Universal Windows Platform					X	

The following table shows the connection types supported by the various SCRA devices:

Connection Type	SCRA Device
Audio	aDynamo uDynamo
Bluetooth LE	DynaMAX
Bluetooth LE EMV	eDynamo tDynamo
Bluetooth	BulleT
USB	BulletT DynaMag DynaMAX eDynamo mDynamo DynaWave tDynamo iDynamo 5 Gen III
Serial	DynaWave

Return Value: None

4.3 setAddress

This method sets the address of the device.

```
public void setAddress(string deviceAddress)
```

Parameters:

Parameter	Description
deviceAddress	String value of the address.

Return Value: None

4.4 setDeviceID

This method sets the device ID.

```
public void setDeviceID(string deviceID)
```

Parameters:

Parameter	Description
deviceID	String value of the device ID.

Return Value: None

4.5 openDevice

This method opens connection to the device. If you use the MagTek Universal Windows SDK and USB Card reader with PID 0011, please refer to section **2.5 How to remove POS HID Magnetic Stripe Reader.**

```
public void openDevice()
```

Parameters: None

Return Value: None

4.6 closeDevice

This method closes the connection to the device.

```
public void closeDevice()
```

Parameters: None

Return Value: None

4.7 isDeviceConnected

This method returns whether the device is connected or not.

```
public bool isDeviceConnected()
```

Parameters: None

Return Value:
Return true if the device is connected. Otherwise, return false.

4.8 isDeviceEMV

This method returns whether the device supports EMV or not.

```
public bool isDeviceEMV()
```

Parameters: None

Return Value:
Return true if EMV is supported by the device. Otherwise, return false.

4.9 isDeviceOEM

This method returns whether the device is an OEM device or not.

```
public bool isDeviceOEM()
```

Parameters: None

Return Value:
Return true if device is OEM. Otherwise, return false.

4.10 getMaskedTracks

Get stored masked tracks data. If decodable track data exists for a given track, it is located in the Masked Track Data field that corresponds to the track number. The length of each Masked Track Data field is fixed at 112 bytes, but the length of valid data in each field is determined by the Masked Track Data Length field that corresponds to the track number. Masked Track Data located in positions greater than indicated in the Masked Track Data Length field are undefined and should be ignored.

The Masked Track Data is decoded and converted to ASCII and then it is masked. The Masked Track Data includes all data starting with the start sentinel and ending with the end sentinel. Much of the data is masked; a specified mask character is sent instead of the actual character read from the track. Which characters are masked depends on the format of the card. Only ISO/ABA (Financial Cards with Format Code B) and AAMVA cards are selectively masked; all other card types are either entirely masked or sent totally in the clear. There is a separate masking property for ISO/ABA cards and AAMVA cards. See the ISO Track Masking property and the AAMVA Track Masking property for more information. See ***99875475*** for a description on how ISO/ABA and AAMVA cards are identified.

Each of these properties allows the application to specify masking details for the Primary Account Number and Driver's License / ID Number (DL/ID#), the masking character to be used, and whether a correction should be applied to make the Mod 10 9 (Luhn algorithm) digit at the end of the number be correct.

```
public string getMaskedTracks()
```

Parameters: None

Return Value:
Return stored masked tracks data string.

4.11 getTrack1

Get stored track1 data. This field contains the encrypted track data for track 1.

```
public string getTrack1()
```

Parameters: None

Return Value:
Return stored track1 data string.

4.12 getTrack2

Get stored track2 data. This field contains the encrypted track data for track 2.

```
public string getTrack2()
```

Parameters: None

Return Value:

Return stored track2 data string.

4.13 getTrack3

Get stored track3 data. This field contains the encrypted track data for track 3.

```
public string getTrack3 ()
```

Parameters: None

Return Value:
Return stored track3 data string.

4.14 getTrack1Masked

Get stored masked track1 data.

```
public string getTrack1Masked()
```

Parameters: None

Return Value:
Return stored masked track1 data string.

For an ISO/ABA card, the PAN is masked as follows:

- The specified number of initial characters is sent unmasked. The specified number of trailing characters is sent unmasked. If Mod 10 correction is specified, all but one of the intermediate characters of the PAN are set to zero; one of them will be set such that last digit of the PAN calculates an accurate Mod 10 check of the rest of the PAN as transmitted. If the Mod 10 correction is not specified, all of the intermediate characters of the PAN are set to the specified mask character.
- The Card Holder's name and the Expiration Date are transmitted unmasked.
- All Field Separators are sent unmasked.
- All other characters are set to the specified mask character.

For an AAMVA card, the specified mask character is substituted for each of the characters read from the card.

4.15 getTrack2Masked

Get stored masked track2 data.

```
public string getTrack2Masked()
```

Parameters: None

Return Value:
Return stored masked track2 data string.

For an ISO/ABA card, the PAN is masked as follows:

- The specified number of initial characters are sent unmasked. The specified number of trailing characters are sent unmasked. If Mod 10 correction is specified, all but one of the intermediate characters of the PAN are set to zero; one of them will be set such that last digit of the PAN calculates an accurate Mod 10 check of the rest of the PAN as transmitted. If the Mod 10 correction is not specified, all of the intermediate characters of the PAN are set to the specified mask character.

- The Expiration Date is transmitted unmasked.
- All Field Separators are sent unmasked.
- All other characters are set to the specified mask character.

For an AAMVA card, the DL/ID# is masked as follows:

- The specified number of initial characters are sent unmasked. The specified number of trailing characters are sent unmasked. If Mod 10 correction is specified, all but one of the intermediate characters of the DL/ID#PAN are set to zero; one of them will be set such that last digit of the DL/ID# calculates an accurate Mod 10 check of the rest of the DL/ID# as transmitted. If the Mod 10 correction is not specified, all of the intermediate characters of the DL/ID# are set to the specified mask character.
- The Expiration Date and Birth Date are transmitted unmasked.
- All other characters are set to the specified mask character.

4.16 getTrack3Masked

Get stored masked track3 data.

```
public string getTrack3Masked()
```

Parameters: None

Return Value:
Return stored masked track3 data string.

For an ISO/ABA card, the PAN is masked as follows:

- The specified number of initial characters are sent unmasked. The specified number of trailing characters are sent unmasked. If Mod 10 correction is specified, all but one of the intermediate characters of the PAN are set to zero; one of them will be set such that last digit of the PAN calculates an accurate Mod 10 check of the rest of the PAN as transmitted. If the Mod 10 correction is not specified, all of the intermediate characters of the PAN are set to the specified mask character.
- All Field Separators are sent unmasked.
- All other characters are set to the specified mask character.

For an AAMVA card, the specified mask character is substituted for each of the characters read from the card.

4.17 getMagnePrint

Supported on uDynamo only. This 128-byte Binary field contains the MagnePrint data. Only the number of bytes specified in the MagnePrint data length field are valid. The least significant bit of the first byte of data in this field corresponds to the first bit of MagnePrint data. If the Enable/Disable MagnePrint property is set to disable MagnePrint, this field will not be sent.

```
public string getMagnePrint()
```

Parameters: None

Return Value:
Return the MagnePrint data.

4.18 getMagnePrintStatus

Supported on uDynamo only.

```
public string getMagnePrintStatus()
```

Parameters: None

Return Value:
Returns the MagnePrint status.

This Binary field represents 32 bits of MagnePrint status information. Each character represents 4 bits (hexadecimal notation). For example, suppose the characters are: “A1050000”:

Nibble	1				2				3				4				5				6				7				8			
Value	A				1				0				5				0				0				0				0			
Bit	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9	8	23	22	21	20	19	18	17	16	31	30	29	28	27	26	25	24
Value	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Usage*	R	R	R	R	R	R	R	M	R	R	R	R	R	R	R	R	0	0	D	0	F	L	N	S	0	0	0	0	0	0	0	0

Usage Legend:

- D = Direction
- F = Too Fast
- L = Too Slow
- M = MagnePrint capable
- N = Too Noisy
- R =Revision

This four-byte field contains the MagnePrint status. The MagnePrint status is in little endian byte order. Byte 1 is the least significant byte. Byte 1 LSB is status bit 0. Byte 4 MSB is status bit 31. MagnePrint status is defined as follows:

- Bit 0 = MagnePrint-capable product (usage M)
- Bits 1-15 = Product revision & mode (usage R)
- Bit 16 = STATUS-only state (usage S)
- Bit 17 = Noise too high or “move me” away from the noise source (used only in STATUS) (usage N)
- Bit 18 = Swipe too slow (usage L)
- Bit 19 = Swipe too fast (usage F)
- Bit 20 = Unassigned (always set to Zero)
- Bit 21 = Actual Card Swipe Direction (0 = Forward, 1 = Reverse) (usage D)
- Bits 22-31 = Unassigned (always set to Zero)

If the Enable/Disable MagnePrint property is set to disable MagnePrint, this field will not be sent.

4.19 getDeviceSerial

Get stored device serial number. This 16-byte ASCII field contains the device serial number. The device serial number is a NUL (zero) terminated string. So the maximum length of the device serial number, not including the null terminator, is 15 bytes. The device's serial number can also be retrieved and set with the device serial number property explained in the property section of this document. This field is stored in non-volatile memory, so it will persist when the unit is power cycled.

```
public string getDeviceSerial()
```

Parameters: None

Return Value:
Return stored device serial number.

4.20 getSessionID

Not suported on Audio Reader. This 8-byte Binary field contains the encrypted version of the current Session ID. Its primary purpose is to prevent replays. After a card is read, this property will be encrypted, along with the card data, and supplied as part of the transaction message. The clear text version of this will never be transmitted. To avoid replay, the application sets the Session ID property before a transaction and verifies that the Encrypted Session ID returned with card data decrypts to the value set.

```
public string getSessionID()
```

Parameters: None

Return Value:
Return the Session ID

4.21 getKSN

Get stored key serial number. This 10-byte Binary field contains the DUKPT Key Serial Number used to encrypt the encrypted fields in this message. This 80-bit field includes the Initial Key Serial Number in the leftmost 59 bits and a value for the Encryption Counter in the rightmost 21 bits. If no keys are loaded, all bytes will have the value 0x00.

```
public string getKSN()
```

Parameters: None

Return Value:
Return stored key serial number.

4.22 getDeviceName

Get device model name.

```
public string getDeviceName()
```

Parameters: None

Return Value:
Return device model name.

4.23 clearBuffers
Clears buffered data retrieved from the reader.

```
public void clearBuffers()
```

Parameters: None

Return Value: None

4.24 getBatteryLevel
Retrieves battery level.

```
public long getBatteryLevel()
```

Parameters: None

Return Value:
Battery Level (0 to 100)

4.25 getSwipeCount
Retrieves swipe count.

```
public long getSwipeCount()
```

Parameters: None

Return Value:
Long value representing swipe count. If the value is less than zero, it indicates the device does not support tracking of the number of card swipes.

4.26 getCapMagnePrint
Retrieves MagnePrint Capabilities.

```
public string getCapMagnePrint()
```

Parameters: None

Return Value:
String representing MagnePrint capabilities:
0 = No MagnePrint,
1 = Short MagnePrint,
2 = Long MagnePrint

4.27 getCapMagnePrintEncryption
Retrieves MagnePrint Encryption Capabilities.

```
public string getCapMagnePrintEncryption()
```

Parameters: None

Return Value:
String representing MagnePrint Encryption capabilities:
0 = No Encryption,
1 = Same as MagStripe (8122),
other values TBD.
If absent, the default value is 1.

4.28 getCapMagneSafe20Encryption

Retrieves MagneSafe 2.0 Encryption Capabilities.

```
public string getCapMagneSafe20Encryption ()
```

Parameters: None

Return Value:
String representing MagneSafe 2.0 Encryption Capabilities. 0 = Not supported, other values TBD.

4.29 getCapMagStripeEncryption

Retrieves MagneStripe Encryption Capabilities.

```
public string getCapMagStripeEncryption()
```

Parameters: None

Return Value:
String representing MagStripe Encryption Capabilities. 0 = No Encryption, 1 = TDES DUKPT / PIN Variant, other values TBD

4.30 getCapMSR

Retrieves MSR Capabilities.

```
public string getCapMSR()
```

Parameters: None

Return Value:
String representing MSR Capabilities. 0 = No MSR, 1 = MSR.

4.31 getCapTracks

Retrieves Track Capabilities.

```
public string getCapTracks()
```

Parameters: None

Return Value:

String representing Track Capabilities:

- Bit 0 = 1 / Track 1 supported,
- Bit 1 = 1 / Track 2 supported,
- Bit 2 = 1 / Track 3 supported,
- All other bits = 0.

4.32 getCardDataCRC

Retrieves CRC from card data.

```
public long getCardDataCRC()
```

Parameters: None

Return Value:
Card data CRC

4.33 getCardExpDate

Retrieves CRC from card data.

```
public string getCardExpDate ()
```

Parameters: None

Return Value:
String representing card expiration date.

4.34 getCardIIN

Retrieves Issuer Identification Number (IIN) from card data.

```
public string getCardIIN()
```

Parameters: None

Return Value: String representing card IIN.

4.35 getCardLast4

Retrieves Last 4 digits of card number from card data.

```
public string getCardLast4()
```

Parameters: None

Return Value:
String representing card last 4 digits.

4.36 getCardName

Retrieves card name from card data.

```
public string getCardName()
```

Parameters: None

Return Value:
String representing card name.

4.37 getCardPAN
Retrieves PAN from card data.

```
public string getCardPAN()
```

Parameters: None

Return Value: String representing card PAN.

4.38 getCardPANLength
Retrieves PAN length from card data.

```
public int getCardPANLength()
```

Parameters: None

Return Value: PAN length.

4.39 getCardServiceCode
Retrieves Service Code.

```
public string getCardServiceCode()
```

Parameters: None

Return Value: String representing service code.

4.40 getCardStatus
Retrieves the card status.

```
public string getCardStatus()
```

Parameters: None

Return Value:
String representing the card status.

Card Status
This is a string value which indicates the card status. The following table defines the possible values.

Value	Description
00	The card was swiped in the withdrawal direction.

Value	Description
01	The card was swiped in the insertion direction.

4.41 getCardEncodeType

Retrieves the card encode type.

```
public string getCardEncodeType()
```

Parameters: None

Return Value:
String representing the card encode type.

Card Encode Type
This is a string value which indicates the type of encoding that was found on the card. The following table defines the possible values.

Value	Encode Type	Description
00	ISO/ABA	ISO/ABA encode format. At least one track in ISO/ABA format, Track 3 not AAMVA format.
01	AAMVA	AAMVA encode Track 3 is AAMVA format. Tracks 1 and 2 are ISO/ABA if correctly decoded.
02	Reserved	
03	Blank	The card is blank. Only occurs if all tracks decode without error and without data.
04	Other	The card has a non-standard encode format. For example, ISO/ABA track 1 format on track 2.
05	Undetermined	The card encode type could not be determined because no tracks could be decoded. (Combination of Error tracks and Blank Tracks, at least one Error track).
06	None	No decode has occurred. This type occurs if no magnetic stripe data has been acquired since the data has been cleared or since the reader was powered on. This reader only sends an Input report when a card has been swiped so this value will never occur.

4.42 getDataFieldCount

Retrieves data field count.

```
public int getDataFieldCount()
```

Parameters: None

Return Value:
Data field count

4.43 getHashCode

Retrieves SHA-x hash code.

```
public string getHashCode()
```

Parameters: None

Return Value:
String representing SHA-x hash code.

4.44 getDeviceConfig

Retrieves device configuration.

```
public string getDeviceConfig(string configType)
```

Parameters:
configType can be one of:

- 8180: Send TLV Version on Power Up
- 8181: Send Discovery on Power Up
- 8280: Send Card name
- 8281: Send Card IIN
- 8282: Send Card Last 4 Digits of PAN
- 8283: Send Card Expiration
- 8284: Send Card Service Code
- 8285: Send Card PAN Length

Return Value:
String representing device configuration.

4.45 getEncryptionStatus

Retrieves encryption status. This two-byte Binary field contains the Encryption Status. The Reader Encryption Status is sent in big endian byte order. Byte 1 is the least significant byte. Byte 1 LSB is status bit 0. Byte 2 MSB is status bit 15.

```
public string getEncryptionStatus()
```

Parameters: None

Return Value:
String representing decryption status as a 2-byte binary field.

- Bit 0 = DUKPT Keys exhausted (1=exhausted, 0=keys available)
- Bit 1 = Initial DUKPT key Injected, always set to One (Primary DUKPT Key)
- Bit 2 = Encryption Enabled, always set to One
- Bit 3 = Reserved (always set to zero)
- Bit 4 = Reserved (always set to zero)
- Bit 5 = Reserved (always set to zero)

- Bit 6 = Reserved (always set to zero)
- Bit 7 = Reserved (always set to zero)
- Bit 8 = Reserved (always set to zero)
- Bit 9 = Initial DUKPT key injected (Secondary DUKPT Key)
- Bit 10 = DUKPT Key used for encryption, 0=Primary, 1=Secondary
- Bit 11 = DUKPT Key Variant used to encrypt data, 0=PIN Variant, 1=Data Variant/Bidirectional
- Bits 12–15 = Unassigned (always set to Zero)

4.46 getFirmware

Retrieves firmware version.

```
public string getFirmware()
```

Parameters: None

Return Value:
String representing firmware version.

4.47 getMagTekDeviceSerial

Retrieves MagTek device serial number.

```
public string getMagTekDeviceSerial()
```

Parameters: None

Return Value:
String representing MagTek device serial number.

4.48 getResponseData

Retrieves response data.

```
public string getResponseData()
```

Parameters: None

Return Value:
String representing response data.

4.49 getResponseType

Retrieves response type.

```
public string getResponseType()
```

Parameters: None

Return Value:
String representing response type. For Audio Reader, always “C101”.

4.50 getTagValue

Retrieves the value of the specified tag.

```
public string getTagValue(string tag, string data)
```

Parameters: None

tag

Tag to search for

data

Data to search from

Return Value: String representing tag value.

4.51 getTLVVersion

Retrieves TLV version.

```
public string getTLVVersion()
```

Parameters: None

Return Value:
String representing TLV version as a two-byte hex string.

4.52 getTrackDecodeStatus

Retrieves track decode status. This is a one-byte value, which indicates the status of decoding track 1. Bit position zero indicates if there was an error decoding track 1 if the bit is set to one. If it is zero, then no error occurred. If a track has data on it that is not noise, and it is not decodable, then a decode error is indicated. If a decode error is indicated, the corresponding track data length value for the track that has the error will be set to zero and no valid track data will be supplied.

```
public string getTrackDecodeStatus()
```

Parameters: None

Return Value:
Track Decode Status. Consists of three 2-byte hex values representing the decode status for tracks 1, 2, and 3 (respectively from left to right). Values are:

- 00 = Track OK
- 01 = Track read Error
- 02 = Track is Blank

4.53 getSDKVersion

Retrieves SDK version.

```
public string getSDKVersion()
```

Parameters: None

Return Value:
The version information of the SDK.

4.54 sendCommandToDevice

Send command to device.

```
public int sendCommandToDevice(string command)
```

Parameters:

Parameter	Description
command	Command string to send to the device.

Return Value:

- 0 = Success
- 9 = Error
- 15 = Busy

4.55 startTransaction (EMV Device Only)

This function starts an EMV L2 transaction for smart card.

```
public int startTransaction(
byte timeLimit,
byte cardType,
byte option,
byte[] amount,
byte transactionType,
byte[] cashBack,
byte[] currentCode,
byte reportingOption)
```

Parameters:

Parameter	Description
timeLimit	Specifies the maximum time, in seconds, allowed to complete the total transaction. This includes time for the user to insert the card, choose a language, choose an application, and online processing. If this time is exceeded, the transaction will be aborted, and an appropriate Transaction Status will be available. Value 0 is not allowed.
cardType	Card Type to Read: 0x01 = Magnetic Stripe (as alternative to EMV L2, card swipe causes abort of EMV L2) 0x02 = Contact chip card 0x03 = Magnetic Stripe and Contact chip Card. 0x04 = Contactless chip card 0x05 = Magnetic Stripe and Contactless chip card. 0x06 = Contact chip card and Contactless chip card. 0x07 = Magnetic Stripe, Contact chip card, Contactless chip card. Refer to **Supported Device Features** for supported devices.

Parameter	Description
option	0x00 = Normal 0x01 = Bypass PIN 0x02 = Force Online 0x04 = Acquirer not available (Note: prevents long timeout on waiting for host approval) (causes "decline" to be generated internally if ARQC is generated) To use Quick Chip mode, set the most significant bit to '1'. 0x80 = Quick Chip, Normal 0x81 = Quick Chip, Bypass PIN 0x82 = Quick Chip, Force Online Refer to **Supported Device Features** for supported devices.
amount	Amount Authorized (EMV Tag 9F02, format n12, 6 bytes) in hex string. For example: "000000000999", means 9.99 dollars.
transactionType	Valid values: 0x00 = Purchase (listed as "Payment" on ICS) 0x01 = Cash Advance (not supported for this reader) 0x02 or 0x09 = Cash back (0x09 only supported when using contactless) 0x04 = Goods (Purchase) 0x08 = Services (Purchase) 0x10 = International Goods (Purchase) 0x20 = Refund 0x40 = International Cash Advance or Cash Back 0x80 = Domestic Cash Advance or Cash Back
cashBack	Cash back Amount (if non-zero, EMV Tag 9F03, format n12, 6 bytes) in hex string. For example: "000000001000", means 10.00 dollars.
currencyCode	Transaction Currency Code (EMV Tag 5F2A, format n4, 2 bytes) Sample Valid values: 0x0840 – US Dollar 0x0978 – Euro 0x0826 – UK Pound
reportingOption	This single byte field indicates the level of Transaction Status notifications the host desires to receive during the course of this transaction. 0x00 = Termination Status only (normal termination, card error, timeout, host cancel) 0x01 = Major Status changes (terminations plus card insertions and waiting on user) 0x02 = All Status changes (documents the entire transaction flow)

Return Value:

- 0 = Success
- 9 = Error
- 15 = Busy

4.56 setUserSelectionResult (EMV Device Only)

This function sets the user selection result. It should be called after receiving the OnUserSelectRequest event which is triggered after the user makes a selection.

```
public int setUserSelectionResult(byte status, byte selection)
```

Parameters:

Parameter	Description
Status	Indicates the status of User Selection: 0x00 – User Selection Request completed, see Selection Result 0x01 – User Selection Request aborted, cancelled by user 0x02 – User Selection Request aborted, timeout
selection	Indicates the menu item selected by the user. This is a single byte zero based binary value.

Return Value:

- 0 = Success
- 9 = Error
- 15 = Busy

4.57 setAcquirerResponse (EMV Device Only)

This function sends to the device the transaction decision from acquirer.

```
public int setAcquirerResponse(byte[] response)
```

Parameters:

Parameter	Description
response	The first two bytes (most significant byte first) indicate the total length of the following byte array. The byte array contains the ARQC Response message. See Appendix C for ARQC Response Message Format.

Return Value:

- 0 = Success
- 9 = Error
- 15 = Busy

4.58 cancelTransaction (EMV Device Only)

This function cancels a transaction while waiting for the user to insert a card.

```
public int cancelTransaction ()
```

Parameters: None

Return Value:

- 0 = Success
- 9 = Error
- 15 = Busy

4.59 sendExtendedCommand (EMV Device Only)

Send extended command to device.

```
public int sendExtendedCommand(string command)
```

Parameters:

Parameter	Description
command	Hexadecimal string of the byte array for the extended command. The first two bytes represent the value of the extended command. The next two bytes (most significant byte first) indicate the total length of the following data in bytes.

Return Value:

- 0 = Success
- 9 = Error
- 15 = Busy

4.60 getDeviceFeatures()

Retrieves features for the device.

```
public MTDeviceFeatures getDeviceFeatures()
```

Parameters: None

Return Value:

```
public class MTDeviceFeatures
     {
          bool MSR;
          bool Contact;
          bool Contactless;
          bool PINPad;
          bool MSRPowerSaver;
          bool BatteryBackedClock;
          bool SRED;
          bool SignatureCapture;
          bool ManualEntry;
     }
```

4.61 getPowerManagementValue()

Retrieves power management value for the device.

```
public String getPowerManagementValue()
```

Parameters: None

Return Value: Returns the PM value associated with the device.

Parameter	Power Management
BulleT KB BulleT SPP	PM1
cDynamo	
Dynamag, Dynamag Duo, USB Enc IntelliHead V5	
Dynasty	PM3
DynaMAX	PM2
DynaPAD	
DynaWave	
eDynamo	PM3
Flash	PM1
iDynamo	
iDynamo 5	
IDynamo 5 Gen III	
Home Banking (Dynamo LCD)	
kDynamo	PM5
mDynamo	
P-series and I-65 w/V5	
pDynamo	PM6
sDynamo	
SPI Encrypting IntelliHead V5	
tDynamo	PM5
UART Enc IntelliHead V5	
uDynamo	PM4
U-Finity	PM1

5 MTSCRA Events

5.1 OnDeviceList

This event occurs when device information is available.

```
public event DeviceListHandler OnDeviceList

public delegate void DeviceListHandler(object sender,
MTConnectionType connectionType, List<MTDeviceInformation> deviceList)
```

Parameter	Description
Sender	Object representing the publisher of the event

connectionType	MTConnectionType value:
	`MTConnectionType.Audio,`
	`MTConnectionType.USB`

deviceList	A list of MTDeviceInformation objects

5.2 OnDeviceConnectionStateChanged

This event occurs when the connection state of the device is changed.

```
public event DeviceConnectionStateHandler
OnDeviceConnectionStateChanged

public delegate void DeviceConnectionStateHandler(object sender,
MTConnectionState state)
```

Parameter	Description
sender	Object representing the publisher of the event

state	MTDeviceState value indicating the state of the device:
	`Disconnected`
	`Connecting`
	`Error`
	`Connected`
	`Disconneting`

5.3 OnCardDataState

This event occurs when the state of the card information is changed.

```
public event CardDataStateHandler OnCardDataState

public delegate void CardDataStateHandler(object sender,
MTCardDataState state)
```

Parameter	Description
sender	Object representing the publisher of the event

state	MTCardDataState value indicating the state of the card data:
	`DataNotReady`
	`DataReady`
	`DataError`

5.4 OnDataReceived

This event occurs when card information is received from the device.

```
public event DataReceivedHandler OnDataReceived

public delegate void DataReceivedHandler(object sender, IMTCardData
cardData)
```

Parameter	Description
sender	Object representing the publisher of the event
cardData	IMTCardData object containing the card information received

5.5 OnDeviceResponse

This event occurs when a response is received from the device.

```
public event DeviceResponseHandler OnDeviceResponse

public delegate void DeviceResponseHandler(object sender, string data)
```

Parameter	Description
sender	Object representing the publisher of the event
data	String representing data received

5.6 OnTransactionStatus (EMV Device Only)

This message occurs when transaction status update is received from the EMV device.

Parameter	Description
sender	Object representing the publisher of the event
data	Byte array containing the data received from the device. See table below for descriptions of the data.

0	Event	Indicates the event that triggered this notification: • 0x00 = No events since start of transaction • 0x01 = Card Inserted (Contact Only) • 0x02 = Payment method communication or data error • 0x03 = Transaction Progress Change • 0x04 = Waiting for User Response • 0x05 = Timed Out • 0x06 = End of Transaction • 0x07 = Host Cancelled Transaction • 0x08 = Card Removed (Contact Only)
1	Current Transaction Time remaining	Indicates the remaining time available, in seconds, for the transaction to complete. If the transaction does not complete within this time, it will be aborted.

2	Current Transaction Progress Indicator	This one-byte field indicates the current processing stage for the transaction: • 0x00 = No transaction in progress • 0x01 = Waiting for cardholder to present payment • 0x02 = Powering up the card • 0x03 = Selecting the application • 0x04 = Waiting for user language selection (Contact Only) • 0x05 = Waiting for user application selection (Contact Only) • 0x06 = Initiating application (Contact Only) • 0x07 = Reading application data (Contact Only) • 0x08 = Offline data authentication (Contact Only) • 0x09 = Process restrictions (Contact Only) • 0x0A = Cardholder verification (Contact Only) • 0x0B = Terminal risk management (Contact Only) • 0x0C = Terminal action analysis (Contact Only) • 0x0D = Generating first application cryptogram (Contact Only) • 0x0E = Card action analysis (Contact Only) • 0x0F = Online processing • 0x10 = Waiting online processing response • 0x11 = Transaction Complete • 0x12 = Transaction Error • 0x13 = Transaction Approved • 0x14 = Transaction Declined • 0x15 = Transaction Cancelled by MSR Swipe (MSR Only) • 0x16 = EMV error - Conditions Not Satisfied (Contact Only) • 0x17 = EMV error - Card Blocked (Contact Only) • 0x18 = Application selection failed (Contact Only) • 0x19 = EMV error - Card Not Accepted (Contact Only) • 0x1A = Empty Candidate List • 0x1B = Application Blocked
3-4	Final Status	TBD

5.7 OnDisplayMessageRequest (EMV Device Only)

This message occurs when the EMV device has a display message to present to the user.

Parameter	Description
sender	Object representing the publisher of the event
data	Byte array containing the display message. If the length is zero, the request to clear the display.

5.8 OnUserSelectionRequest (EMV Device Only)

This message occurs when the EMV device has a user selection message to present to the user.

Parameter	Description
sender	Object representing the publisher of the event
data	Byte array containing the data received from the device. See table below for descriptions of the data.

0	Selection Type	This field specifies what kind of selection request this is: • 0x00 – Application Selection • 0x01 – Language Selection
1	Timeout	Specifies the maximum time, in seconds, allowed to complete the selection process. If this time is exceeded, the host should send the User Selection Result command with transaction will be aborted and an appropriate Transaction Status will be available. Value 0 is not allowed.
2	Menu Items	This field is variable length and is a collection of "C" style zero terminated strings (maximum 17 strings). The maximum length of each string is 20 characters, not including a Line Feed (0x0A) character that may be in the string. The last string may not have the Line Feed character. The first string is a title and should not be considered for selection. It is expected that the receiver of the notification will display the menu items and return (in the User Selection Result request) the number of the item the user selects. The minimum value of the Selection Result should be 1 (the first item, #0, was a title line only). The maximum value of the Selection Result is based on the number of items displayed.

5.9 OnARQCReceived (EMV Device Only)

This message occurs when ARQC is received from the EMV device.

Parameter	Description
sender	Object representing the publisher of the event
data	Byte array containing the data received from the device. See table below for descriptions of the data.

0	Message Length	Two-byte binary, most significant byte first. This gives the total length of the ARQC message that follows.
2	ARQC Message	Byte array containing the ARQC Message. See Appendix B for ARQC Message Format.

5.10 OnTransactionResult (EMV Device Only)

This message occurs when transaction result is received from the EMV device.

Parameter	Description
sender	Object representing the publisher of the event
data	Byte array containing the data received from the device. See table below for descriptions of the data.

0	Signature Required	This field indicates whether a card holder signature is required to complete the transaction: • 0x00 – No signature required • 0x01 – Signature required If a signature is required, it is expected that the host will acquire the signature from the card holder as part of the transaction data.
1	Batch Data Length	Two-byte binary, most significant byte first. This gives the total length of the ARQC message that follows.
3	Batch Data	Byte array containing the Batch Data. See Appendix D for Batch Data Format.

5.11 OnEMVCommandResult (EMV Device Only)

This message occurs when an EMV command result is received from the EMV device.

Parameter	Description
sender	Object representing the publisher of the event
data	Byte array containing the result code received from the device. See table below for descriptions of the result code.

Result Code Description
• 0x0000 = Success, the transaction process has been started • 0x0381 = Failure, DUKPT scheme is not loaded • 0x0382 = Failure, DUKPT scheme is loaded but all of its keys have been used • 0x0383 = Failure, DUKPT scheme is not loaded (Security Level not 3 or 4) • 0x0384 = Invalid Total Transaction Time field • 0x0385 = Invalid Card Type field • 0x0386 = Invalid Options field • 0x0387 = Invalid Amount Authorized field • 0x0388 = Invalid Transaction Type field • 0x0389 = Invalid Cash Back field • 0x038A = Invalid Transaction Currency Code field • 0x038B = Invalid Selection Status • 0x038C = Invalid Selection Result • 0x038D = Failure, no transaction currently in progress • 0x038E = Invalid Reporting Option • 0x038F = Failure, transaction in progress, card already inserted • 0x0390 = Device Has No Keys • 0x0391 = Invalid Device Serial Number • 0x0396 = Invalid System Date and Time

5.12 OnDeviceExtendedResponse (EMV Device Only)

This message occurs when an extended response is received from the device.

Parameter	Description
Obj	Hexadecimal string containing the extended response data received from the device. The first two bytes represent the result codes for the extended command. The next two bytes (most significant byte first) indicate the total length of the following data in bytes.

6 Commands

Custom software can use the sendCommandToDevice method to send direct commands to the devices. This section provides information about commonly used commands.

6.1 Discovery

To send a Discovery command to device, use:

```
public void sendCommandToDevice(string command)
```

Parameters: Use “C10206C20503840900” as command string for audio readers.

Return Value:
The following device information will be retrieved.
Device SN, internal: Device serial number created by chip manufacturer. Use `getDeviceSerial` method to retrieve data.

Device SN, MagTek: Device serial number created by MagTek. Use `getDeviceSerialMagTek` method to retrieve data.

Device Firmware Part Number: Device firmware part number. Use `getFirmware` method to retrieve data.

Device Model Name: Device model name. Use `getDeviceName` method to retrieve data.

Device TLV Version: Device TLV version. Use getTLVVersion method to retrieve data.

Device Part Number: Device part number. Use `getDevicePartNumber` method to retrieve data.

Capability - MSR: 0 = No MSR, 1 = MSR. Use `getCapMSR` method to retrieve data.

Capability - TRACKS:

- 0 = Supported tracks: None.
- 1 = Supported tracks: Track1.
- 2 = Supported tracks: Track2.
- 3 = Supported tracks: Track1, Track2.
- 4 = Supported tracks: Track3.
- 5 = Supported tracks: Track1, Track3.
- 6 = Supported tracks: Track2, Track3.
- 7 = Supported tracks: Track1, Track2, Track3.

Use `getCapTracks` method to retrieve data.

Capability - MagStripe Encryption: 0 = No Encryption, 1 = TripDES DUKPT. Use `getCapMagStripeEncryption` method to retrieve data.

Appendix A Code Examples

A.1 Request List of Devices

To request a list of devices:

1) Create an MTSCRANET.MTSCRA object.
2) Set the connection type with setConnectionType().
3) Add a handler for OnDeviceList().
4) Call requestDeviceList().

```
MTSCRANET.MTSCRA listMTSCRA = new MTSCRANET.MTSCRA();
listMTSCRA.setConnectionType(MTConnectionType.USB);
listMTSCRA.OnDeviceList() += listMTSCRA_OnDeviceList;
listMTSCRA.requestDeviceList(MTConnectionType.USB);

listMTSCRA_OnDeviceList(
object sender,
MTConnectionType connectionType,
List<MTDeviceInformation> deviceList)
{
   //Handle deviceList
}
```

A.2 Open Device(s)

To open multiple devices:

1) Create an MTSCRANET.MTSCRA object.
2) Set the connection type with setConnectionType().
3) Add a handler for OnDeviceList().
4) Call requestDeviceList().
5) Create an MTSCRANET.MTSCRA object for each reader.
6) Set the connection type with setConnectionType() for each reader.
7) Call openDevice() for each reader.

```
MTSCRANET.MTSCRA listMTSCRA = new MTSCRANET.MTSCRA();
listMTSCRA.setConnectionType(MTConnectionType.USB);
listMTSCRA.OnDeviceList() += listMTSCRA_OnDeviceList;
MTDeviceInformation listDeviceInfo;
listMTSCRA.requestDeviceList(MTConnectionType.USB);

listMTSCRA_OnDeviceList(
object sender,
MTConnectionType connectionType,
List<MTDeviceInformation> deviceList)
{
   //Handle deviceList
   For Each (dev in deviceList)
```

```
    {

    }
    listDeviceInfo.Add(dev)
}

MTSCRANET.MTSCRA msr1 = new MTSCRANET.MTSCRA();
MTSCRANET.MTSCRA msr2 = new MTSCRANET.MTSCRA();
MTSCRANET.MTSCRA msr3 = new MTSCRANET.MTSCRA();

msr1.setConnectionType(MTConnectionType.USB);
msr1.setAddress(dev.Address);
msr1.openDevice();
if (! msr1.isDeviceConnected())
{
      msr1.openDevice();
}

msr2.setConnectionType(MTConnectionType.USB);
msr2.setAddress(dev.Address);
msr2.openDevice();
if (! msr2.isDeviceConnected())
{
      msr2.openDevice();
}

msr3.setConnectionType(MTConnectionType.USB);
msr3.setAddress(dev.Address);
msr3.openDevice();
if (! msr3.isDeviceConnected())
{
      msr3.openDevice();
}
```

A.3 Close Device

```
if (mMTSCRA != null)
{
      mMTSCRA.closeDevice();
}
```

A.4 Get Connection Status of Device

```
if (! mMTSCRA.isDeviceConnected())
{

}
```

A.5 Receiving Card Data from Device

```
if (! mMTSCRA.isDeviceConnected())
```

```
{
     mMTSCRA.CardDataReceived += OnCardDataReceived;
     mMTSCRA.openDevice();
}

public void OnCardDataReceived(Object sender)
{
      // Display last 4 digits of the card
      CardLast4.Text = mMTSCRA.getCardLast4();
}
```

A.6 Send Command to Device

```
if (mMTSCRA.isDeviceConnected())
{
      // Send discovery command
      mMTSCRA.sendCommandToDevice(“C10206C20503840900”, 0);
}
```

Appendix B ARQC Message Format

This section gives the format of the ARQC Message delivered in the ARQC Message notification. The output is controlled by Property 0x68 – EMV Message Format. There are currently 2 selectable formats: Original and DynaPro. It is a TLV object with the following contents.

Original Format:

```
FD<len>/* container for generic data */
        DFDF25(IFD Serial Number)<len><val>
        FA<len>/* container for generic data */
                <tags defined by DFDF02 >
                  . Note: Sensitive Data cannot be defined in DFDF02
                  .
                DFDF4D(Masked T2 ICC Data)
                DFDF52 - Card Type Used
                F8<len>/* container tag for encrypted data */
                        DFDF56(Encrypted Transaction Data KSN)<len><val>
                        DFDF57(Encrypted Transaction Data Encryption Type)<val>

                        FA<len>/* container for generic data */
                                DF30(Encrypted Tag 56 TLV, T1 Data)<len><val>
                                DF31(Encrypted Tag 57 TLV, T2 Data)<len><val>
                                DF32(Encrypted Tag 5A TLV, PAN)<len><val>
                                DF35(Encrypted Tag 9F1F TLV, T1 DD)<len><val>
                                DF36(Encrypted Tag 9F20 TLV, T2, DD)<len><val>
                                DF37(Encrypted Tag 9F61 TLV, T2 CVC3)<len><val>
                                DF38(Encrypted Tag 9F62 TLV, T1,PCVC3)<len><val>
                                DF39(Encrypted Tag DF812A TLV, T1 DD)<len><val>
                                DF3A(Encrypted Tag DF812B TLV, T2 DD)<len><val>
                                DF3B(Encrypted Tag DFDF4A TLV, T2 ISO Format)<len><val>
                                DF40(Encrypted Value only of DFDF4A, T2 ISO Format)<len><val>
```

DynaPro Format:

```
F9<len>/* container for MAC structure and generic data */
        DFDF54(MAC KSN)<len><val>
        DFDF55(MAC Encryption Type)<len><val>
        DFDF25(IFD Serial Number)<len><val>
        FA<len>/* container for generic data */
                70<len>/*container for ARQC */
                        DFDF53<len><value>/*fallback indicator */
                        5F20<len><value>/*cardholder name */
                        5F30<len><value>/*service code */
                        DFDF4D<len><value>/* Mask T2 ICC Data */
                        DFDF52<len><value>/* card type */
                        F8<len>/*container tag for encryption */
                                DFDF59(Encrypted Data Primitive)<len><Encrypted Data val (Decrypt
                                data to read tags)>
                                DFDF56(Encrypted Transaction Data KSN)<len><val>
                                DFDF57(Encrypted Transaction Data Encryption Type)<val>
                                DFDF58(# of bytes of padding in DFDF59)<len><val>
(Buffer if any to be a multiple of 8 bytes)
CBC-MAC (4 bytes, always set to zeroes)
```

The Value inside tag DFDF59 is encrypted and contains the following after decryption:

```
                FC<len>/* container for encrypted generic data */
                        <tags defined by DFDF02 >
                      .
```

Appendix C ARQC Response Message Format

This section gives the format of the data for the Online Processing Result / Acquirer Response message. This request is sent to the reader in response to an ARQC Message notification from the reader. The output is controlled by Property 0x68 – EMV Message Format. There are currently 2 selectable formats: Original and DynaPro. It is a TLV object with the following contents.

Original format:

```
F9<len>/* container for ARQC Response data */
       DFDF25 (IFD Serial Number)<len><val>
       FA<len>/* Container for generic data */
              70<len>/* Container for ARQC */
                     8A<len> approval
                     Further objects as needed...
```

DynaPro format:

```
F9<len>/* container for MAC structure and generic data */
       DFDF54 (MAC KSN)<len><val>
       DFDF55 (Mac Encryption Type><len><val>
       DFDF25 (IFD Serial Number)<len><val>
       FA<len>/* Container for generic data */
              70<len>/* Container for ARQC */
                     8A<len> approval
                     Further objects as needed...
(ARQC padding, if any, to be a multiple of 8 bytes)
CBC-MAC (4 bytes, use MAC variant of MSR DUKPT key that was used in ARQC request, from
message length up to and including ARQC padding, if any
```

Appendix D Batch Data Format

This section gives the format of the data the device uses to do completion processing. The output is controlled by Property 0x68 – EMV Message Format. There are currently 2 selectable formats: Original and DynaPro. It is a TLV object with the following contents.

Original Format:

```
FE<len>/* container for generic data */
       DFDF25(IFD Serial Number)<len><val>
       FA<len>/* container for generic data */
              F0<len>/* Transaction Results */
                     F1<len>/* container for Status Data */
                     … /* Status Data tags */
                            DFDF1A - Transaction Status (See DFDF1A descriptions)
                            DFDF1B - Additional Transaction Information (always 0)
                            DFDF52 - Card Type Used

                     F2<len>/* container for Batch Data */
                     … /* Batch Data tags defined in DFDF17 */
                     …/* Note: Sensitive Data cannot be defined in DFDF17*/

                     F3<len>/* container for Reversal Data, if any */
                     … /* Reversal Data tags defined in DFDF05 */
                     …/* Note: Sensitive Data cannot be defined in DFDF05*/

                     F7<len>/* container for Merchant Data */
                     … /* < Merchant Data tags */

                     F8<len>/* container tag for encrypted data */
                            DFDF56(Encrypted Transaction Data KSN)<len><val>
                            DFDF57(Encrypted Transaction Data Encryption Type)<val>

                     FA<len>/* container for generic data */
                            DF30(Encrypted Tag 56 TLV, T1 Data)<len><val>
                            DF31(Encrypted Tag 57 TLV, T2 Data)<len><val>
                            DF32(Encrypted Tag 5A TLV, PAN)<len><val>
                            DF35(Encrypted Tag 9F1F TLV, T1 DD)<len><val>
                            DF36(Encrypted Tag 9F20 TLV, T2, DD)<len><val>
                            DF37(Encrypted Tag 9F61 TLV, T2 CVC3)<len><val>
                            DF38(Encrypted Tag 9F62 TLV, T1,PCVC3)<len><val>
                            DF39(Encrypted Tag DF812A TLV, T1 DD)<len><val>
                            DF3A(Encrypted Tag DF812B TLV), T2 DD<len><val>
                            DF3B(Encrypted Tag DFDF4A TLV, T2 ISO Format)<len><val>
                            DF40(Encrypted Value only of DFDF4A, T2 ISO
                            Format)<len><val>
```

D.1 DFDF1A Transaction Status Return Codes

0x00 = Approved
0x01 = Declined
0x02 = Error
0x10 = Cancelled by Host
0x1E = Manual Selection Cancelled by Host
0x1F = Manual Selection Timeout
0x21 = Waiting for Card Cancelled by Host
0x22 = Waiting for Card Timeout
0x23 = Cancelled by Card Swipe
0xFF = Unknown

DynaPro Format:

```
F9<len>/* container for MAC structure and generic data */
       DFDF54(MAC KSN)<len><val>
       DFDF55(MAC Encryption Type)<len><val>
       DFDF25(IFD Serial Number)<len><val>
       FA<len>/* container for generic data */
              F0<len>/* Transaction Results */
                     F1<len>/* container for Status Data */
                            … /* Status Data tags */
                     F8<len>/* container tag for encryption */
                            DFDF59(Encrypted Data Primative)<len><Encrypted Data val>
                                          (Decrypt data to read tags)
                            DFDF56(Encrypted Transaction Data KSN)<len><val>
                            DFDF57(Encrypted Transaction Data Encryption Type)<val>
                            DFDF58(# of bytes of padding in DFDF59)<len><val>
                     F7<len>/* container for Merchant Data */
                            … /* < Merchant Data tags */
(Buffer if any to be a multiple of 8 bytes)
CBC-MAC (4 bytes, always set to zeroes)
```

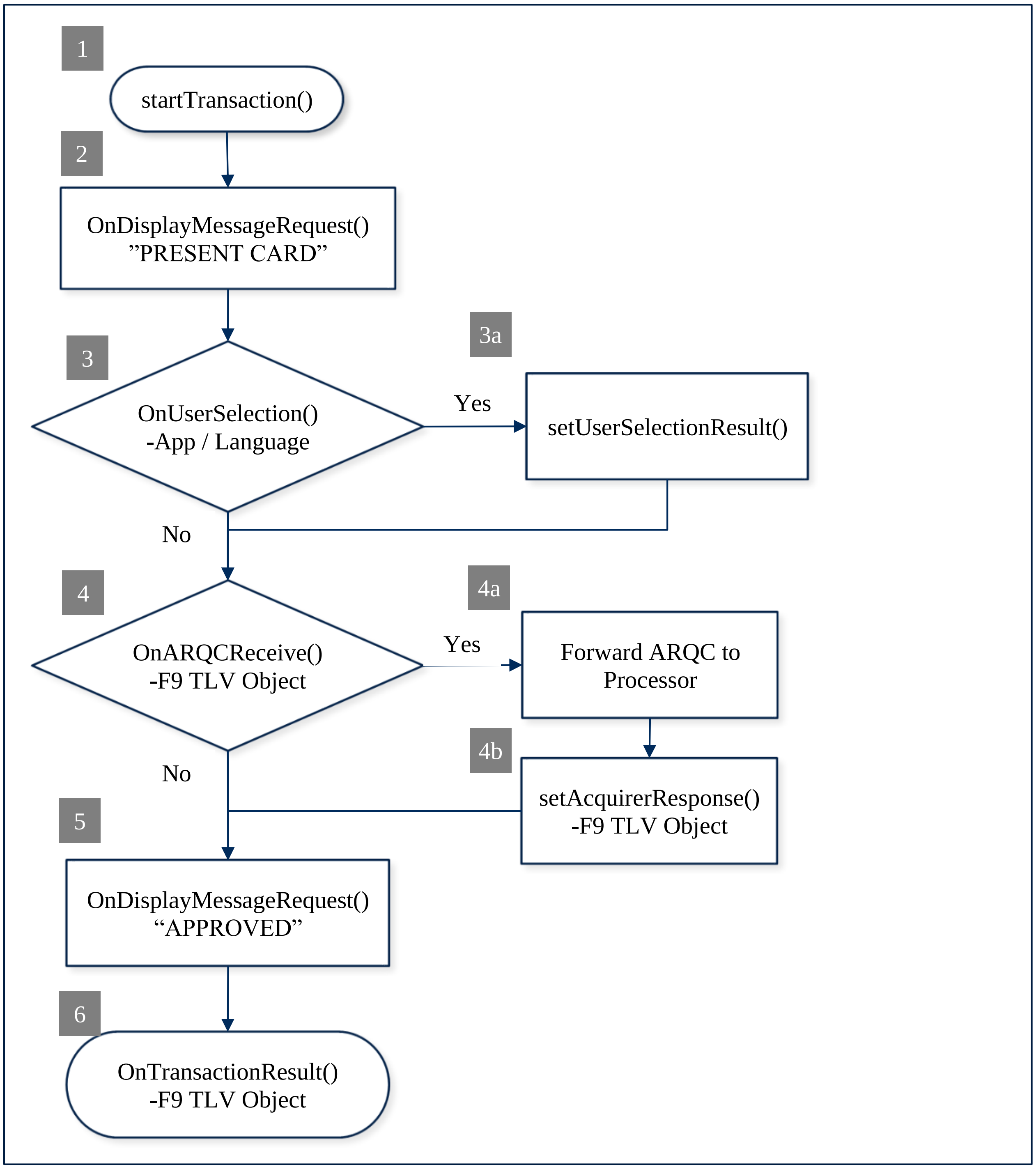
Appendix E Supported Device Features

Feature / Product	cDynamo	DynaMAX	eDynamo	iDynamo 5	iDynamo 5 (Gen II)	iDynamo 5 (Gen III)	iDynamo 6	kDynamo	sDynamo	tDynamo	uDynamo
MSR Swipe	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MSR Insert	N	N	N	N	N	N	N	N	N	N	N
MSR 3 Tracks	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
MSR Disable	Y	N	N	Y	N	N	N	N	N	N	N
MSR Swap Tracks 1/3	N	N	N	N	N	N	N	N	N	N	N
MSR Embedded V5 Head	N	N	N	N	Y	Y	Y	Y	Y	Y	N
MSR Configurable MSR Variants	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
MSR Configurable MP Variants	N	Y	Y	N	N	N	Y	Y	N	Y	N
MSR SureSwipe	N	Y	Y	N	N	Y	N	N	N	N	N
MSR JIS Capable	Y	N	N	Y	N	N	N	N	Y	N	N
SHA-1	N	Y	Y	N	N	N	N	N	N	N	N
SHA-256	N	N	N	N	N	N	N	N	N	N	N
Configurable SHA	N	Y	Y	N	N	N	N	N	N	N	N
Configurable Encryption Algorithm	N	N	N	N	N	Y	Y	N	N	N	N
Set Mask Service Code	N	N	N	N	N	N	N	N	N	N	N
Never Mask Service Code	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N
MagneSafe 2.0	N	N	Y	N	N	N	N	N	N	N	N
EMV Contact	N	N	Y	N	N	N	Y	Y	N	Y	N
EMV Contactless	N	N	N	N	N	N	Y	Y	N	Y	N
EMV Offline ODA	N	N	Y	N	N	N	N	N	N	N	N
EMV MSR Flow	N	N	N	N	N	N	Y	Y	N	Y	N
EMV Contact Quick Chip	N	N	Y	N	N	N	Y	Y	N	Y	N
EMV Contactless Quick Chip	N	N	N	N	N	N	Y	Y	N	Y	N
External PIN Accessory Support	N	N	N	N	N	N	Y	N	N	N	N
Keypad Entry	N	N	N	N	N	N	N	N	N	N	N
Fixed Key	N	N	N	N	N	N	N	N	N	N	N
Secondary DUKPT Key	N	Y	Y	N	N	N	N	N	N	N	Y
Power Mgt Scheme (PM#)	N	2	3	N	N	N	7	5	N	5	4
Battery-Backed RTC	N	N	Y	N	N	N	N	N	N	N	N
OEM Features	N	N	N	N	N	N	N	N	N	N	N
Transaction Validation	N	N	N	N	N	N	N	N	N	N	N

Feature / Product	cDynamo	DynaMAX	eDynamo	iDynamo 5	iDynamo 5 (Gen II)	iDynamo 5 (Gen III)	iDynamo 6	kDynamo	sDynamo	tDynamo	uDynamo
Display	N	N	N	N	N	N	N	N	N	N	N
Multi-Language	N	N	Y	N	N	N	Y	Y	N	Y	N
Tamper	N	N	Y	N	N	N	N	N	N	N	N
Extended Commands	N	N	Y	N	N	N	Y	Y	N	Y	N
Extended Notifications	N	N	Y	N	N	N	Y	Y	N	Y	N
Dual USB Ports	N	N	N	N	N	Y	Y	N	N	Y	N
Pairing Modes	N	N	Y	N	N	N	N	N	N	Y	N
Custom Advertising	N	N	Y	N	N	N	N	N	N	Y	N
Configurable Lightning FID	Y	N	N	N	Y	Y	Y	Y	N	N	N
Auxiliary Ports	N	N	N	N	N	N	N	N	N	N	N
External LED Control	N	N	N	N	N	N	N	N	N	N	N
Encrypt Bulk Data (b)	120	24	24	120	N	N	N	N	N	N	24

Appendix F EMV Transaction Flow

F.1 Flow Chart



F.2 Sample Transaction Flow Code

```
// #1

MTSCRA m_SCRA = new MTSCRA();

// Delegate the MTSCRA Events.
m_SCRA.OnDisplayMessageRequest += OnDisplayMessageRequest;
.

// Assign parameters.
byte timeLimit = 0x3C;
byte cardType = 0x07;
byte option = 0x00;
byte[] amount = new byte[] { 0x00, 0x00, 0x00, 0x00, 0x15, 0x00 };
byte transactionType = 0x00; // Purchase
byte[] cashBack = new byte[] { 0x00, 0x00, 0x00, 0x00, 0x00, 0x00 };
byte[] currencyCode = new byte[] { 0x08, 0x40 };
byte reportingOption = 0x02;  // All Status Changes

// Start transaction.
long result = m_SCRA.startTransaction(
timeLimit,
cardType,
option,
amount,
transactionType,
cashBack,
currentCode,
reportingOption);
```

```
// #2

protected void OnDisplayMessageRequest(obj sender, byte[] data)
{
  String message;

  // Get the message.
  if (data != NULL)
  {
    message = System.Text.Encoding.UTF8.GetString(data);
  }


  // A data size of 0 is an instruction to clear the display.
  if (data.Length == 0)
  {
    // Clear the display.
  }
}
```

```
// #3

protected void OnUserSelectionRequest(object sender, byte[] data)
{
  /* data[0]    - selection type
     data[1]    - timeout
     data[2..n] - remainder contains zero-terminated string items */

  // display/retrieve user selection.
  .
  // set status and selection result.
  m_SCRA.setUserSelectionResult(status, selection);

}
```

```
// #4

protected void OnARQCReceived(object sender, byte[] data)
{
  /* data[0..1] - ARQC length
     data[2..n] - remainder contains the ARQC TLV object */


  // #4a Forward ARQC to Processor.

  /* An application function to forward the ARQC
     to a Processor for approval. */
  proccesorResponse = sendARQCToProcesor(data);


  /* No need to send ARQC Response if transaction option
     had enabled Quick Chip mode. */
  if (isQuickChipEnabled())
  {
    return;
  }



  // #4b Set Acquirer Response.

  // An application function to build Acquirer Response.
  buildAcquirerResponse(processorResponse);

  // Set Acquirer Response.
  m_SCRA.setAcquirerResponse(response);

}
```

```
// #5

protected void OnDisplayMessageRequest(obj sender, byte[] data)
{
  String message;

  // Get the message.
  if (data != NULL)
  {
    message = System.Text.Encoding.UTF8.GetString(data);
  }


  // A data size of 0 is an instruction to clear the display.
  if (data.Length == 0)
  {
    // Clear the display.
  }
}
```

```
// #6

protected void OnTransactionResult(obj sender, byte[] data)
{
  /* data[0]    - Signature Required
     data[1..2] - Batch Data length
     data[3..n] - remainder contains the Batch Data TLV object */

  // Parse the TLV from data[].
  .
  // Abstract Approval status from TLV tag "DFDF1A".
  .
  // Abstract Signature Required status from TLV tag data[0].
  .
}
```