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MagTek Universal SDK

MagTek Devices

Programmer's Manual (Android)

May 2025

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Table 0.1 - Revisions

Rev Number	Date	Notes
10	November 11, 2020	Initial release

20	February 26, 2021	Added GetFile method for MMSDevice. Replaced setDisplay method with displayMessage method in IDeviceControl interface. Added TechnicalFallback to TransactionStatus enumeration. Added PreventMSRSignatureForCardWithICC property to ITransaction interface. Added OperationStatus to EventType enumerations. Added TamperStatus, OperationStatus, and OfflineDetail to InfoType enumerations. Added new enumeration type OperationStatus. Updated MMSDevice to support Host-Driven Fallback for transactions.
30	June 25, 2021	Corrected the description of PreventMSRSignatureForCardWithICC in the ITransaction interface. Added sample of getConfiguration and setConfiguration in section B6 IDeviceConfiguration Walk Through. Added DataEntryType, DeviceEvent, and UserEvent enumerations. Added Manual Card Entry, SuppressThankYouMessage, and OverrideFinalTransactionMessage properties to ITransaction interface.
40	November 18, 2021	Extended showImage(). Extended EventType enum. Added enum DeviceFeature and FeatureStatus. Added support for Barcode display, Barcode reader, and DynaProx.
50	March 11, 2022	Added requestPIN(), requestPAN() to IDevice. Updated EMV transaction flow in the appendix.
60	March 14, 2023	Added support for WebSocket WSS at section 3. Added Wireless as firmware type to updateFirmware() at section 9. Added BMP image format at section 6. Added CertificateInfo class, AppleVASMode and AppleVASProtocol to ITransaction at section 10. Added VASMode and VASProtocol enumerations, Apple VAS and BarCode to PaymentMethods, BarcodeRead and VASError to TransactionStatus, and WEBSOCKET and WEBSOCKET_TRUST to ConnectionType at section 13.
600	September 26, 2023	Added Display Amount for Quick Chip to ITransaction class at section 10.4. Added NFC Tag support to ITransaction at section 10.4 and NFC enumerations as section 13.13. Added WebSocket certificate requirement to section 1.4.
601	November 13, 2023	Added Tip/Tax properties to ITransaction interface at section 10.4. Added TransactionStartedFromDevice, TransactionStartedFromDeviceQuickChip, and TransactionCancelledFromDevice to TransactionStatus enumeration at section 13.16. Added EnhancedInputRequest to EventType enumeration at section 13.9. Added classes DirectoryEntry, EnhancedInputRequest, InputRequest, NFCData, NFCEventBuilder to section 10. Added MifareClassic1K, MifareClassic4K, IOFailed, and AuthenticationFailed to NFCEvent enumeration at section 13.13.

602	January 10, 2024	Added DynaFlex II Go (Bluetooth LE) at section 13.4. Added NFCAPDUResponse to EventType at section 13.9. Added MifareDESFire to NFCEvent at section 13.13 Added ConnectionStateBuilder class at section 10.3. Added NFCRAPDUData class at section 10.10. Added sendDESFireNFCCommand at section 4.14.
603	February 22, 2024	Added GoogleVAS to PaymentMethod enum at section 13.15. Added Apple VAS details as Appendix D. Added Google VAS details as Appendix E.
604	July 1, 2024	Added UI page support to IDeviceControl as sections 6.16 to 6.20. Added FunctionalButtonRightOption to ITransaction at section 10.8. Added UI TouchScreen events to EventType at section. 13.9.
605	May 18, 2025	Added support for MQTT API. Added MQTT methods to CoreAPI at section 3. Added StatusCallback as sections 13 and 14. Added ErrorType enum at section 15. Added MQTT to ConnectionType at section 15.4.

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Table of Contents

1 Introduction

This document provides instructions for software developers who want to create Android software solutions that include MagTek devices connected to an Android based host. MagTek Universal SDK (MTUSDK) incorporates MagTek SCRA and MagTek PIN Pad SCRA devices into one SDK. This document is part of a larger library of documents designed to assist MagTek device implementers, which includes the following documents available from MagTek:

- ***D998200383 DynaFlex Products Programmer's Manual (Commands)***

1.1 About the MagTek Sample Code

The sample code provides Android demonstration source code and a reusable MTUSDK API library that provides developers of custom software solutions with an easy-to-use interface for MagTek devices. Developers can distribute the MTUSDK API Library to customers or distribute internally as part of an enterprise solution.

1.2 Nomenclature

- **Device** refers to the MagTek devices that receives and responds to command set.
- **Host** refers to the piece of general-purpose electronic equipment the device is connected or paired to, which sends data to and receives data from the device. Host types include but not limited to PC and Mac computers, tablets, and smartphones. When "host" must be used differently, it is qualified as something specific, such as "USB host."
- **User** in this document generally refers to the **cardholder**.

1.3 SDK Contents

File name	Description
MTUSDKDemo.apk	Sample code APK file.
MTUSDK.aar	Universal SDK Android AAR Library file.

1.4 System Requirements

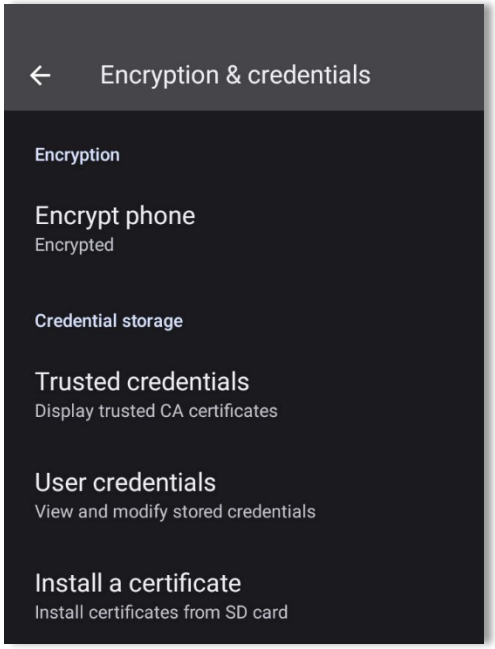
Tested operating systems:

1) Android 4.4.2 and above
2) Android Studio 3.5.3 and above

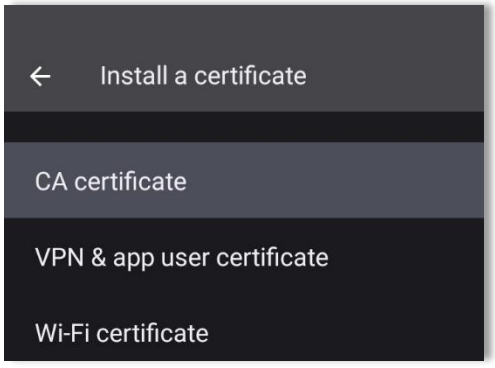
1.5 Certificate Requirements

When connecting to the DynaFlex II PED device by WLAN, a client certificate and its certificate chain must be installed on the Android device. Root Certificate, Sub CA Certificate, and Client private key Certificate as referenced in document ***D998200550 DynaFlex II PED Using Wireless LAN Guide***.

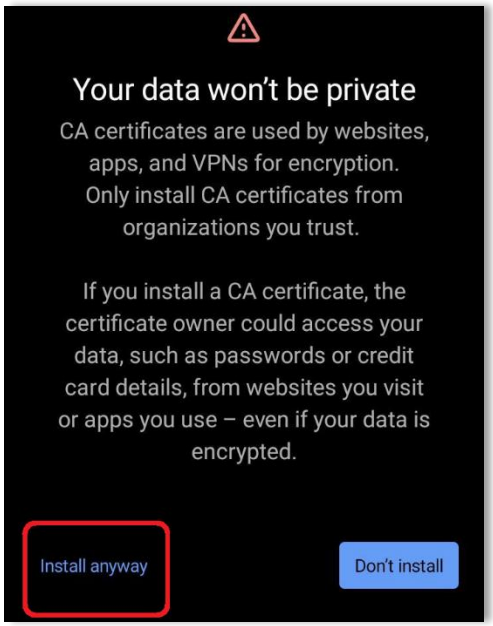
1) Download the certificate chain to the Android device.
2) The navigation paths for the following instructions may very on the Android device. If not seen, do a search within Settings for the end of the navigation path.
3) Navigate to Settings → Security → More security settings → Encryption & credentials → **Install a certificate**.



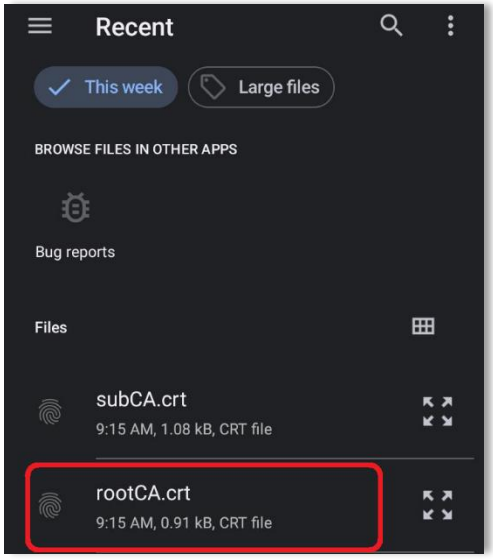
4) Select **CA certificate**.



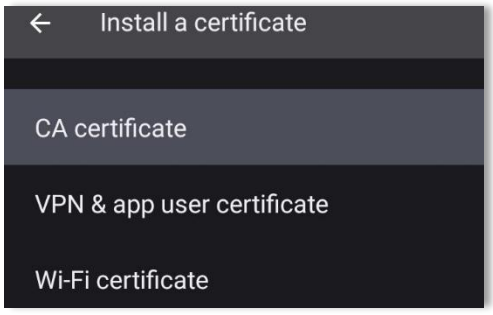
5) Confirm any prompts such as **Install anyway**.



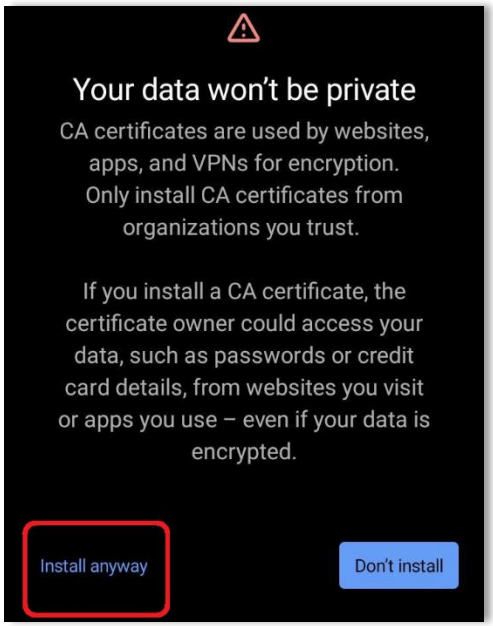
6) Select the **rootCA.crt** file.



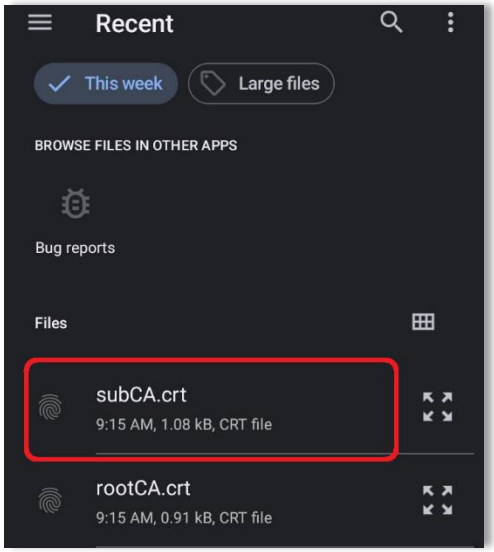
7) Continue to install the subCA by selecting **CA certificate**.



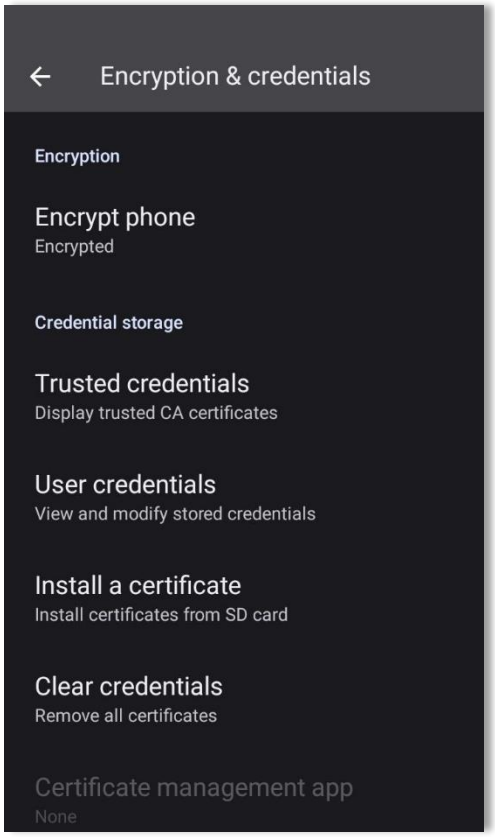
8) Confirm any prompts such as **Install anyway**.



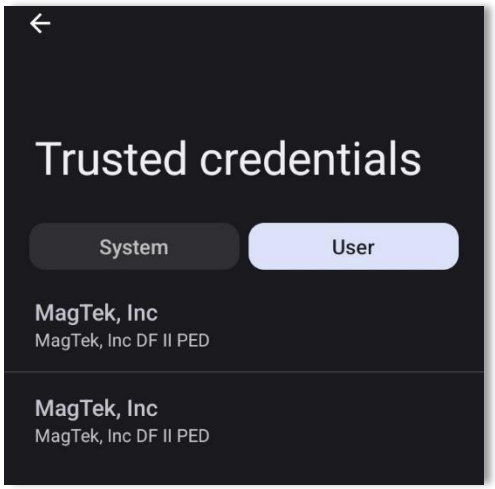
9) Select the **subCA.crt** file.



10) Verify the certificate chain by navigating to Settings → Security → More security settings → Encryption & credentials → **Trusted credentials**.



11) Select **User**.



12) Installation of certificate chain is complete.

13) Custom software will need the client private key certificate (client.p12) when creating a connection to DynaFlex II PED WLAN. Place the client.p12 into a folder accessible by the custom software.

2 How to Set Up the SDK

To set up the MagTek Universal SDK library for Android, download the ***1000007352 MagTek Universal SDK for MMS Devices (Android)*** available from MagTek.com.

To add the MT Universal libraries to a custom software project in Android Studio, follow these steps:

1) Launch Android Studio.
2) Copy the following AAR file to the **`libs`** subfolder of your software project: MTUSDK.aar
3) Ensure your project settings are set up correctly.
4) Clean, build, and run your custom software project to make sure the library imported correctly.
5) In your custom software, create an instance of `MTUSDK`. For examples, see the source code included with the MagTek Universal Demo project and/or the Code Examples section in this document.
6) Depending on the connection types supported, the project should include the uses-features and uses-permissions as specified in the table below in its AndroidManifest.xml file. For examples, see the AndroidManifest.xml included with the MagTek Universal Demo project.

Connection Type	AndroidManifest
Audio	`<uses-permission android:name="android.permission.RECORD_AUDIO"/>` `<uses-permission android:name="android.permission.MODIFY_AUDIO_SETTINGS"/>`

BLE
BLEEMV
BLEEMVT
	`<uses-feature android:name="android.hardware.bluetooth_le"/>`
	`<uses-permission android:name="android.permission.BLUETOOTH"/>`
	`<uses-permission android:name="android.permission.BLUETOOTH_ADMIN"/>`
	`<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION"/>`
	`<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>`

Bluetooth	`<uses-permission android:name="android.permission.BLUETOOTH"/>` `<uses-permission android:name="android.permission.BLUETOOTH_ADMIN"/>`
USB Serial	`<uses-feature android:name="android.hardware.usb.host" />`
WebSocket	`<uses-permission android:name="android.permission.INTERNET" />`

To Run/Debug the sample code, follow these steps:

1) In Android Studio, select **File**->**Open**...
2) Select `MTUSDKDemo` project, click **OK**.
3) Select **Run**->**Run app** to run the sample code or select **Run**->**Debug app** to run it in debug mode.

3 CoreAPI

Use the CoreAPI to create an **IDevice**. **IDevice** is the bases for the MagTek Universal SDK.

If accessing a device specific API outside of MagTek Universal SDK, use the various functions in this section to create an instance of that device's API. Once a device specific API is referenced, the associated library will need to be added into the application's development project.

3.1 createCMSDevice

This function creates an instance of a CMS type of device.
The API's of MagTek Universal SDK do not apply. See ***D998200160 MagTek Common Message Structure (MTCMS)*** for the MTCMS API.

```
MTDevice CoreAPI.createCMSDevice(Context context, Handler handler);
```

Parameter	Description
context	An instance of android.content.Context to allow SDK access to application-specific resources.
handler	An instance of android.os.Handler to allow SDK access to application-specific message queues.

Return Value:
Returns an `MTDevice`.

3.2 createDevice

This function creates an instance of **IDevice.** All API's of MagTek Universal SDK can but utilized from **IDevice**.

```
IDevice CoreAPI.createDevice(
      Context context,
      DeviceType deviceType,
      ConnectionType connectionType,
      String address,
      String model,
      String name,
      String serial,
      CertificateInfo certificateInfo);
```

Parameter	Description
context	An instance of android.content.Context to allow SDK access to application-specific resources.
deviceType	Enumerated device type.
connectionType	Enumerated connection type.

address	Address for the device.
	
	For USB devices, address may be an empty string when only one device is attached. Otherwise address should be in the form:
	`USB://DEVICESERIALNUMBER`
	for example, `USB://99261829170E0810`
	
	For Ethernet devices, address should be in the form:
	`IP://IP-Address:PORT`
	for example, `IP://10.57.10.180:26`
	
	For Wireless devices, address should be in the form:
	`TLS12://TLSDEVICESERIALNUMBER`
	`TLS12TRUST://TLSDEVICESERIALNUMBER`
	for example, `TLS12://TLS99261829170E0810`
	`TLS12TRUST://TLS99261829170E0810`
	
	For Bluetooth LE devices, address should be in the form:
	`BLEEMV://DEVICENAME`
	for example, `BLEEMV://DynaPro Go-EB66`
	
	For WebSocket or Secure WebSocket devices, address should be in the form:
	`ws://IP-Address`
	`wss://IP-Address`
	for example,:
	`ws://192.168.1.150 or serialnumber.xx`
	`wss://serialnumber.xx (where xx is domain name)`
	
	Place the client private key certificate (client.p12) into a folder accessible by the custom software.
	
	For Serial devices, address should be in the form:
	PORT=**[PORT]**,
	BAUDRATE=**[BAUDRATE]**,
	DATABITS=**[DATABITS]**,
	PARITY=**[PARITY]**,
	STOPBITS=**[STOPBITS]**,
	HANDSHAKE=**[HANDSHAKE]**,
	STARTINGBYTE=**[STARTINGBYTE]**,
	ENDINGBYTE=**[ENDINGBYTE]**,
	CRCMODE=**[CRCMODE]**

model	Model name for the device.
name	Unique name for the device to distinguish between multiple devices of the same model.
serial	Serial number for the device.
certificateInfo	The client private key certificate (client.p12) into a folder accessible by the custom software. See **Certificate Requirements.**

Return Value:
Returns an **IDevice**.

3.3 createMMSDevice

This function creates an instance of an MMS type of device, DynaFlex Family.

```
MMXDevice CoreAPI.createMMSDevice(
      Context context,
      IMMXDeviceAdapter deviceAdapter);
```

Parameter	Description
context	An instance of android.content.Context to allow SDK access to application-specific resources.
deviceAdapter	Callback interface for MMS device messages.

Return Value:
Returns an `MMXDevice`.

3.4 createPPSCRA

This function creates an instance of an MTPPSCRA type of device.
The API's of MagTek Universal SDK do not apply. See ***D998200078 IPAD, DynaPro, DynaPro Go, and DynaPro Mini PIN Encryption Devices Programmer's Reference*** for the MTPPSCRA API.

```
MTPPSCRA CoreAPI.createPPSCRA(Context context, Handler handler);
```

Parameter	Description
context	An instance of android.content.Context to allow SDK access to application-specific resources.
handler	An instance of android.os.Handler to allow SDK access to application-specific message queues.

Return Value:
Returns an `MTPPSCRA`.

3.5 createSCRA

This function creates an instance of a MTSCRA type of device.
The API's of MagTek Universal SDK do not apply. See ***D99875723 uDynamo, Dynamag, DynaMAX, eDynamo, mDynamo, Insert, DynaWave, iDynamo 6*** for the MTSCRA API.

```
MTSCRA CoreAPI.createPPSCRA(Context context, Handler handler);
```

Parameter	Description
context	An instance of android.content.Context to allow SDK access to application-specific resources.

handler	An instance of android.os.Handler to allow SDK access to application-specific message queues.

Return Value:
Returns an `MTSCRA`.

3.6 getDeviceList

This function returns a list of **IDevice**. **IDevice** is the base for utilizing the MagTek Universal SDK interface.

```
List<IDevice> CoreAPI.getDeviceList(
      Context context,
      IDeviceListCallback deviceListCallback);

List<IDevice> CoreAPI.getDeviceList(
      Context context,
      DeviceType deviceType,
      IDeviceListCallback deviceListCallback);

List<IDevice> CoreAPI.getDeviceList(
      Context context,
      List<DeviceType> deviceTypes,
      IDeviceListCallback deviceListCallback);
```

Parameter	Description
context	An instance of android.content.Context to allow SDK access to application-specific resources.
deviceType	An enum for the type of MagTek readers which the SDK will control.
deviceTypes	An enum list for the type of MagTek readers which the SDK will control.
deviceListCallback	Callback interface for SDK to provide a list of device information in the system.

Return Value:
Returns a list of **IDevice** .

3.7 getAPIVersion

This function returns the API version.

```
int CoreAPI.getAPIVersion();
```

Return Value:
Returns an integer representing the API version.

3.8 setMQTTBrokerInfo

This function sets the MQTT (Message Queuing Telemetry Transport) broker information. Call prior to device discovery.

```
void setMQTTBrokerInfo(String uri);

void setMQTTBrokerInfo(
      String uri,
      String username = null,
      String password = null);
```

Parameter	Description
uri	URI included the port. Support URIs: 3) TCP: “test.mosquitto.org”, “test.mosquitto.org:1883”, “mqtt://test.mosquitto.org:1883”, “mqtt://broker.emqx.io:1883” 4) TCP (Authenticated): “test.mosquitto.org:1884”, “mqtt://test.mosquitto.org:1884” 5) TCP (Encrypted): “mqtts://test.mosquitto.org:8886”, “mqtts://broker.emqx.io:8883” 6) TCP (Encrypted & Authenticated): “mqtts://test.mosquitto.org:8885” 7) WebSocket: “ws://test.mosquitto.org:8080”, “ws://broker.emqx.io:8083” 8) WebSocket (Encrypted): “wss://test.mosquitto.org:8081” , “wss://broker.emqx.io:8084” 9) WebSocket (Authenticated): “ws://test.mosquitto.org:8090” 10) WebSocket, (Encrypted & Authenticated): “wss://test.mosquitto.org:8091”
username	Username
password	Password

Return Value: None

3.9 setMQTTClientID

This function sets the MQTT client ID to establish a connection.

```
void setMQTTClientID(String clientID);
```

Parameter	Description
clientID	Client ID. If not set, the default value is [HostName]-[RandomUUID]

Return Value: None

3.10 setMQTTClientCertificateInfo

This function sets the MQTT certificate information.

```
void setMQTTClientCertificateInfo(CertificateInfo certificateInfo);
```

Parameter	Description
certificateInfo	If client certificate is required when initiating a connection to the MQTT broker, this shall be used to establish the connection. If not set, the default value is NULL.

Return Value: None

3.11 setMQTTDeviceDiscoveryTimeout

This function sets the MQTTDeviceDiscoveryTimeout value.

```
void setMQTTDeviceDiscoveryTimeout(int timeout);
```

Parameter	Description
timeout	Time out in milliseconds. Default value = 5000 if not set. A call to getDeviceList() does not return the list until this time has expired.

Return Value: None

3.12 startMQTTDeviceStatusMonitoring

This function sets the MQTT callback interface instance.

After connecting to the MQTT broker, the MQTT Device Status Monitoring subscribes to "<MQTTSubscribeTopic>/#". The wildcard "/#" is automatically appended.

Example:
subscribe topic = "MagTek/Server/DynaFlexIIPED"
monitored subscription = "MagTek/Server/DynaFlexIIPED/#".

When a device status updates to "connected" or "disconnected", OnConnected() and OnDisconnected() are invoked respectively.

This method can be called whether or not there is an active connection to an MQTT device.

Devices reporting with "/Status/connected" are added to the device list as follows:
<DeviceAddress>="MagTek/Server/DynaFlexIIPED/B51E72D"

```
void startMQTTDeviceStatusMonitoring(
      IMQTTDeviceStatusCallback callback);
```

Parameter	Description
`callback`	Name of a class or structure that implements the IMQTTDeviceStatusCallback interface events. Call after calling getDeviceList().

Return Value: None

3.13 setMQTTPublishTopic

This function sets the base value for MQTTPublishTopic. When connected to the MQTT broker, the composed topic is in the format:
"<basetopic>/<DeviceID>/MMSMessage".

Example:
Base topic = "MagTek/Device/DynaFlexIIPED/"
Full topic = "MagTek/Device/DynaFlexIIPED/B51E72D/MMSMessage"

```
void setMQTTPublishTopic(String topic);
```

Parameter	Description
topic	Base topic for which to publish messages. Full topic is composed by the SDK.

Return Value: None

3.14 setMQTTQos

This function sets the MQTTQoS value.

```
void setMQTTQos(int qos);
```

Parameter	Description
qos	The quality of service level for publishing messages. Range: 0 = At most once (default) 1 = At least once 2 = Exactly once

Return Value: None

3.15 setMQTTSubscribeTopic

This function sets the base value for MQTTSubscribeTopic. When connected to the device, the composed topic is in the format:
"<basetopic>/<DeviceID>/MMSMessage".

Example:
Base topic = "MagTek/Server/DynaFlexIIPED/"
Full topic = "MagTek/Server/DynaFlexIIPED/B51E72D/MMSMessage"

```
void setMQTTSubscribeTopic(String topic);
```

Parameter	Description
topic	Base topic for which to subscribe for messages.

Return Value: None

3.16 stopMQTTDeviceStatusMonitoring

This function stops the MQTT device status monitoring process. If called when already running, the process shall be stopped immediately. This method can be called whether or not there is an active connection to an MQTT device.

```
void stopMQTTDeviceStatusMonitoring();
```

Return Value: None

3.17 setSystemStatusCallback

This function sets the SystemStatusCallback global value.

```
void setSystemStatusCallback(ISystemStatusCallback callback);
```

Parameter	Description
callback	Name of a class or structure that implements the ISystemStatusCallback interface event. Call before starting any MQTT communication. When there is an error, the interface's OnError() event is invoked.

Return Value: None

4 IDevice

4.1 cancelTransaction

This function cancels a transaction. A transaction can only be cancelled before a card is presented.

```
boolean IDevice.cancelTransaction();
```

Return Value:
Returns true if cancelled. Otherwise, returns false.

4.2 getCapabilities

This function retrieves the capabilities of the device.

```
IDeviceCapabilities IDevice.getCapabilities();
```

Return Value:
Returns **IDeviceCapabilities**

4.3 getConnectionInfo

This function retrieves the connection information of the device.

```
ConnectionInfo IDevice.getConnectionInfo();
```

Return Value:
Returns **ConnectionInfo**

4.4 getConnectionState

This function retrieves the connection state of the device.

```
ConnectionState IDevice.getConnectionState();
```

Return Value:
Returns **ConnectionState**

4.5 getDeviceConfiguration

This function allows the host to get an **IDeviceConfiguration** to configure the device.

```
IDeviceConfiguration IDevice.getDeviceConfiguration();
```

Return Value:
Returns **IDeviceConfiguration**.

4.6 getDeviceControl

This function retrieves the device control interface to the device.

```
IDeviceControl IDevice.getDeviceControl();
```

Return Value:
Returns **IDeviceControl**

4.7 getDeviceInfo

This function returns an information class of the device.

```
DeviceInfo IDevice.getDeviceInfo();
```

Return Value:
Returns DeviceInfo.

4.8 Name

This function returns the name of the device assigned from createDevice().

```
String IDevice.Name();
```

Return Value:
Returns the name of the device.

4.9 requestPAN

This function prompts the user to present their card and enter a PIN. A card is presented so that the device can retrieve the PAN, which is used for Format blocks requiring a PAN. The encrypted PIN block (EPB) will be returned in the event **OnEvent**. The data byte array may be passed to builder function PANDataBuilder.GetPANData();

For DynaFlex devices, this function starts a PIN session on the first call and shall be called again to send the PIN status to the device for completing the PIN session.

```
boolean IDevice.requestPAN(PANRequest panRequest, PINRequest
pinRequest);
```

`PANRequest`:

Parameter	Type	Description
Timeout	byte	Wait time in seconds.
PaymentMethods	List of PaymentMethod	List of the PaymentMethod enumeration. `MSR` = For magnetic stripe cards. `Contact` = For EMV chip cards. `Contactless` = For NFC contactless cards. `ManualEntry` = Manually entry, no card. When set, other payment methods must not be included. `Barcode` = For barcode. `BarcodeEncrypted` = For barcode with encrypted response. `AppleVAS` = For Apple VAS. `GoogleVAS` = For Google Wallet VAS. `NFC` = For NFC tag.

`PINRequest`:

Parameter	Type	Description
Timeout	byte	Wait time in seconds.
PINMode	byte	PIN mode. Usage: 0x00 - Enter PIN 0x01 - Enter PIN Amount 0x02 - Reenter PIN Amount 0x03 - Reenter PIN 0x04 - Verify PIN For DynaFlex devices this is the User Interface Sequence: 0x01 - Present Card / Enter PIN (start session) 0x04 - Present Card / Enter PIN / Enter PIN Again (start session) On the second call to requestPAN(), send the PIN status: 0xFD - Cancel PIN Session (end session) 0xFE - PIN Entry Failed (end session) 0xFF - PIN Entry Successful (end session)
MinLength	byte	Minimum length of accepted PIN (>= 4).
MaxLength	byte	Maximum length of accepted PIN (=< 12).
Tone	byte	Tone to play when prompting for the PIN. Usage: 0x00 - No sound 0x01 - One beep 0x02 - Two beeps
Format	byte	ISO format for the PIN block.
PAN	String	First 12 digits of the Primary Account Number. Leave blank if not required by the ISO format for the PIN block.

Return Value:
Returns true if successful. Otherwise, returns false.

4.10 requestPIN

This function prompts the user to enter a PIN. The host must supply the PAN if the Format block selected requires a PAN. The encrypted PIN block (EPB) will be returned in the event **OnEvent**. The data byte array may be passed to builder function PINDataBuilder.GetPINData();

For DynaFlex devices, this function starts a PIN session on the first call and shall be called again to send the PIN status to the device for completing the PIN session.

```
boolean IDevice.requestPIN(PINRequest pinRequest);
```

PINRequest:

Parameter	Type	Description
Timeout	byte	Wait time in seconds.

Parameter	Type	Description
PINMode	byte	PIN mode. Usage: 0x00 - Enter PIN 0x01 - Enter PIN Amount 0x02 - Reenter PIN Amount 0x03 - Reenter PIN 0x04 - Verify PIN For DynaFlex devices this is the User Interface Sequence: 0x00 - Enter PIN (start session) 0x02 - PIN Incorrect, Try Again (continue session) 0x03 - Enter PIN / Enter PIN Again (start session) 0x05 - Enter PIN Again (continue session) On the second call to requestPIN(), send the PIN status: 0xFD - Cancel PIN Session (end session) 0xFE - PIN Entry Failed (end session) 0xFF - PIN Entry Successful (end session)
MinLength	byte	Minimum length of accepted PIN (> 4).
MaxLength	byte	Maximum length of accepted PIN (< 12).
Tone	byte	Tone to play when prompting for the PIN. Usage: 0x00 - No sound 0x01 - One beep 0x02 - Two beeps
Format	byte	ISO format for the PIN block.
PAN	String	First 12 digits of the Primary Account Number. Leave blank if not required by the ISO format for the PIN block.

Return Value:
Returns true if successful. Otherwise, returns false.

4.11 requestSignature

This function prompts the user to enter a signature. The response data will be returned in the event **OnEvent**.

```
boolean IDevice.requestSignature();
```

Return Value:
Returns true of successful. Otherwise, returns false.

4.12 sendAuthorization

This function sends the Authorization Response Code (ARPC) blob to the device. The response data will be returned in the event **OnEvent**. See **EMV Transaction Flow** for how to process an EMV transaction.

```
boolean IDevice.sendAuthorization(IData data);
```

Parameter	Description
data	Contains ARPC blob.

Return Value:
Returns true if successful. Otherwise, returns false.

4.13 sendClassicNFCCommand

This function sends a command to a NFC Mifare Classic Tag type 2. The NFC tag must first be activated by calling startTransaction() with NFC enabled.

```
boolean IDevice.sendClasicNFCCommand(
      Error! Reference source not found. data,
      boolean lastCommand,
      boolean encrypt);
```

Parameter	Description
data	Command to send to the NFC tag. For details of the command see NFC Classic commands table below or ***D998200383 DynaFlex Family Programmer's Manual (COMMANDS) section NFC/Mifare Pass Through Commands***
lastCommand	Determines if this is the last NFC command to complete the operation. `true` = This is the last command. Device will provide a single beep after receiving a successful response from the NFC tag. To send subsequent commands, the NFC tag must be activated by calling startTransaction() with NFC enabled. `false` = Expect more commands (Default). Either set to true or false, if the NFC tag command fails, device will provide a double beep.
encrypt	Determines if data returned is to be encrypted. `true` = Encrypt data `false` = Do not encrypt data (Default)

Return Value:
Returns true if successful. Otherwise, returns false.

NFC Classic Commands

Command	Length	Field Value
Mifare Read	11	Byte 0 – 0x30 – Read Command Byte 1 – Sector Number to Read Byte 2 – Start Block Number Byte 3 – End Block Number Byte 4 – Key Type, 0 = A, 1 = B Byte 5 to 10 = 6 Byte Key
Mifare Write	var	Byte 0 – 0xA0 – Write Command Byte 1 – Sector Number to Write Byte 2 – Start Block Number Byte 3 – End Block Number Byte 4 – Key Type 0 = A, 1 = B Byte 5 to 10 = 6 Byte Key Byte 11 to x = Variable length Byte Data (16 bytes per block)
Mifare Increment	14	Byte 0 – 0xC1 – Increment Command Byte 1 – Source Sector Number Byte 2 – Source Block number Byte 3 – Key Type 0 = A, 1 = B Byte 4 to 9 = 6 Byte Key Byte 10 to 13 = 4 Byte Operand
Mifare Decrement	14	Byte 0 – 0xC0 – Decrement Command Byte 1 – Source Sector Number Byte 2 – Source Block number Byte 3 – Key Type 0 = A, 1 = B Byte 4 to 9 = 6 Byte Key Byte 10 to 13 = 4 Byte Operand
Mifare Restore	10	Byte 0 – 0xC2 – Restore Command Byte 1 – Source Sector Number Byte 2 – Source Block number Byte 3 – Key Type 0 = A, 1 = B Byte 4 to 9 = 6 Byte Key
Mifare Transfer	10	Byte 0 – 0xB0 – Write the value from the Transfer Buffer into destination block number Byte 1 – Destination Sector Number Byte 2 – Destination Block number Byte 3 – Key Type 0 = A, 1 = B Byte 4 to 9 = 6 Byte Key

Response Data For NFC Classic Tag

<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>81</td><td>var</td><td>Tag Response Code
Byte 0 = 0x00 = Success
Byte 0 = 0x01 = I/O Failed
Byte 0 = 0x02 Authentication Failed

Byte 1 = 0x01 = Block that Failed (optional)</td></tr>
<tr><td>82</td><td>var</td><td>Encryption Control Payload

If unencrypted:
<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>FC</td><td>var</td><td>NFC Data Container</td></tr>
<tr><td>/DF7A</td><td>var</td><td>NFC Data</td></tr>
</table>
If encrypted:
<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>/DFDF59</td><td>var</td><td>Encrypted Data Primitive to be decrypted.</td></tr>
<tr><td>/DFDF50</td><td>var</td><td>Encrypted Data KSN</td></tr>
<tr><td>/DFDF51</td><td>01</td><td>Encrypted Data Encryption Type</td></tr>
</table>
</td></tr>
</table>

Example Unencrypted Payload

```
81 0100 (Tag Respons Code)
82 82036D (Encryption Control)
   FC 820369 (NFC Data Container)
      DF7A 820364 (NFC Data)
           031391010F5504 7777772E6D616774656B2E636F6D FE00. . .
                          www.magtek.com
```

Example Encrypted Payload for Fast Read

```
81 0100 (Tag Response code)
82 820389 (Encryption Control)
   DFDF59 820370 (Encrypted Data Primitive)
          03679DC03B4CA607E3A7D2B52C8E9F1B5CD3D85E7368425. . .
   DFDF50 0A (Encrypted Data KSN)
          FFFF9876543210200047
   DFDF51 01 (Encrypted Data Type)
          80
```

4.14 sendDESFireNFCCommand

This function sends a command to an NFC Mifare DESFire Tag Type 4. The NFC tag must first be activated by calling startTransaction() with NFC enabled.

```
boolean IDevice.sendDESFireNFCCommand(
      Error! Reference source not found. data,
      boolean lastCommand,
      boolean encrypt);
```

Parameter	Description
data	Command to send to the NFC tag. See DESFire Data Sheet (MF2DLHX0). Should follow ISO 7816-4 APDU format. For details of the command see ***D998200383 DynaFlex Family Programmer's Manual (COMMANDS) section NFC/Mifare Pass Through Commands***
lastCommand	Determines if this is the last NFC command to complete the operation. `true` = This is the last command. Device will provide a single beep after receiving a successful response from the NFC tag. To send subsequent commands, the NFC tag must be activated by calling startTransaction() with NFC enabled. `false` = Expect more commands (Default). Either set to true or false, if the NFC tag command fails, device will provide a double beep.
encrypt	Determines if data returned is to be encrypted. `true` = Encrypt data `false` = Do not encrypt data (Default)

Return Value:
Returns true if successful. Otherwise, returns false.

Response Data For NFC Mifare DESFire Tag Type 4

Tag	Len	Value / Description
81	02	Tag Response (SW1 SW2). See DESFire Data Sheet (MF2DLHX0). Should follow ISO 7816-4 APDU format. • SW1 and SW2 of R-APDU If card is not able to respond: SW1 = 0x64, SW2 = 0x00

<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>82</td><td>var</td><td>Encryption Control Payload tag data.
• Data of R-APDU

If unencrypted:
<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>FC</td><td>var</td><td>NFC Data Container</td></tr>
<tr><td>/DF7A</td><td>var</td><td>NFC Data</td></tr>
</table>

If encrypted:
<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>/DFDF59</td><td>var</td><td>Encrypted Data Primitive to be decrypted.</td></tr>
<tr><td>/DFDF50</td><td>var</td><td>Encrypted Data KSN</td></tr>
<tr><td>/DFDF51</td><td>01</td><td>Encrypted Data Encryption Type</td></tr>
</table>
</td></tr>
</table>

Example Unencrypted Payload

```
81 0100 (Tag Respons Code)
82 82036D (Encryption Control)
   FC 820369 (NFC Data Container)
      DF7A 820364 (NFC Data)
           031391010F5504 7777772E6D616774656B2E636F6D FE00. . .
                          www.magtek.com
```

Example Encrypted Payload for Fast Read

```
81 0100 (Tag Response code)
82 820389 (Encryption Control)
   DFDF59 820370 (Encrypted Data Primitive)
          03679DC03B4CA607E3A7D2B52C8E9F1B5CD3D85E7368425. . .
   DFDF50 0A (Encrypted Data KSN)
          FFFF9876543210200047
   DFDF51 01 (Encrypted Data Type)
          80
```

4.15 sendNFCCommand

This function sends a command to an NFC Tag type 2. The NFC tag must first be activated by calling startTransaction() with NFC enabled.

```
boolean IDevice.sendNFCCommand(
      Error! Reference source not found. data,
      boolean lastCommand,
      boolean encrypt);
```

Parameter	Description
data	Command to send to the NFC tag. • `Get Version` • `Read` • `Fast Read` • `Write` • `Compatibility Write` • `Read_Cnt` • `PWD_Auth` • `Read_Sig` For details of the command see the NFC commands table below or ***D998200383 DynaFlex Family Programmer's Manual (COMMANDS) section NFC/Mifare Pass Through Commands***
lastCommand	Determines if this is the last NFC command to complete the operation. `true` = This is the last command. Device will provide a single beep after receiving a successful response from the NFC tag. To send subsequent commands, the NFC tag must be activated by calling startTransaction() with NFC enabled. `false` = Expect more commands (Default). Either set to true or false, if the NFC tag command fails, device will provide a double beep.
encrypt	Determines if data returned is to be encrypted. `true` = Encrypt data `false` = Do not encrypt data (Default)

Return Value:
Returns true if successful. Otherwise, returns false.

NFC Commands

Command	Length	Field Value
Get Version	1	The GET_VERSION command is used to retrieve information on the NTAG family, the product version, storage size and other product data required to identify the specific NTAG21x. Byte 0 = 0x60

Command	Length	Field Value
Read	2	The READ command requires a start page address, and returns the 16 bytes of four NTAG21x pages. For example, if address is 03h then pages 03h, 04h, 05h, 06h are returned. Special conditions apply if the READ command address is near the end of the accessible memory area. The special conditions also apply if at least part of the addressed pages is within a password protected area. Byte 0 = 0x30 Byte 1 = Start Page Address
Fast Read	3	The FAST_READ command requires a start page address and an end page address and returns the all n*4 bytes of the addressed pages. For example, if the start address is 03h and the end address is 07h then pages 03h, 04h, 05h, 06h and 07h are returned. Byte 0 = 0x3A Byte 2 = Start Page Address Byte 3 = End Page Address
Write	6	The WRITE command requires a block address, and writes 4 bytes of data into the addressed NTAG21x page. Byte 0 = 0xA2 Byte 1 = Address to Write Byte 2 to 5 = 4 Bytes of Data to Write
Compatibility Write	18	The COMPATIBILITY_WRITE command is implemented to guarantee interoperability with the established MIFARE Classic PCD infrastructure, in case of coexistence of ticketing and NFC applications. Even though 16 bytes are transferred to NTAG21x, only the least significant 4 bytes (bytes 0 to 3) are written to the specified address. Set all the remaining bytes, 04h to 0Fh, to logic 00h. Byte 0 = 0xA0 Byte 1 = Address to Write Byte 2 to 17 = 16 Bytes of Data to Write (only least significant 4 bytes are written) Note: This command is sent in 2 steps, which the Firmware will handle (1) <CMD><Address to Write><CRCH><CRCL> (2) <16 Bytes of Data to Write><CRCH><CRCL>

Command	Length	Field Value
READ_CNT	2	The READ_CNT command is used to read out the current value of the NFC one-way counter of the NTAG213, NTAG215 and NTAG216. The command has a single argument specifying the counter number and returns the 24-bit counter value of the corresponding counter. If the NFC_CNT_PWD_PROT bit is set to 1b the counter is password protected and can only be read with the READ_CNT command after a previous valid password authentication Byte 0 = 0x39 Byte 1 = 0x02 (NFC Counter Address)
PWD_AUTH	5	A protected memory area can be accessed only after a successful password verification using the PWD_AUTH command. The AUTH0 configuration byte defines the protected area. It specifies the first page that the password mechanism protects. The level of protection can be configured using the PROT bit either for write protection or read/write protection. The PWD_AUTH command takes the password as parameter and, if successful, returns the password authentication acknowledge, PACK. By setting the AUTHLIM configuration bits to a value larger than 000b, the number of unsuccessful password verifications can be limited. Each unsuccessful authentication is then counted in a counter featuring anti-tearing support. After reaching the limit of unsuccessful attempts, the memory access specified in PROT, is no longer possible. Byte 0 = 0x1B Byte 1..4 = password (4 bytes)
READ_SIG	2	The READ_SIG command returns an IC specific, 32-byte ECC signature, to verify NXP Semiconductors as the silicon vendor. The signature is programmed at chip production and cannot be changed afterwards. Byte 0 = 0x3C Byte 1 = 0x00, RFU

Response Data For NFC Tag Type 2

Tag	Len	Value / Description
81	01	Tag Response Code 0x00 = Success 0x01 = Failed

<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>82</td><td>var</td><td>Encryption Control Payload

If unencrypted:
<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>FC</td><td>var</td><td>NFC Data Container</td></tr>
<tr><td>/DF7A</td><td>var</td><td>NFC Data</td></tr>
</table>

If encrypted:
<table>
<tr><th>Tag</th><th>Len</th><th>Value / Description</th></tr>
<tr><td>/DFDF59</td><td>var</td><td>Encrypted Data Primitive to be decrypted.</td></tr>
<tr><td>/DFDF50</td><td>var</td><td>Encrypted Data KSN</td></tr>
<tr><td>/DFDF51</td><td>01</td><td>Encrypted Data Encryption Type</td></tr>
</table>
</td></tr>
</table>

Example Unencrypted Payload

```
81 0100 (Tag Respons Code)
82 82036D (Encryption Control)
   FC 820369 (NFC Data Container)
      DF7A 820364 (NFC Data)
           031391010F5504 7777772E6D616774656B2E636F6D FE00. . .
                          www.magtek.com
```

Example Encrypted Payload for Fast Read

```
81 0100 (Tag Response code)
82 820389 (Encryption Control)
   DFDF59 820370 (Encrypted Data Primitive)
          03679DC03B4CA607E3A7D2B52C8E9F1B5CD3D85E7368425. . .
   DFDF50 0A (Encrypted Data KSN)
          FFFF9876543210200047
   DFDF51 01 (Encrypted Data Type)
          80
```

4.16 sendSelection

This function send a user selection to the device.

```
boolean IDevice.sendSelection(IData data);
```

Parameter for data	Description
Byte 0	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

Parameter for data	Description
Byte 1	The menu item selected by the user. This is a single byte zero based binary value.

Return Value:
Returns true if successful. Otherwise, returns false.

4.17 startTransaction

This function starts a transaction. This function will automatically handle the opening and closing of a device. The transaction will be processed through multiple calls to the event **OnEvent**. See **EMV Transaction Flow** for how to process an EMV transaction.

```
boolean IDevice.startTransaction(ITransaction transaction);
```

Parameter	Description
transaction	An interface that holds the parameters for the transaction.

Return Value:
Returns true if the transaction started successfully. Otherwise, returns false.

4.18 subscribeAll

This function allows the host to be notified of all events sent by the device.

```
boolean IDevice.subscribeAll(IEventSubscriber eventCallback);
```

Parameter	Description
eventCallback	Name of a class or structure that implements the IEventSubscriber Delegate interface event.

Return Value:
Returns true if successful. Otherwise, returns false.

4.19 unsubscribeAll

This function allows the host to no longer receive any events sent by the device.

```
boolean IDevice.unsubscribeAll(IEventSubscriber eventCallback);
```

Parameter	Description
eventCallback	Name of a class or structure that implements the interface event.

Return Value:
Returns true if successful. Otherwise, returns false.

5 IDeviceCapabilities

Create an instance of the **IDeviceCapabilities** using **IDevice.getCapabilities**(). Then use the functions described in this chapter.

5.1 BatteryBackedClock

This property returns true if the device is equipped with a battery that preserves the internal clock when not powered by a host system or charging.

```
boolean IDeviceCapabilities.BatteryBackedClock();
```

Return Value:
Returns true if device is equipped with a battery backed clock. Otherwise, returns false.

5.2 Display

This property returns true if the device is equipped with display.

```
boolean IDeviceCapabilities.Display();
```

Return Value:
Returns true if device is equipped with a display. Otherwise, returns false.

5.3 MSRPowerSaver

This property returns true if the device has the option to disable or enable the magnetic stripe reader head (MSR). The MSR may be powered down while the device is idle to minimize power consumption.

```
boolean IDeviceCapabilities.MSRPowerSaver();
```

Return Value:
Returns true if device supports MSR power saver. Otherwise, returns false.

5.4 PaymentMethods

This property returns an enumerate list of payment methods supported by the device.

```
List<PaymentMethod> IDeviceCapabilities.PaymentMethods();
```

Return Value:
Returns a list of **PaymentMethod**.

5.5 PINPad

This property returns true if the device is equipped with a PIN Pad.

```
boolean IDeviceCapabilities.PINPad();
```

Return Value:
Returns true if device is equipped with a PIN Pad. Otherwise, returns false.

5.6 Signature

This property returns true if the device is equipped signature capture.

```
boolean IDeviceCapabilities.Signature();
```

Return Value:
Returns true if device is equipped with signature capture. Otherwise, returns false.

5.7 SRED

This property returns true if the device supports Secure Reading and Exchange of Data.

```
boolean IDeviceCapabilities.SRED();
```

Return Value:
Returns true if device supports SRED. Otherwise, returns false.

6 IDeviceControl

Create an instance of the **IDeviceControl** using **IDevice.getDeviceControl()**. Then use the function calls described in this chapter.

Generally, these functions will run in one of two modes:

- **Asynchronous** functions return data in the event handlers in section
- **Synchronous** functions return data in the return value. If the data is not available immediately, the call will block until a wait time has elapsed.

6.1 close

This function closes the connection to the device.

```
boolean IDeviceControl.close();
```

Return Value:
Returns true if successful. Otherwise, returns false.

6.2 deviceReset

This function resets the device. This is equivalent to a power reset. After the reset, connection to the device will need to be re-established.

```
boolean IDeviceControl.deviceReset();
```

Return Value:
Returns true if successful. Otherwise, returns false.

6.3 displayMessage

This function displays a message on the device's screen.

```
boolean IDeviceControl.displayMessage(byte messageID, byte timeout);
```

Parameter	Description
messageID	Byte array or string data of the image file to send to the device.
timeout	Wait time in seconds.

Return Value:
Returns true if successful. Otherwise, returns false.

6.4 endSession

This function clears session data and returns the device to an idle state.

```
boolean IDeviceControl.endSession();
```

Return Value:
Returns true if successful. Otherwise, returns false.

6.5 getInput

This function sends a request for user input to the device. The response data will be returned in the event **OnEvent**.

```
boolean IDeviceControl.getInput(IData data);
```

Parameter	Description
data	Byte array or string data to send to the device.

Return Value:
Returns true if successful. Otherwise, returns false.

6.6 open

This function opens a connection to the device.

```
boolean IDeviceControl.open();
```

Return Value:
Returns true if successful. Otherwise, returns false.

6.7 playSound

This function instructs the device to play a tone.

```
boolean IDeviceControl.playSound(IData data);
```

Parameter	Description
data	Byte array or string data to send to the device.

Return Value:
Returns true if successful. Otherwise, returns false.

6.8 send

This function sends a command to the device. The response will be passed to the event **OnEvent**.

```
boolean IDeviceControl.send(IData data);
```

Parameter	Description
data	Byte array or string data to send to the device. Data must contain the full command as required by the device.

Return Value:
Returns true if successful. Otherwise, returns false.

6.9 sendExtendedCommand

This function sends an extended command to the device. The response will be passed to the event **OnEvent**.

```
boolean IDeviceControl.sendExtendedCommand(IData data);
```

Parameter	Description
data	Byte array or string data to send to the device. Data must contain the full command as required by the device.

Return Value:
Returns true if successful. Otherwise, returns false.

6.10 sendSync

This function sends a synchronous command to the device. The response from the device will be returned in IResult.

```
IResult IDeviceControl.sendSync(IData data);
```

Parameter	Description
data	Byte array or string data to send to the device.

Return Value:
Returns `IResult`.

```
public interface IResult
{
  StatusCode Status
  IData Data
}
```

6.11 setDateTime

This function sets the date and time for the device.

```
boolean IDeviceControl.setDateTime(IData data);
```

Parameter	Description
data	Byte array or string data to send to the device.

Return Value:
Returns true if successful. Otherwise, returns false.

6.12 setLatch

This function send a command to lock or unlock the card latch. The host can choose to lock the card during EMV transactions to limit the possibility of the cardholder prematurely removing the card. The lock can also be enabled while the card is out of the system to block cardholders from inserting a card.

```
boolean IDeviceControl.setLatch(boolean enableLock);
```

Parameter	Description
enableLock	Usage: `false` – unlock the latch in the device. `true` – lock the latch in the device.

Return Value:
Returns true if successful. Otherwise, returns false.

6.13 showBarCode

This function sends a command to show a barcode on the device's display.

```
boolean IDeviceControl.showBarCode(
      BarCodeRequest request
      byte timeout
      IData prompt);
```

Parameter	Description
request	BarCodeRequest object containing the barcode data to display.
timeout	Display Time. Usage: 0x00 = Indefinite 0x01 to 0xFF = 1 to 255 seconds
prompt	Text to display below the QR code. In Landscape orientation, the limit is approximately 30 characters. In Portrait orientation, the limit is approximately 22 characters.

`BarCodeRequest:`

Parameter	Type	Description
Type	BarCodeType	Enum to specify the type of barcode
Format	BarCodeFormat	Enum to specify the barcode format
Data	byte[]	Data to encode into a barcode
BlockColor	byte[]	Block color. Use RRGGBB format. 0x000000 = Black
BackgroundColor	byte[]	Background color. Use RRGGBB format. 0xFFFFFF = White
ErrorCorrection	byte	Error Correction 0x00 = Low (default) 0x01 = Medium 0x02 = Quartile 0x03 = High See **ISO/IEC 18004:2015**

Parameter	Type	Description
MaskPattern	byte	Mask Pattern 0x00 to 0x07 = Mask Pattern 0xFF = Device Select Optimal Mask Pattern (default) See **ISO/IEC 18004:2015**
MinVersion	byte	Minimum Version. Must be less than or equal to Maximum Version. 0x01 to 0x28 = Version 1 to Version 40 (0x01 is default) See **ISO/IEC 18004:2015**
MaxVersion	byte	Maximum Version. Must be greater than or equal to Minimum Version. 0x01 to 0x28 = Version 1 to Version 40 (0x28 is default) See **ISO/IEC 18004:2015**

Return Value:
Returns true if successful. Otherwise, returns false.

6.14 showImage

This function sends a command to immediately show an image on the device's display.

```
boolean IDeviceControl.showImage(byte imageID);
```

Parameter	Description
imageID	Usage: 0x01 – show the image at slot 1. 0x02 – show the image at slot 2. 0x03 – show the image at slot 3. 0x04 – show the image at slot 4.

Return Value:
Returns true if successful. Otherwise, returns false.

6.15 showImage

This function sends a command to immediately show an image on the device's display.

```
boolean IDeviceControl.showImage(
      ImageData data
      byte timeout);
```

Parameter	Description
data	See ImageData below.
timeout	Display Time Usage: 0x00 = Indefinite 0x01 to 0xFF = 1 to 255 seconds

```
ImageData
```

Member	Type/ Format	Description
type	ImageType	Enum for image type. Usage: BITMAP = BMP file
data	byte[]	Image encoded data. Images must be BMP format, 160KB or smaller with no compression, maximum 320px by 240px, with color depth 16 color, 256 color, 16-bit color, or 24-bit color. Images smaller than the maximum size are centered on the display. Note images at full screen size must be 16-bit color or lower to meet the size requirement. For details see ***D998200383 DynaFlex Family Programmer's Manual (Commands)***.
backgroundColor	byte[3]	Background color in RRGGBB format. 0x000000 = Black 0xFFFFFF = White

Return Value:
Returns true if successful. Otherwise, returns false.

6.16 showUIPage

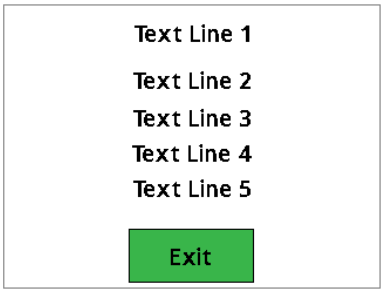
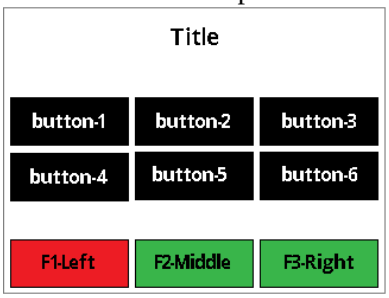
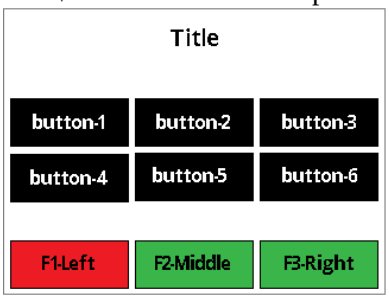
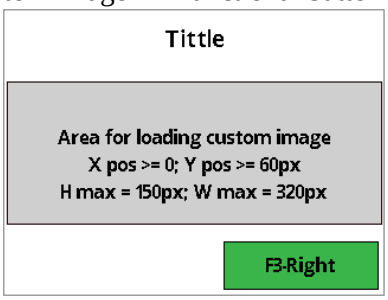
This function displays custom User Interface (UI) pages on devices that support a screen. It holds parameters for all UI page options of Text Lines, Text Buttons, Amount Buttons, and Image. Only one UI page option may be in effect at one time based on the option parameter. See the other subset functions for invoking a specific UI page.

When the UI page is active, the device waits for further action. The device notifies the host when a Button is pressed. Text Buttons and Functional Buttons report as the button number. Amount Buttons report the $ amount in BCD format. A press on a Text line does not produce a report.

```
boolean showUIPage(
      byte timeout,
      byte option,
      byte[] titleStringID,
      String line1,
      String line2,
      String line3,
      String line4,
      String line5,
      byte[] stringID1,
      byte[] stringID2,
      byte[] stringID3,
      byte[] stringID4,
      byte[] stringID5,
      byte[] stringID6,
      byte[] amount1,
      byte[] amount2,
```

```
byte[] amount3,
byte[] amount4,
byte[] amount5,
byte[] amount6,
byte[] leftFButtonStringID,
byte[] middleFButtonStringID,
byte[] rightFButtonStringID,
byte leftFButtonColor,
byte middleFButtonColor,
byte rightFButtonColor,
byte[] xPosition,
byte[] yPosition,
byte[] imageData);
```

Parameter	Description
timeout	Time in seconds to enable barcode reader. 0x00 = Infinite until the host initiates a change. 0x01 to 0xFF = RFU

Parameter	Description
option	UI page option. 0x00 = Up to 5 lines of text + 1 functional button Middle.  0x01 = Title + up to 6 text buttons + up to 3 functional buttons.  0x02 = Title + up to 6 $Amount buttons + up to 3 functional buttons.  0x03 = Title + custom image + 1 functional button Right. 
titleStringID[]	String ID for the title. See list of display user interface strings. This list may vary according to the device configuration.
line1 … line5	Text string for the line. Terminate with null char. To disable a line, set to empty.
stringID1[2] … stringID6[2]	Text string ID for buttons 1 to 6. 2-bytes in length. To disable a button, set to null.

Parameter	Description

amount1[4] … amount6[4]	Value $ Amount in BCD (Binary Coded Decimal) array format for buttons 1 to 6. 4-bytes in length. To disable a button, set to null.
	
	Byte index:
	• [0-2] = dollar value
	• [3] = cents value
	
	BCD positioning:
	87 65 43 . 21
	0x00 0x00 0x00 0x00
	• 8 – hundred thousand
	• 7 – ten thousand
	• 6 – thousand
	• 5 – hundred
	• 4 – ten
	• 3 – one
	• 2 – 1/tenth
	• 1 – 1/hundredth
	
	Range:
	• Min value displayed is `$0.00`
	• Max value displayed is `$999,999.99`
	
	Example:
	`// $0.01`
	`amount1 = new Byte[] { 0x00, 0x00, 0x00, 0x01 };`
	
	`//$100,000.23`
	`amount1 = new Byte[] { 0x10, 0x00, 0x00, 0x23 };`

leftFButtonStringID[2]	String ID for the Left functional button. 2-bytes in length. To disable this button, set to null.
middleFButtonStringID[2]	String ID for the Middle functional button. 2-bytes in length. To disable this button, set to null.
rightFButtonStringID[2]	String ID for the Right functional button. 2-bytes in length. To disable this button, set to null.
leftFButtonColor	Color of Left functional button. `0` = red, `1` = green, `2` = yellow
middleFButtonColor	Color of Middle functional button. `0` = red, `1` = green, `2` = yellow
rightFButtonColor	Color of Right functional button. `0` = red, `1` = green, `2` = yellow

Parameter	Description
xPosition[2]	X Position for image. 2-bytes in length. To display the image in the center of the loading image area, set to null.
yPosition[2]	Y Position for image. 2-bytes in length. To display the image in the center of the loading image area, set to null.
imageData[]	Bitmap data. Image encoded in full BMP file format as defined by Microsoft (e.g, starting with "BM"). If no image provided, set to null.

Return Value:
Returns true if successful. Otherwise, returns false.

6.17 showUIPageWithAmountButtons

This function shows the Amount UI page.

```
boolean showUIPageWithAmountButtons(
      byte timeout,
      byte[] titleStringID,
      String[] buttonAmountList,
      byte[] leftFButtonStringID,
      byte[] middleFButtonStringID,
      byte[] rightFButtonStringID,
      byte leftFButtonColor,
      byte middleFButtonColor,
      byte rightFButtonColor);

boolean showUIPageWithAmountButtons(
      byte timeout,
      byte[] titleStringID,
      String amount1,
      String amount2,
      String amount3,
      String amount4,
      String amount5,
      String amount6,
      byte[] leftFButtonStringID,
      byte[] middleFButtonStringID,
      byte[] rightFButtonStringID,
      byte leftFButtonColor,
      byte middleFButtonColor,
      byte rightFButtonColor);

boolean showUIPageWithAmountButtons(
      byte timeout,
      byte[] titleStringID,
      byte[] amount1,
      byte[] amount2,
```

```
byte[] amount3,
byte[] amount4,
byte[] amount5,
byte[] amount6,
byte[] leftFButtonStringID,
byte[] middleFButtonStringID,
byte[] rightFButtonStringID,
byte leftFButtonColor,
byte middleFButtonColor,
byte rightFButtonColor);
```

Parameter	Description
timeout	Time in seconds to enable barcode reader. 0x00 = Infinite until the host initiates a change. 0x01 to 0xFF = RFU
titleStringID[2]	String ID for the title. 2-bytes in length. See list of display user interface strings. This list may vary according to the device configuration.
buttonAmountList	List of $ Amount in BCD string format to display for each button.
leftFButtonStringID[2]	String ID for the Left functional button. 2-bytes in length. To disable this button, set to 0.
middleFButtonStringID[2]	String ID for the Middle functional button. 2-bytes in length. To disable this button, set to 0.
rightFButtonStringID[2]	String ID for the Right functional button. 2-bytes in length. To disable this button, set to 0.
leftFButtonColor	Color of Left functional button. 0 = red, 1 = green, 2 = yellow
middleFButtonColor	Color of Middle functional button. 0 = red, 1 = green, 2 = yellow
rightFButtonColor	Color of Right functional button. 0 = red, 1 = green, 2 = yellow
amount1 … amount6	Value $ Amount in BCD string format for buttons 1 to 6. 8-characters in length. To disable a button, set to null. Range: • Min value displayed is $0.00 • Max value displayed is $999,999.99 • Decimal needed to display cents • Comma not needed Example: // $0.01 string sAmount1 = "0.01"; // $100,000.23 string sAmount1 = "100000.23";

Parameter	Description

amount1[4] … amount6[4]	Value $ Amount in BCD (Binary Coded Decimal) array format for buttons 1 to 6. 4-bytes in length. To disable a button, set to null.
	
	Byte index:
	• [0-2] = dollar value
	• [3] = cents value
	
	BCD positioning:
	87 65 43 . 21
	0x00 0x00 0x00 0x00
	• 8 – hundred thousand
	• 7 – ten thousand
	• 6 – thousand
	• 5 – hundred
	• 4 – ten
	• 3 – one
	• 2 – 1/tenth
	• 1 – 1/hundredth
	
	Range:
	• Min value displayed is `$0.00`
	• Max value displayed is `$999,999.99`
	
	Example:
	`// $0.01`
	`amount1 = new Byte[] { 0x00, 0x00, 0x00, 0x01 };`
	
	`//$100,000.23`
	`amount1 = new Byte[] { 0x10, 0x00, 0x00, 0x23 };`

Return Value:
Returns true if successful. Otherwise, returns false.

6.18 showUIPageWithImage

This function shows the Image UI page.

```
boolean showUIPageWithImage(
      byte timeout,
      byte[] titleStringID,
      byte[] rightFButtonStringID,
      byte[] xPosition,
      byte[] yPosition,
      byte[] imageData);
```

Parameter	Description
timeout	Time in seconds to enable barcode reader. 0x00 = Infinite until the host initiates a change. 0x01 to 0xFF = RFU
titleStringID[2]	String ID for the title. 2-bytes in length. See list of display user interface strings. This list may vary according to the device configuration.
rightFButtonStringID[2]	String ID for the Right functional button. 2-bytes in length. To disable this button, set to 0.
xPosition[2]	X Position for image. 2-bytes in length. To display the image in the center of the loading image area, set to null.
yPosition[2]	Y Position for image. 2-bytes in length. To display the image in the center of the loading image area, set to null.
imageData[]	Bitmap data. Image encoded in full BMP file format as defined by Microsoft (e.g, starting with "BM").

Return Value:
Returns true if successful. Otherwise, returns false.

6.19 showUIPageWithTextButtons

This function shows the Text buttons UI page.

```
boolean showUIPageWithTextButtons(
      byte timeout,
      byte[] titleStringID,
      byte[] stringID1,
      byte[] stringID2,
      byte[] stringID3,
      byte[] stringID4,
      byte[] stringID5,
      byte[] stringID6,
      byte[] leftFButtonStringID,
      byte[] middleFButtonStringID,
      byte[] rightFButtonStringID,
      byte leftFButtonColor,
      byte middleFButtonColor,
      byte rightFButtonColor);
```

Parameter	Description
timeout	Time in seconds to enable barcode reader. 0x00 = Infinite until the host initiates a change. 0x01 to 0xFF = RFU

Parameter	Description
titleStringID[2]	String ID for the title. See list of display user interface strings. This list may vary according to the device configuration.
stringID1[2] to stringID6[2]	Text string ID for buttons 1 to 6. 2-bytes in length. To disable a button, set to null.
leftFButtonStringID[2]	String ID for the Left functional button. To disable this button, set to null.
middleFButtonStringID[2]	String ID for the Middle functional button. To disable this button, set to null.
rightFButtonStringID[2]	String ID for the Right functional button. To disable this button, set to null.
leftFButtonColor	Color of Left functional button. 0 = red, 1 = green, 2 = yellow
middleFButtonColor	Color of Middle functional button. 0 = red, 1 = green, 2 = yellow
rightFButtonColor	Color of Right functional button. 0 = red, 1 = green, 2 = yellow

Return Value:
Returns true if successful. Otherwise, returns false.

6.20 showUIPageWithTextLines

This function shows the Text lines UI page.

```
boolean showUIPageWithTextLines(
      byte timeout,
      String[] lines,
      byte[] middleFButtonStringID);

boolean showUIPageWithTextLines(
      byte timeout,
      String line1,
      String line2,
      String line3,
      String line4,
      String line5,
      byte[] middleFButtonStringID);
```

Parameter	Description
timeout	Time in seconds to enable barcode reader. 0x00 = Infinite until the host initiates a change. 0x01 to 0xFF = RFU
lines[]	List of Text strings for lines 1 to 5 in array format. Terminate with null char. To disable a line, set to null.

Parameter	Description
line 1 … line5	Text string for lines 1 to 5 in string format. Terminate with null char. To disable a line, set to null.
middleFButtonStringID[2]	String ID for the Middle functional buttons. 2-byte in length. To disable this button, set to null.

Return Value:
Returns true if successful. Otherwise, returns false.

6.21 startBarCodeReader

This function sends a command to start the barcode reader.

```
boolean IDeviceControl.startBarCodeReader(
      byte timeout
      byte encryptionMode);
```

Parameter	Description
timeout	Time to enable barcode reader. Usage: 0x00 = Wait until a barcode is read or **stopBarCodeReader()** is called. 0x01 to 0xFF = 1 to 255 seconds
encryptionMode	Encrypt payload Usage: 0x00 = do not encrypt barcode data 0x01 = encrypt barcode data.

Return Value:
Returns true if successful. Otherwise, returns false.

6.22 stopBarCodeReader

This function sends a command to stop the barcode reader. This is applicable only when the timeout value for startBarCodeReader() was set to 0x00.

```
boolean IDeviceControl.stopBarCodeReader();
```

Return Value:
Returns true if successful. Otherwise, returns false.

7 ConnectionInfo

Create an instance of the **ConnectionInfo** using **IDevice**.**getConnectionInfo()**. Then use the function calls described in this chapter.

7.1 getAddress

This function returns address of the device.

```
String ConnectionInfo.getAddress();
```

Return Value:
Returns the address of the device.

7.2 getConnectionType

This function returns the type of connection Interface for the device.

```
ConnectionType ConnectionInfo.getConnectionType();
```

Return Value:
Returns the **ConnectionType**

7.3 getDeviceType

This function returns the type for the device.

```
DeviceType ConnectionInfo.getDeviceType();
```

Return Value:
Returns the **DeviceFeature**
This enum refers to a featured supported by the device.

Enum	Description
`None`	No feature.
`SignatureCapture`	Supports signature capture
`PINEntry`	Supports PIN entry
`PANEntry`	Supports PAN entry
`ShowBarCode`	Supports display of a barcode
`ScanBarCode`	Supports scanning a barcode

DeviceType

8 DeviceInfo

Create an instance of the **DeviceInfo** from **IDevice**.**getDeviceInfo()**. Then use the function calls described in this chapter.

8.1 getModel

This function returns the model name of the device.

```
String DeviceInfo.getModel();
```

Return Value:
Returns the model name of the device.

8.2 getName

This function returns the name of the device.

```
String DeviceInfo.getName();
```

Return Value:
Returns the name of the device.

9 IDeviceConfiguration

Create an instance of the **IDeviceConfiguration** using **getDeviceConfiguration()**. Then use the function calls described in this chapter.

Generally, these functions will run in one of two modes:

- **Asynchronous** functions return data in the event handlers in section
-

- Static

Member	Value	Description
NFC_MIFARE_ULTRALIGHT	String	"nfc_mifare_ultralight"
MIFARE_CLASSIC_1K	String	"mifare_classic_1k"
MIFARE_CLASSIC_4K	String	"mifare_classic_4k"
MIFARE_DESFIRE	String	“Mifare_desfire”
TAG_REMOVED	String	"tag_removed"
FAILED	String	"failed"
IO_FAILED	String	"io_failed"
AUTHENTICATION_FAILED	String	"authentication_failed"

- IEventSubscriber Delegates.
- **Synchronous** functions return data in the return value. If the data is not available immediately, the call will block until a wait time has elapsed.

9.1 getChallengeToken

This function retrieves a challenge token from the device. A challenge token consists of a random nonce or timestamp. A challenge token must be used within the time allowed by the device (generally 5 minutes) of being issued. Only one token can be active at a time. Attempts to use a token for requests other than the one specified will cause the token to be revoked/erased.

```
byte[] IDeviceConfiguration.getChallengeToken(byte[] data);
```

Parameter	Description
data	Byte array containing the request ID to be protected.

Return Value:
Returns a byte array containing the challenge token.

9.2 getConfigInfo

This function retrieves device configuration information.

```
byte[]IDeviceConfiguration.getConfigInfo(
      byte configType,
      byte[] data);
```

Parameter	Description
configType	Type of configuration. For DynaFlex, this is the function ID.
data	Configuration data to be sent to the device. For DynaFlex, this is the OID.

Return Value:
Returns an array of bytes containing the configuration information.

9.3 getDeviceInfo

This function retrieves device specific information.

```
String IDeviceConfiguration.getDeviceInfo(InfoType infoType);
```

Parameter	Description
infoType	Enumerated information type.

Return Value:
Returns a string value device information.

9.4 getFile

This function retrieves device specific information.

```
int IDeviceConfiguration.getFile(
      byte[] fileID,
      IConfigurationCallback callback);
```

Parameter	Description
fileID	Byte array for the file ID. For DynaFlex, use a 4-byte file id.
callback	Name of a class or structure that implements the **IConfigurationCallback Delegates** events.

Return Value:
Returns a string value device information.

9.5 getKeyInfo

This function retrieves key information.

```
byte[]IDeviceConfiguration.getKeyInfo(
      byte keyType,
      byte[] data);
```

Parameter	Description
keyType	Type of key. For DynaFlex, use 0.
data	Key data to be sent to the device. For DynaFlex, this is the 2-byte key slot number.

Return Value:
Returns an array of bytes containing the key information.

9.6 sendFile

This function sends a file to the device.

```
int IDeviceConfiguration.sendFile(
      byte[] fileID,
      byte[] data,
      IConfigurationCallback callback);
```

Parameter	Description
fileID	Byte array for the file ID. For DynaFlex, use a 4-byte file id.
data	File contents to be sent to the device.
callback	Name of a class or structure that implements the **IConfigurationCallback Delegates** events.

Return Value:
Returns 0 if the asynchronous update operation started. Otherwise, returns a non 0 value.

9.7 sendImage

This function sends an image to the device.

```
int IDeviceConfiguration.sendImage(
      byte imageID,
      byte[] data,
      IConfigurationCallback callback);
```

Parameter	Description
imageID	Value for the image ID. For DynaFlex, use: `1, 2, 3, or 4`
data	File contents to be sent to the device. Images must be BMP format, 160KB or smaller with no compression, maximum 320px by 240px, with color depth 16 color, 256 color, 16-bit color, 24-bit color. Images smaller than the maximum size are centered on the display. Note images at full screen size must be 16-bit color or lower to meet the size requirement. For details see ***D998200383 DynaFlex Family Programmer's Manual (Commands)***.
callback	Name of a class or structure that implements the **IConfigurationCallback Delegates** events.

Return Value:
Returns 0 if the asynchronous update operation started. Otherwise, returns a non 0 value.

9.8 sendSecureFile

This function sends a file to the device using a secure command structure.

```
int IDeviceConfiguration.sendSecureFile(
      byte[] fileID,
      byte[] data,
      IConfigurationCallback callback);
```

Parameter	Description
fileID	Byte array for the file ID. For DynaFlex, use a 4-byte file id.
data	File contents to be sent to the device.
callback	Name of a class or structure that implements the **IConfigurationCallback Delegates** events.

Return Value:
Returns 0 if the asynchronous update operation started. Otherwise, returns a non 0 value.

9.9 setConfigInfo

This function sets device configuration information.

```
int IDeviceConfiguration.setConfigInfo(
      byte configType,
      byte[] data,
      IConfigurationCallback callback);
```

Parameter	Description
configType	Type of configuration. For DynaFlex, this is the function ID.
data	Configuration data to be sent to the device.
callback	Name of a class or structure that implements the **IConfigurationCallback Delegates** events.

Return Value:
Returns 0 if the asynchronous configuration operation started. Otherwise, returns a non 0 value.

9.10 setDisplayImage

This function sets which image is to be displayed when the device is idle.

```
int IDeviceConfiguration.setDisplayImage(byte imageID);
```

Parameter	Description
imageID	Value for the image ID. For DynaFlex, use: `0, 1, 2, 3, or 4` Where `0` substitutes the "Welcome" screen.

Return Value:
Returns 0 if the asynchronous configuration operation started. Otherwise, returns a non 0 value.

9.11 updateFirmware

This function updates the device firmware.

```
int IDeviceConfiguration.updateFirmware(
      ushort firmwareType,
      byte[] data,
      IConfigurationCallback callback);
```

Parameter	Description
firmwareType	Type of firmware. For DynaFlex, use: `1` – Main App
data	Firmware image to be sent to the device.
callback	Name of a class or structure that implements the **IConfigurationCallback Delegates** events.

Return Value:
Returns 0 if the asynchronous update operation started. Otherwise, returns a non 0 value.

9.12 updateKeyInfo

This function updates key information in the device.

```
int IDeviceConfiguration.updateKeyInfo(
      byte keyType,
      byte[] data,
      IConfigurationCallback callback);
```

Parameter	Description
keyType	Type of key.
data	Key data to be sent to the device.
callback	Name of a class or structure that implements the **IConfigurationCallback Delegates** events.

Return Value:
Returns 0 if the asynchronous update operation started. Otherwise, returns a non 0 value.

10 Classes

These classes are equipped with helper classes named Builders. Builders can parse the raw data byte array of an OnEvent() into a format required by a builder's class.

10.1 BarCodeData

These constructors initialize a BarCodeData object. Use BarCodeDataBuilder.GetBarCodeData with data from the BarCodeData event to return a BarcodeData.

```
BarCodeData BarCodeDataBuilder.GetBarCodeData(
      DeviceType deviceType,
      byte[] dataBytes
      );

new BarCodeData(byte[] Data, boolean Encrypted);
new BarCodeData(
      byte[] Data,
      boolean Encrypted,
      byte EncryptionType,
      byte[] KSN
      );
```

Member	Description
Data()	Returns the data payload.
Encrypted()	Returns the encryption status. false = data is not encrypted true = data is encrypted
EncryptionType()	Returns the encryption type.
KSN()	Returns the Key Serial Number.

Return Value:
Returns an instance of BarCodeData.

10.2 CertificateInfo

CertificateInfo is used for the connection to a device requiring client credentials. See the following for details on installing a certificate chain: ***D998200550 DynaFlex II PED Using Wireless LAN Guide***.

This constructor initialize a CertificateInfo object. Once created, it is to be passed to CoreAPI.createDevice().

```
new CertificateInfo(
      String format,
      byte[] data,
      String password
      );
```

CertificateInfo		
Parameter/ Member	Type/ Format	Description
format getFormat()	String	Certificate data format. "PKCS12" – for .p12 file. "PFX" – for .pfx file.
data getData()	byte[]	Certificate data.
password getPassword()	String	Password to access the certificate data.

Return Value:
Returns an instance of Certificate Info.

Example of using CertificateInfo.

```
String format = "PKCS12";
byte[] data = System.IO.File.ReadAllBytes("client.p12");
String password = "password";

CertificateInfo certificateInfo = new CertificateInfo(
      format,
      data,
      password);

IDevice device = CoreAPI.createDevice(
      DeviceType.MMS,
      ConnectionType.WEBSOCKET,
      "",
      "DynaFlex",
      "",
      "",
      certificateInfo));
```

10.3 ConnectionStateBuilder

This class returns the connection state of the device when supplied the data object of the OnEvent() ConnectionState event.

```
String ConnectionStateBuilder.GetString(ConnectionState value);

ConnectionState ConnectionStateBuilder.GetValue(string data);
```

Member	Description
CONNECTED	Returns string of connected.
CONNECTING	Returns string of connecting.
DISCONNECTED	Returns string of disconnected.

Member	Description
DISCONNECTING	Returns string of disconnecting.
ERROR	Returns string of error.
GetString()	Returns string of the ConnectionState enum.
GetValue()	Returns ConnectionState enum from the event data string value.

Return Value:
Returns an instance of ConnectionStateBuilder.

10.4 DirectoryEntry

DirectoryEntry is similar to an InputRequest for Application during a transaction. Other fields of information are included besides Application Label. During a transaction, the device selects the PPSE. The directory entries are the PPSE response starting from the BF0C tag. The number of directory entries correspond to the number of applications on the card.

These constructors initialize a DirectoryEntry object.

```
new DirectoryEntry();
new DirectoryEntry(
      String Aid,
      String Label,
      byte Priority,
      byte[] ProprietaryData,
      byte KernelIdentifier,
      byte[] IssuerIN,
      byte[] IssuerINE,
      byte[] IssuerCountryCodeAlpha2,
      byte[] IssuerCountryCodeAlpha3,
      byte[] CardProductDetails
      );
```

Parameter	Type	Description
Aid	String	Application Identifier. Tag 4F
Label	String	Application Label. Tag 50
Priority	byte	Application Priority Indicator. Tag 87
ProprietaryData	byte[]	Application Selection Registered Proprietary Data. Tag 9F0A
KernelIdentifier	byte	Kernel Identifier. Tag 9F2A
IssuerIN	byte[3]	Issuer Identification Number. Tag 42
IssuerINE	byte[4]	Issuer Identification Number Extended. Tag 9F0C
IssuerCountryCodeAlpha2	byte[2]	Issuer Country Code (alpha2 format). Tag 5F55
IssuerCountryCodeAlpha3	byte[3]	Issuer Country Code (alpha3 format). Tag 5F56
CardProductDetails	byte[2]	Card Product Details. Tag 9F7D

Return Value:
Returns an instance of DirectoryEntry.

10.5 EnhancedInputRequest

This supplies a directory entry list for application selection after a card has been presented to the device during a transaction. To be implemented, Application Selection Behavior property 1.2.1.1.1.2 must be set to 0x03 – Enhanced Prompt Cardholder.

The data byte array from the EnhancedInputRequest event is parsed and returned as an enhanced application selection list (directory entry). This list is the PPSE response starting from tag BF0C. EnhancedInputRequest class extends InputRequest.

```
new EnhancedInputRequest();
new EnhancedInputRequest(byte[] data);
```

EnhancedInputRequest		
Member	**Return**	**Description**
EnhancedSelectionList()	List<DirectoryEntry>	Returns a list of enhanced application selection.
setEnhancedSelectionList()	List<DirectoryEntry>	Sets a list of enhanced application selection.
Title()	String	Title to display.
Type()	int	Selection type.
Timeout()	long	Timeout in seconds to make selection.

10.6 IData

IData is used for the payload of events and passing data to functions. When assigning the member StringValue, the member ByteArray is automatically assigned. Same is true vice versa. In this way either a string or an array can be accessed without need of data conversion.

Use the BaseData() function to assign an instance of IData.

IData		
Member	**Type/ Format**	**Description**
StringValue()	String	Returns a string value.
ByteArray()	byte[]	Returns a byte array.

Example of using IData.

```
// String usage
IData data1 = new BaseData("3030");

// Array usage
IData data2 = new BaseData(new byte[] {0x30, 0x30});
```

10.7 InputRequest

This is used for displaying messages prompted by the card during a transaction. The data byte array from the InputRequest event is parsed and returned as an application selection list.

```
new InputRequest ();
new InputRequest (byte[] data);
```

InputRequest		
Member	Type/ Format	Description
Type() setType()	byte	Input type. 0x00 = INPUT_TYPE_APPLICATION 0x01 = INPUT_TYPE_LANGUAGE
Timeout() setTimeout	byte	Timeout in seconds
Title() setTitle()	string	Title
SelectionList() setSelectionList()	List<String>	List of selections for Application and Language depending on the Type.

Static		
Member	Value	Description
INPUT_TYPE_APPLICATION	0x00	Selection type is for Application.
INPUT_TYPE_LANGUAGE	0x01	Selection type is for Language.
INPUT_STATUS_COMPLETED	0x00	To send the status of completed for sendSelection().
INPUT_STATUS_CANCELLED	0x01	To send the status of canceled for sendSelection().
INPUT_STATUS_TIMED_OUT	0x02	To send the status of timed out for sendSelection().

Return Value:
Returns an instance of InputRequest.

10.8 ITransaction

This is the interface used as the parameter for startTransaction(). For an example, see the sample code in **IDevice Walk Through**.

ITransaction		
Parameter	Type/ Format	Description
Timeout	byte	Transaction timeout in seconds. Default is 60 seconds. `0 to 255` - Depending on the device, 0 means no timeout.
PaymentMethods	List of PaymentMethod	List of the PaymentMethod enumeration. `MSR` = For magnetic stripe cards. `Contact` = For EMV chip cards. `Contactless` = For NFC contactless cards. `ManualEntry` = Manually entry, no card. When set, other payment methods must not be included. `Barcode` = For barcode. `BarcodeEncrypted` = For barcode with encrypted response. `AppleVAS` = For Apple VAS. `GoogleVAS` = For Google Wallet VAS. `NFC` = For NFC tag.
QuickChip	boolean	In QuickChip mode, the device does not prompt for an amount. Device sends an ARQC request to the host. Device automatically populates the ARPC response data with EMV Tag 8A set to "Z3". Card holder is prompted to remove the card. Transaction result is later determined by the processor and not by the card. `false` - Do not enable QuickChip mode. `true` - Enable QuickChip mode. Default.
EMVOnly	boolean	Flag that determines whether or not to start an EMV transaction. `false` - Do not start transaction if the device does not support EMV. `true` - Only start transaction if the device supports EMV. Default.
PreventMSRSignatureForCardWithICC	boolean	Flag that forces the device to skip signature capture during an MSR-only transaction if the card's service code indicates it is a chip card. `false` – Allow the prompt for a signature if requested. `true` – Do not prompt for signature.
SuppressThankYouMessage	boolean	By default, devices with a display signal the end of a transaction by briefly showing "THANK YOU," then "WELCOME." `false` – Do not suppress the thank you message. `true` – Suppress the thank you message.

ITransaction		
DisplayAmountForQuickChip	boolean	Display Amount for Quick Chip Transaction Flow. `false` = Do not display Amount when QuickChip mode is true. Default. `true` = Display Amount when QuickChip mode is true.

ITransaction		
OverrideFinalTransactionMessage	byte	By default, devices with a display signal the end of a transaction by returning to the idle page and showing "WELCOME." This parameter directs the device to show a message based on the Message ID from the command **displayMessage()**. This option completely overrides the device's idle page behavior until the next transaction, power cycle, or other similar state change. 0x00 - reserved, do not use. 0x01 - "AMOUNT" 0x02 - "AMOUNT OK?" 0x03 - "APPROVED" 0x04 - "CALL YOUR BANK" 0x05 - "CANCEL OR ENTER" 0x06 - "CARD ERROR" 0x07 - "DECLINED" 0x08 - "ENTER AMOUNT" 0x09 - reserved, do not use. 0x0A - reserved, do not use. 0x0B - "INSERT CARD" 0x0C - "NOT ACCEPTED" 0x0D - reserved, do not use. 0x0E - "PLEASE WAIT" 0x0F - "PROCESSING ERROR" 0x10 - "REMOVE CARD" 0x11 - "USE CHIP READER" 0x12 - "USE MAGSTRIPE" 0x13 - "TRY AGAIN" 0x14 - "WELCOME" 0x15 - "PRESENT CARD" 0x16 - "PROCESSING" 0x17 - "CARD READ OK - REMOVE CARD" 0x18 - "INSERT OR SWIPE CARD" 0x19 - "PRESENT ONE CARD ONLY" 0x1A - "APPROVED PLEASE SIGN" 0x1B - "AUTHORIZING PLEASE WAIT" 0x1C - "INSERT, SWIPE OR TRY ANOTHER CARD" 0x1D - "PLEASE INSERT CARD" 0x1E - Null prompt (empty screen) 0x1F - reserved, do not use. 0x20 - "SEE PHONE" 0x21 - "PRESENT CARD AGAIN" 0x22 - "INSERT/SWIPE/TRY OTHER CARD" 0x23 - "TAP or SWIPE CARD" 0x24 - "TAP or INSERT CARD" 0x25 - "TAP, INSERT or SWIPE CARD" 0x26 - "TAP CARD" 0x27 - "TIMEOUT" 0x28 - "TRANSACTION TERMINATED"

ITransaction		
EMVResponseFormat	byte	The format of the EMV response. 0x00 – Legacy. Default. 0x01 – RFU
TransactionType	byte 1	EMV Tag 9C - The type of financial transaction, represented by the first two digits of the ISO 8583:1987 Processing Code. Examples: 0x00 – purchase. Default. 0x01 – cash advance 0x09 – purchase with cashback 0x20 – refund Supported transaction types can found in the commands programmers manual specific to the device.
Amount	String 12	EMV Tag 9F02 - Authorized amount of the transaction. Example: "000000000123" – $1.23 "000000009999" – $99.99
CashBack	String 12	EMV Tag 9F03 - Secondary amount associated with the transaction. Example: "000000000123" – $1.23 "000000009999" – $99.99
CurrenyCode	byte[] 2	EMV Tag 5F2A - Currency code of the transaction according to ISO 4217. The byte array is null by default. Example: 0x0840 = US Dollar 0x0978 = Euro 0x0826 = UK Pound
CurrencyExponent	byte[] 1	EMV Tag 5F36 - The decimal point position from the right of the transaction amount. The byte array is null by default. Example: 0x02 – decimal point at 2 position from the right.
TransactionCategory	byte[] 1	EMV Tag 9F53 - The type of contactless transaction being performed. The byte array is null by default.
MerchantCategory	byte[] 2	EMV Tag 9F15 - The type of business being done by the merchant, represented according to ISO 18245. The byte array is null by default.

ITransaction		
MerchantID	byte[] 15	EMV Tag 9F16 - Used to uniquely identify a given merchant. The byte array is null by default.
MerchantCustomData	byte[] 20	EMV Tag 9F7C – Proprietary merchant data that may be requested. The byte array is null by default.
ManualEntryType	byte	User interface sequence. 0x00 – Card Number, Expiration Date, Security Code 0x01 – Name on Card, Card Number, Expiration Date, Security Code (Reserved for Future Use) 0x02 – Qwick Code, Last 4 digits of Card Number, Security Code (Reserved for future use)
ManualEntryFormat	byte	Card number valid format. 0x00 – PAN min 8, max 21 digits
ManualEntrySound	byte	Beeper feedback. 0x00 – On keypress sound disabled 0x01 – On keypress sound enabled
AppleVASMode	VASMode	An enumeration for the Apple VAS Mode.
AppleVASProtocol	VASProtocol	An enumeration for the Apple VAS Protocol.
TipMode	byte	Tip mode. 0x00 = Disable Tip Mode 0x01 = Show Tip GUI immediately using % 0x02 = Show Tip GUI immediately using $ 0x11 = Enable Read Channel(s), with +Tip Button using % 0x12 = Enable Read Channel(s), with +Tip Button, using $
Tip1DisplayMode	byte	Display mode for Tip button 1. 0x00 = % or $ 0x01 = Display Custom 0x02 = Display NO TIP 0x03 = Disabled
Tip2DisplayMode	byte	Display mode for Tip button 2. 0x00 = % or $ 0x01 = Display Custom 0x02 = Display NO TIP 0x03 = Disabled

ITransaction		
Tip3DisplayMode	byte	Display mode for Tip button 3. 0x00 = % or $ 0x01 = Display Custom 0x02 = Display NO TIP 0x03 = Disabled
Tip4DisplayMode	byte	Display mode for Tip button 4. 0x00 = % or $ 0x01 = Display Custom 0x02 = Display NO TIP 0x03 = Disabled
Tip5DisplayMode	byte	Display mode for Tip button 5. 0x00 = % or $ 0x01 = Display Custom 0x02 = Display NO TIP 0x03 = Disabled
Tip6DisplayMode	byte	Display mode for Tip button 6. 0x00 = % or $ 0x01 = Display Custom 0x02 = Display NO TIP 0x03 = Disabled
Tip1Value	String	Display value for Tip button 1. "1.00" = $1.00 (Display Mode is $) "10.0001" = 10.0001% (Display Mode is %)
Tip2Value	String	Display value for Tip button 2. "1.00" = $1.00 (Display Mode is $) "10.0001" = 10.0001% (Display Mode is %)
Tip3Value	String	Display value for Tip button 3. "1.00" = $1.00 (Display Mode is $) "10.0001" = 10.0001% (Display Mode is %)
Tip4Value	String	Display value for Tip button 4. "1.00" = $1.00 (Display Mode is $) "10.0001" = 10.0001% (Display Mode is %)

ITransaction		
Tip5Value	String	Display value for Tip button 5. "1.00" = $1.00 (Display Mode is $) "10.0001" = 10.0001% (Display Mode is %)
Tip6Value	String	Display value for Tip button 6. "1.00" = $1.00 (Display Mode is $) "10.0001" = 10.0001% (Display Mode is %)
TaxAmount	String	Tax amount. "1.00" = $1.00
FunctionalButtonRightOption	byte[] 2	String ID to use for the Right functional button. The byte array is null by default. When user presses this button, device sends a notification to the host to indicate the present card functional button Right is pressed. Device then waits for the next command from the host. While waiting, the screen shows "PLEASE WAIT". null = Disable. 0x0000 to 0x00FF = String ID

10.9 NFCData

These constructors initialize an NFCData object. Use NFCDataBuilder.GetNFCData with the data byte array from the NFCData event to return an NFCData.

```
NFCData NFCDataBuilder.GetNFCData(deviceType, byte[] dataBytes);

new NFCData(byte[] Data, boolean Encrypted);
new NFCData(
      byte[] Data,
      boolean Encrypted,
      byte EncryptionType,
      byte[] KSN
      );
```

Member	Description
Data()	Returns the data payload.
Encrypted()	Returns the encryption status. false = data is not encrypted true = data is encrypted
EncryptionType()	Returns the encryption type.
KSN()	Returns the Key Serial Number.

Return Value:

Returns an instance of NFCData.

10.10 NFCRAPDUData

These constructors initialize an NFCRAPDUData object. Use NFCDataBuilder.GetNFCRAPDUData with data byte array from the NFCRAPDUResponse event to return an NFCRAPDUData.

```
NFCRAPDUData NFCRAPDU(
      byte[] response,
      byte[] data,
      boolean encrypted,
      );

NFCRAPDUData NFCRAPDU(
      byte[] response,
      byte[] data,
      bool encrypted,
      byte encryptionType,
      byte[] ksn
      );

NFCRAPDUData NFCDataBuilder.GetNFCRAPDUData(
      DeviceType deviceType,
      byte[] dataBytes,
      );
```

Parameter	Description
response	Response data.
data	The data payload.
encrypted	Encryption status. false = data is not encrypted true = data is encrypted
encryptionType	The encryption type.
ksn	The Key Serial Number.
deviceType	Device type.
dataBytes	Data bytes from the NFCAPDUResponse event.

Return Value:
Returns an instance of NFCRAPDUData.

10.11 NFCEventBuilder

This class assist in parsing NFCEvent data.

Static		
Member	Return	Description
GetDetail(string data)	String	Returns a string containing NFC detail.

Static		
GetEventValue(string data)	NFCEvent	Returns the NFCEvent enumeration.
GetString(NFCEvent value)	String	Returns a string representation of NFCEvent enumeration.

Static		
Member	Value	Description
NFC_MIFARE_ULTRALIGHT	String	"nfc_mifare_ultralight"
MIFARE_CLASSIC_1K	String	"mifare_classic_1k"
MIFARE_CLASSIC_4K	String	"mifare_classic_4k"
MIFARE_DESFIRE	String	“Mifare_desfire”
TAG_REMOVED	String	"tag_removed"
FAILED	String	"failed"
IO_FAILED	String	"io_failed"
AUTHENTICATION_FAILED	String	"authentication_failed"

11 IEventSubscriber Delegates

MTUSDKNET API will invoke the callback function in this chapter to provide the requested data and/or a detailed response. To delegate the event, call the **subscribeAll** function with the name of a class that implements the IEventSubscriber Delegates interface.

11.1 OnEvent

OnEvent handles all event types. The `eventType` parameter defines which event is triggered.

```
public void OnEvent(
      EventType eventType,
      IData data);
```

Parameter	Description
eventType	An enumeration indicating the event triggered by the device.
data	Contains the data for the event. The payload is dependent on the event type.

Return Value: None

Example:

```
public class OnEventClass implements IEventSubscriber
{
    public void OnEvent(EventType eventType, IData data)
    {
        // Event handler
    }

}

OnEventClass eventCallBack = new OnEventClass();
device.subscribeAll(evenCallBack);
```

In this example, the main window implements IEventSubscriber. The keyword “this” is used to pass in the name of the current class MainWindow.

```
public partial class MainWindow implements IEventSubscriber
{
    public void OnEvent(EventType eventType, IData data)
    {
        // Event handler
    }

    public void connectDevice()
    {
        device.subscribeAll(this);
    }
}
```

Event Data Parsing

Classes can be initialized by passing in the data byte array.

Example:

```
public void OnEvent(EventType eventType, IData data)
    {
      // Barcode data
      BarCodeData barcodeData =
BarCodeDataBuilder.GetBarCodeData(DeviceType.MMS, data.ByteArray());

      // Input request
      InputRequest ir = new InputRequest(data.ByteArray());

      // NFC data
      NFCData nfcData = NFCDataBuilder.GetNFCData(DeviceType.MMS,
data.ByteArray());

      // Enhanced input request
      EnhancedInputRequest eir = new
EnhancedInputRequest(data.ByteArray());
      List<DirectoryEntry> deList = eir.EnhancedSelectionList;

    }
```

12 IConfigurationCallback Delegates

MTUSDKNET API will invoke the callback function in this chapter to provide the requested data and/or a detailed response. These events will be called in a class that implements the **IConfigurationCallback Delegates** interface.

12.1 OnCalculateMAC

This event is called when certain asynchronous **IDeviceConfiguration** operations need to be have a MAC included with the request.

```
IResult OnCalculateMAC(
      byte macType,
      byte[] data);
```

Parameter	Description
macType	Type of Mac algorithm. For DynaFlex, use 0.
data	Contains the data of the payload to MAC.

Return Value:
Returns an IResult that contains the calculated MAC.

12.2 OnProgress

This event is called to update the host on the progress of an asynchronous **IDeviceConfiguration** operation.

```
public void OnProgres(int progress);
```

Parameter	Description
progress	The progress of the configuration operation. Range: 0 - 100

Return Value: None

12.3 OnResult

This event is called to update the host when an asynchronous **IDeviceConfiguration** operation is completed.

```
public void OnResult(
      StatusCode status,
      byte[] data);
```

Parameter	Description
status	An enumerated **Library Status Codes**.
data	Contains the data for the event.

Return Value: None

Example:

```
class OnConfigCallbackClass implements IConfigurationCallBack
{
    public IResult OnCalculateMAC(byte macType, byte[] data)
    {
        // Event handler
    }

    public void OnProgress(int progress)
    {
        // Event handler
    }

    public void OnResult(StatusCode status, byte[] data)
    {
        // Event handler
    }

}

OnConfigCallbackClass configCallBack = new OnConfigCallbackClass();
```

13 IMQTTDeviceStatusCallback Delegates

This interface invokes callback functions to receive data and/or a detailed response. To register for the event(s), call the setMQTTDeviceStatusMonitoring() function with the name of a class that implements the IMQTTDeviceStatusCallback interface.

13.1 OnConnected

This event is called when a device is connected to the MQTT broker.

```
void OnConnected(String deviceAddress);
```

Parameter	Description
deviceAddress	Device address.

Return Value: None

13.2 OnDisconnected

This event is called when a device is disconnected from the MQTT broker.

```
void OnDisconnected(String deviceAddress);
```

Parameter	Description
deviceAddress	Device address.

Return Value: None

14 ISystemStatusCallback Delegates

This interface invokes callback functions to receive data and/or a detailed response. To register for the event(s), call the setSystemStatusCallback() function with the name of a class that implements the ISystemStatusCallback interface.

14.1 OnError

This event is called when an error occurs with the connection with the MQTT broker.

```
void OnError(
      ErrorType error,
      String details);
```

Parameter	Description
error	Type of error enumeration.
details	Details of the error.

Return Value: None

15 Enumerations

15.1 BarCodeFormat

This enum refers to the type of barcodes to display.

Enum	Description
BLOB	Data is binary format
COMMAND	Data is a command in binary format
BLOB_BASE64	Data is Base64 encoded format
COMMAND_BASE64	Data is a command in Base64 format

15.2 BarCodeType

This enum refers to the type of barcodes to display.

Enum	Description
QRCODE	QR code

15.3 ConnectionState

This enum refers to the readiness of the SDK to communicate with the device. This is not the physical attachment to a host system.

Enum	Description
Unknown	Device is in an unknown connection state.
Disconnected	Device is disconnected.
Connecting	Device is in the process of connecting. The next state is to be Connected.
Error	There was an error either connecting or disconnecting the device.
Connected	Device is connected and ready for transacting.
Disconnecting	Device is in the process of disconnecting. The next state will is to be Disconnected.

15.4 ConnectionType

This enum refers to the communication interface type of MagTek reader which the SDK will control.

Enum	Description
USB	Universal Serial Bus supported devices:

Enum	Description
	• eDynamo • mDynamo • Dynamag • DynaMax • tDynamo • kDynamo • cDynamo • iDynamo 6 • DynaPro • DynaPro Go • DynaPro Mini • DynaFlex • DynaFlex Pro • DynaFlex II PED • DynaProx • DynaFlex II Go
BLUETOOTH_LE	Bluetooth Low Energy devices: • DynaMax • DynaFlex II Go
BLUETOOTH_LE_EMV	Bluetooth Low Energy with EMV supported devices: • eDynamo
BLUETOOTH_LE_EMVT	Bluetooth Low Energy with EMV supported devices: • tDynamo
TCP	Transmission Control Protocol supported devices: • DynaPro
TCP_TLS	Transmission Control Protocol with Transport Layer Security supported devices: • DynaPro Go
TCP_TLS_TRUST	Transmission Control Protocol with Transport Layer Security supported devices: • DynaPro Go
WEBSOCKET	WebSocket supported devices: • DynaFlex Pro • DynaFlex II PED
WEBSOCKET_TRUST	WebSocket supported devices. This will establish a TLS connection to device without requirement for name match. • DynaFlex Pro • DynaFlex II PED
SERIAL	UART supported devices
AIDL	AIDL devices: • DynaGlass
VIRTUAL	Virtual devices

Enum	Description
MQTT	MQTT • DynaFlex II PED

15.5 DataEntryType

This enum is reserved for future use.

Enum	Description
PIN	Request Personal Identification Number
Signature	Request Signature
SSN	Request Social security number
ZIPCODE	Request Zip code
BirthDate	Request Birth date
ActivationCode	Request Activation code

15.6 DeviceEvent

This enum refers to a change in the device status.

Enum	Description
None	No event to report.
DeviceResetOccured	A device reset had occurred.
DeviceResetWillOccur	A device reset will occur soon. Host application may uses this as a warning to take appropriate actions.

15.7 DeviceFeature

This enum refers to a featured supported by the device.

Enum	Description
None	No feature.
SignatureCapture	Supports signature capture
PINEntry	Supports PIN entry
PANEntry	Supports PAN entry
ShowBarCode	Supports display of a barcode
ScanBarCode	Supports scanning a barcode

15.8 DeviceType

This enum refers to the type of MagTek reader which the SDK will control.

Enum	Description
SCRA	Secure Reader Authenticator devices. List includes but not limited to: • eDynamo • mDynamo • Dynamag • DynaMax • tDynamo • kDynamo • cDynamo • iDynamo 6
PPSCRA	PIN Pad Secure Reader Authenticator devices. List includes but not limited to: • DynaPro • DynaPro Go • DynaPro Mini
CMF	Common Message Structure devices. List includes but not limited to: • oDynamo
MMS	Apollo class devices. List includes but not limited to: • DynaFlex • DynaFlex Pro • DynaProx

15.9 ErrorType

This enum refers to the type of connection error.

Enum	Description
Unknown	Device is in an unknown connection state.
TimedOut	Device has timed out.
BluetoothOff	Bluetooth is off.
BluetoothUnauthorized	Bluetooth not paired.
NetworkOff	Network is off.
NetworkUnreachable	Network is unreachable.
SecurityRejected	Security rejected.
SecurityFailed	Security failed.
ConnectionFailed	Connection failed.

15.10 EventType

This enum refers to the type of event triggered by the device.

Enum	Description
ConnectionState	There was a change in the connection state of the device.
DeviceResponse	Device has responded to a command.
DeviceNotification	Device has sent a notification.
CardData	Device has sent magnetic stripe data from a card swipe.
TransactionStatus	There was a change in transaction status.
DisplayMessage	Device has a message to display for the user.
ClearDisplay	Device has notified to clear the display of user messages on host app.
InputRequest	Device is requesting input from the user.
EnhancedInputRequest	Device is requesting input for enhanced application selection in response to entering the card's payment system environment.
AuthorizationRequest	Device has sent the Authorization Request Cryptogram and associated block of EMV tags for a transaction. This block is meant to be sent to the transaction processor.
TransactionResult	Device has sent the result of the transaction.
PINBlock	Device has sent the PINBlock after the user has entered a PIN on the device.
Signature	Device has sent data which represents a signature from a user.
DeviceDataFile	Device has sent a data file.
OperationStatus	Device has sent an operation status of a command.
DeviceEvent	Device has sent change of device state.
UserEvent	Device has sent a notification related to user interaction with the device.
FeatureStatus	Device has sent status of a feature.
PINData	Device has sent data related to a PIN.
PANData	Device has sent data related to a PAN.
BarCodeData	Device has sent barcode data.
NFCEvent	Device has sent NFC event.

Enum	Description
NFCData	Device has sent NFC data.
NFCResponse	Device has sent response to and NFC command.
NFCAPDUResponse	Device has sent response to an NFC APDU command for Mifare DESFire Tag.
TouchscreenSignatureCapture	Device has sent response to signature capture.
TouchscreenFunctionalButtonSelected	Device has sent a notification of a functional button selected.
TouchscreenTextStringButtonSelected	Device has sent a notification of a test string button selected.
TouchscreenAmountButtonSelected	Device has sent a notification of an amount button selected.
TouchscreenPresentCardFunctionalButtonSelected	Device has sent a notification of a present card functional button selected.

15.11 FeatureStatus

This enum refers to the status of a specific feature reported from **DeviceFeature**.

Enum	Description
NoStatus	No change in status
Success	Success
Failed	Failed
TimedOut	Timed out
Cancelled	Cancelled
Error	Error
HardwareNA	Featured hardware not applicable for a status

15.12 ImageType

This enum refers to the type of image.

Enum	Description
BITMAP	BMP file

15.13 InfoType

This enum refers to the type of specific information to retrieve from the device.

Enum	Description
DeviceSerialNumber	Device serial number.
FirmwareVersion	Firmware version of the device.

Enum	Description
DeviceCapabilities	Capabilities of the device delimited by a comma.
Boot1Version	Boot 1 firmware version of the device.
Boot0Version	Boot 0 firmware version of the device.
FirmwareHash	Firmware hash comprised of part numbers, versions, and timestamps.
TamperStatus	Tamper status of the device. 0x00 = Not Tampered 0x01 = Tampered
OperationStatus	Operation status of the device. 0x01 = Offline 0x02 = Online
OfflineDetail	Offline details of the device. • Bit 0 = Tamper problem present • Bit 1 = Master Key problem present • Bit 2 = Keys and Certificates problem present • Bit 3 = Real Time Clock problem present • Bit 4 = Random Number Generator problem present • Bit 5 = Cryptography Engine problem present • Bit 6 = Magnetic Stripe Reader Hardware problem present Bit 7 = Reserved

15.14 NFCEvent

Enum	Description
None	No update for the operation.
NFCMifareUltralight	Mifare Ultralight
MifareClassic1K	Mifare Classic 1K
MifareClassic4K	Mifare Classic 4K
MifareDESFire	Mifare DESFire Light
TagRemoved	Tag removed
Failed	Command failed
IOFailed	IO failed
AuthenticationFailed	Authentication failed

15.15 OperationStatus

This enum refers to the operation status of the device.

Enum	Description
NoStatus	No update for the operation.
Started	Device has started an operation.

Enum	Description
Warning	Device has sent a warning about the operation.
Failed	Device has failed an operation.
Done	Device has completed an operation.

15.16 PaymentMethod

This enum refers to which card type the device will perform a transaction.

Enum	Description
MSR	For magnetic stripe cards.
Contact	For EMV chip cards.
Contactless	For NFC contactless cards.
ManualEntry	For user to manually enter transaction data without any card access.
Barcode	For barcode.
BarcodeEncrypted	For encrypted barcode.
AppleVAS	For Apple VAS.
NFC	For NFC tag.
GoogleVAS	For Google Wallet Smart Tap VAS.

15.17 TransactionStatus

This enum refers to the status of the transaction.

Enum	Description
NoStatus	Set before the start of a transaction and before a card is presented to the device.
NoTransaction	No transaction in progress.
CardSwiped	A card was swiped into the device.
CardInserted	A card was inserted into the device.
CardRemoved	A card was removed from the device.
CardDetected	A card was detected by the device.
CardCollision	A card collision was detected by the device.
TimedOut	The transaction was not completed before a timeout period.
HostCancelled	The host software sent a cancel.
TransactionCancelled	The transaction was cancelled.
TransactionInProgress	The transaction is in progress.
TransactionError	There is an error during the transaction.

Enum	Description
TransactionApproved	The transactions is approved.
TransactionDeclined	The transactions is declined.
TransactionCompleted	The transaction is completed.
TransactionFailed	The transaction failed.
TransactionNotAccepted	The transaction was not accepted by the device.
SignatureCaptureRequested	A signature capture is requested by the device.
TechnicalFallback	Due to technical reasons, the chip transaction cannot be completed by the reader.
QuickChipDeferred	Device has sent a “Z3” response code to the chip card.
DataEntered	Data has been entered on the device for a manual card entry transaction.
TryAnotherInterface	Due to removal of the chip card or error with contactless card, the transaction cannot be completed by the reader.
BarcodeRead	A barcode is read.
VASError	Apple VAS error occurred.
TransactionStartedFromDevice	The transaction has started by user interaction with the device.
TransactionStartedFromDeviceQuickChip	The Quick Chip transaction has started by user interaction with the device.
TransactionCancelledFromDevice	The transaction was cancelled from device.

15.18 UserEvent

This enum refers to the type of user event reported by the device. These events relate to user interaction.

Enum	Description
None	No events yet to occur.
ContactlessCardPresented	Contactless card has been presented.
ContactlessCardRemoved	Contactless card has been removed.
CardSeated	Card is seated into the chip station.
CardUnseated	Card was removed from the chip station.
CardSwiped	Magnetic stripe card was swiped.
TouchPresented	Touch screen sensor press detected.
TouchRemoved	Touch screen sensor release detected.
BarcodeRead	Barcode detected.

Enum	Description
NFCMifareUltralightPresented	Mifare Ultralight presented.
MifareClassic1KPresented	Mifare Classic 1K presented.
MifareClassic4KPresented	Mifare Classic 4K presented.
MifareDESFirePresented	Mifare DESFire Light presented.
NFCMifareUltralightRemoved	Mifare Ultralight removed.
MifareClassic1KRemoved	Mifare Classic 1K removed.
MifareClassic4KRemoved	Mifare Classic 4K removed.
MifareDESFireRemoved	Mifare DESFire Light removed.

15.19 VASMode

This enum refers to the Apple VAS and Google Wallet VAS mode. This controls how the VAS data is returned in the transaction ARQC. For details on Apple VAS data structure returned in a transaction see ***D998200383 DynaFlex Family Programmer's Manual (COMMANDS)***.

Enum	Description
Single	The device reads only VAS data from a tapped smartphone, or reads EMV payment data from a tapped card. When the device sends ARQC to conclude the transaction, it only includes either EMV payment data in container FC for cards, or includes VAS data in container FE for smartphones.
Dual	The device reads both VAS data and EMV payment data from a tapped smartphone, or reads EMV payment data from a tapped card. When device sends ARQC to the host to conclude the transaction, it includes EMV payment data in container FC and includes VAS data, if available, in container FE.
VASOnly	The device reads only VAS data from a tapped smartphone, and does not read data from a tapped card. If the tapped smartphone does not support VAS, the device does not detect or read from the smartphone. When the device send ARQC to conclude the transaction, it includes VAS data in container FE and does not include EMV payment data in container FC.

15.20 VASProtocol

This enum refers to the Apple VAS protocol. For details on Apple VAS data structure returned in a transaction see ***D998200383 DynaFlex Family Programmer's Manual (COMMANDS)***.

Enum	Description
URL	URL VAS protocol
Full	Full VAS protocol

Appendix A Status Codes

A.1 Library Status Codes

```
public enum StatusCode
{
    SUCCESS = 0,
    TIMEOUT = 1,
    ERROR = 2,
    UNAVAILABLE = 3
}
```

Enum	Description
SUCCESS	The operation completed successfully.
TIMEOUT	The operation timed out.
ERROR	Error attempting the operation.
UNAVAILABLE	Status currently unavailable.

Appendix B API Walk Through

B.1 CoreAPI Walk Trough

The following walks through how to create instances of devices.

- CoreAPI.createDevice → IDevice
- CoreAPI.getDeviceList → List<IDevice>
- CoreAPI.createPPSCRA → MTPPSCRA

These examples demonstrate methods for creating an **IDevice** to be used in the MagTek Universal SDK. This also shows how to establish a device specific API, which is not used with the MagTek Universal SDK.

Here, a single **IDevice** is established.

```
// Access MMS with Universal SDK using createDevice()

IDevice mtmms = CoreAPI.createDevice(
      context,
      DeviceType.MMS,
      ConnectionType.USB,
      "",
      "",
      "DynaFlex",
      "");
mtmms.requestSignature();
```

Here, a list of **IDevice** is established. The first device is accessed at index 0.

```
// Acess MMS with Universal SDK using getDeviceList()

List<IDevice> mtmms = CoreAPI.getDeviceList(
      context,
      DeviceType.MMS,
      deviceListCallback);
mtmms[0].requestSignature();
```

B.2 IDevice Walk Through

The following walks through how to make use of **IDevice**.

- Implement device events within the class to receive events.
- CoreAPI → IDevice.
- IDevice → subscribeAll().
- IDevice → other functions.
- IDevice → startTransaction().

Example

```
import com.magtek.mobile.android.mtusdk.*;


// Extend the main window to receive events.
public class MainWindow implements IEventSubscriber,
IConfigurationCallback
{

// Establish a device from CoreAPI.
List<IDevice> deviceList = CoreAPI.getDeviceList(
     context,
     deviceListCallbac);
IDevice device = deviceList[0];

/* For a list of a single device type.
DeviceType deviceType = DeviceType.MMS;
List<IDevice> deviceList = CoreAPI.getDeviceList(
     context,
     deviceType
     deviceListCallback);
IDevice device = deviceList[0];
*/

/* For a list of multiple device types.
List<DeviceType> deviceTypes = null;
deviceTypes.Add(DeviceType.MMS);
deviceTypes.Add(DeviceType.CMS);
List<IDevice> deviceList = CoreAPI.getDeviceList(
     context,
     deviceTypes,
     deviceListCallback);
IDevice device = deviceList[0];
*/

/* Suscribe to events sent from the device.
   These would be but not limited to: card inserted, card removed,
   connection state...

   Set MainWindow to receive the events. */
boolean return = device.unsubscribeAll(this);
```

```
boolean return = device.subscribeAll(this);

/* To handle events from some other class.
EventsVector eventsVector = new EventsVector()
boolean return = device.unsubscribeAll(eventsVector);
boolean return = device.subscribeAll(eventsVector);
*/

// Assign parameters for the transaction.
List<PaymentMethod> paymentMethod = new List<PaymentMethod>();
paymentMethod.Add(PaymentMethod.MSR);
paymentMethod.Add(PaymentMethod.Contact);
paymentMethod.Add(PaymentMethod.Contactless);

Transaction transaction = new Transaction();
transaction.setAmount("1.00");
transaction.setCashBack("0.00");
transaction.setEMVOnly(true);
transaction.setPaymentMethods(paymentMethod);
transaction.setQuickChip(false);

// Start transaction.
boolean result = device.startTransaction(transaction);
```

B.2.1 Handling Events

Application Main window may extent the

Static Member	Value	Description
NFC_MIFARE_ULTRALIGHT	String	"nfc_mifare_ultralight"
MIFARE_CLASSIC_1K	String	"mifare_classic_1k"
MIFARE_CLASSIC_4K	String	"mifare_classic_4k"
MIFARE_DESFIRE	String	“Mifare_desfire”
TAG_REMOVED	String	"tag_removed"
FAILED	String	"failed"
IO_FAILED	String	"io_failed"
AUTHENTICATION_FAILED	String	"authentication_failed"

IEventSubscriber Delegates or can be extended by a separate class. This example uses a separate class and demonstrates how to parse for the various event types.

Example

```
// A class to handle events.
public class EventsVector implements IEventSubscriber
{
  public void OnEvent(EventType eventType, IData data)
  {
    switch (eventType)
    {
```

Various events are separately shown below.

```
case ConnectionState:
// Parse for the ConnectionState
ConnectionState value =
ConnectionStateBuilder.GetValue(data.StringValue());

break;
```

```
case DeviceResponse:

break;
```

```
case DeviceExtendedResponse:

break;
```

```
case DeviceNotification:

break;
```

```
case CardData:

break;
```

```
case TransactionStatus:
// Parse for the transaction status code and detail.
TransactionStatus status =
TransactionStatusBuilder.GetStatusCode(data.StringValue());

string statusDetail =
TransactionStatusBuilder.GetStatusDetail(data.StringValue());

break;
```

```
case DisplayMessage:
```

```
String message;

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

break;
```

```
case InputRequest:

break;
```

```
case AuthorizationRequest:

// Forward ARQC to processor.
/* data[0..1] - ARQC length
   data[2..n] - remainder contains the ARQC TLV object
*/

IData processorARPC = new
BaseData(sendForAuthorization(data.ByteArray()));

// Send authorization to device when not in QuickChip mode.
if (transaction.QuickChip == false)
{
  device.sendAuthorization(procesorARPC.ByteArray());
}

break;
```

```
case TransactionResult:

/* 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].
.

break;
```

```
case PINBlock:
```

```
break;
```

```
case Signature:

break;
```

B.3 IDeviceControl Walk Through

The following walks through how to make use of **IDeviceControl**.

- IDevice → IDeviceControl.
- IDeviceControl → open().
- IDeviceControl → other functions.
- IDeviceControl → close().

Example

```
// Establish a device from CoreAPI.
List<IDevice> deviceList = CoreAPI.getDeviceList();
IDevice device = deviceList[0];

// Establish a deviceControl from device.
IDeviceControl deviceControl = device.getDeviceControl();

// Open the device, then use the IDeviceControl functions.
deviceControl.open();

. . .

// Close the device.
deviceControl.close();
```

B.4 ConnectionInfo Walk Through

The following walks through how to make use of **ConnectionInfo**.

- IDevice → ConnectionInfo.
- ConnectionInfo → getAddress()
- ConnectionInfo → getConnectionType()
- ConnectionInfo → getDeviceType()

Example

```
// Establish a device from CoreAPI.
List<IDevice> deviceList = CoreAPI.getDeviceList();
IDevice device = deviceList[0];

// Establish a ConnectionInfo from device.
ConnectionInfo connectionInfo = device.getConnectionInfo();

// Retrieve address, connectionType, and deviceType.
String address = connectionInfo.getAddress();
ConnectionType connectionType = connectionInfo.getConnectionType();
DeviceType deviceType = connectionInfo.getDeviceType();
```

B.5 IDeviceCapabilities Walk Through

The following walks through how to make use of **IDeviceCapabilities**.

- IDevice → IDeviceCapabilities.
- IDeviceCapabilities → BatteryBackedClock() to check if date/time should be set.
- IDeviceCapabilities → PaymentMethods() to check card types supported.
- IDeviceCapabilities → other functions.

```
// Establish a device from CoreAPI.
List<IDevice> deviceList = CoreAPI.getDeviceList();
IDevice device = deviceList[0];


// Establish a IDeviceCapabilities from device.
IDeviceCapabilities capabilities = device.getCapabilities();


// Retrieve device capabilities.
boolean batteryBackedClock = capabilities.BatteryBackedClock();
if (batteryBackedClock)
{
  // Call IDeviceControl.setDateTime().
}

// Retrieve supported card payment methods.
List<PaymentMethod> paymentMethods = capabilities.PaymentMethods();

. . .
```

B.6 IDeviceConfiguration Walk Through

The following walks through how to make use of **IDeviceConfiguration**.

- IDevice → getDeviceConfiguration().
- IDeviceConfiguration → updateFirmware().
- IDeviceConfiguration → getConfiguration().
- IDeviceConfiguration → setConfiguration().
- IDeviceConfiguration → other functions.

Example

```
// Establish a device from CoreAPI.
List<IDevice> deviceList = CoreAPI.getDeviceList();
IDevice device = deviceList[0];

IDeviceConfiguration deviceConfiguration =
 device.getDeviceConfiguration();

/* To handle events from some other class.
ConfigCallBacks configCallBacks = new ConfigCallBacks();
*/

// Update firmware.
byte[] data = getDataFromURI(uri);
int return = deviceConfiguration.updateFirmware(1, data, this);

/* Get configuration.
   Device-Driven Fallback OID = 1.2.1.1.1.1
                contructed OID = E2 08 E1 06 E1 04 E1 02 C1 00
   Note: first digit of OID is ommited in the construction and instead
is passed in the configType.
*/
byte configType = 0x01;
data = new byte[] {0xE2,0x08,0xE1,0x06,0xE1,0x04,0xE1,0x02,0xC1,0x00
};
byte[] response = devConfig.getConfigInfo(configType, data);


/* Set configuation.
   Device-Driven Fallback OID is 1.2.1.1.1.1
      Disabled contructed OID = E2 09 E1 07 E1 05 E1 03 C1 01 00
       Enabled contructed OID = E2 09 E1 07 E1 05 E1 03 C1 01 01
   Note: first digit of OID is ommited in the construction and instead
is passed in the configType.

*/
data = new byte[]
{0xE2,0x09,0xE1,0x07,0xE1,0x05,0xE1,0x03,0xC1,0x01,0x00 };
result = devConfig.getConfigInfo(configType, data);
```

B.6.1 Handling Events

Application Main window may extent the **IConfigurationCallback Delegates** or can be extended by a separate class. This example uses a separate class and demonstrates how to parse for the various events.

Example

```
// A class to handle configuration callback events.
public class ConfigCallbacks implements IConfigurationCallback
{

  public void OnProgress(int progress)
  {
      /* Handle progress.
         Progress is complete when progress = 100 */
  }
```

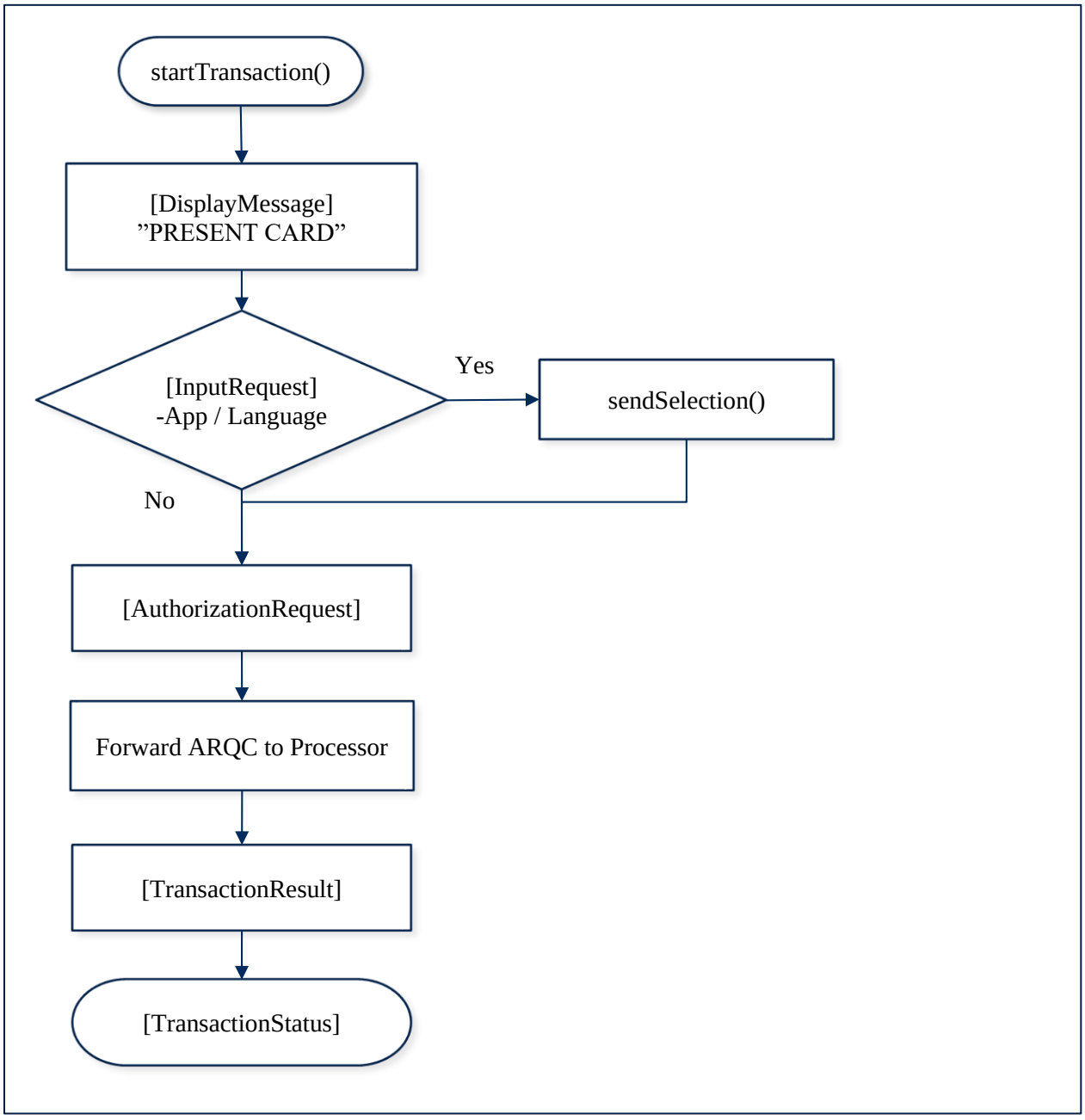
```
  public void OnResult(StatusCode status, byte[] data)
  {
     /* Handle result.
        A configuration process is complete when
        status = StatusCode.Success */
  }
```

```
  public IResult OnCalculateMAC(byte macType, byte[] data)
  {
    IResult result = new Result(StatusCode.UNAVAILABLE);
    byte[] macBytes = null;

    DeviceType deviceType =
      device.getConnection  Info().getDeviceType();

    switch (deviceType)
    {
      case DeviceType.MMS:
        macBytes = getDynaFlexMAC(macType, data);
        break;
    }

    if (macBytes != null)
    {
      result = new Result(StatusCode.SUCCESS);
      result.Data = new BaseData(macBytes);
    }

    return result;
  }

}
```

Appendix C EMV Transaction Flow

This section demonstrates transaction flow.

C.1 Flow Chart - QuickChip



C.2 Sample Code - QuickChip

The following breaks out the EMV flow chart into code. When enabling QuickChip mode, host does not send the ARPC to the device to complete the transaction. Events are shown separately and in the order received.

```
// Assign parameters.
List<PaymentMethod> paymentMethod = new List<PaymentMethod>();
paymentMethod.Add(PaymentMethod.MSR);
paymentMethod.Add(PaymentMethod.Contact);
paymentMethod.Add(PaymentMethod.Contactless);

Transaction transaction = new Transaction();
transaction.setAmount("1.00");
transaction.setCashBack("0.00");
transaction.setEMVOnly(true);
transaction.setPaymentMethods(paymentMethod);
transaction.setQuickChip(true);  // QuickChip mode enabled.

// Start transaction.
boolean result = device.startTransaction(transaction);
```

```
public void OnEvent(EventType eventType, IData data)
{
  String message
  switch (eventType);
    {
      case EventType.DisplayMessage:
        // Get the message.
        message = data.StringValue();
  }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.InputRequest:
        // Get the message.
        message = data.StringValue();

        // display/retrieve user selection.

        // set status and selection result.
        IData selectionData = new BaseData(new Byte[] {status,
selection});
        device.sendSelection(selectionData);
    }
}
```

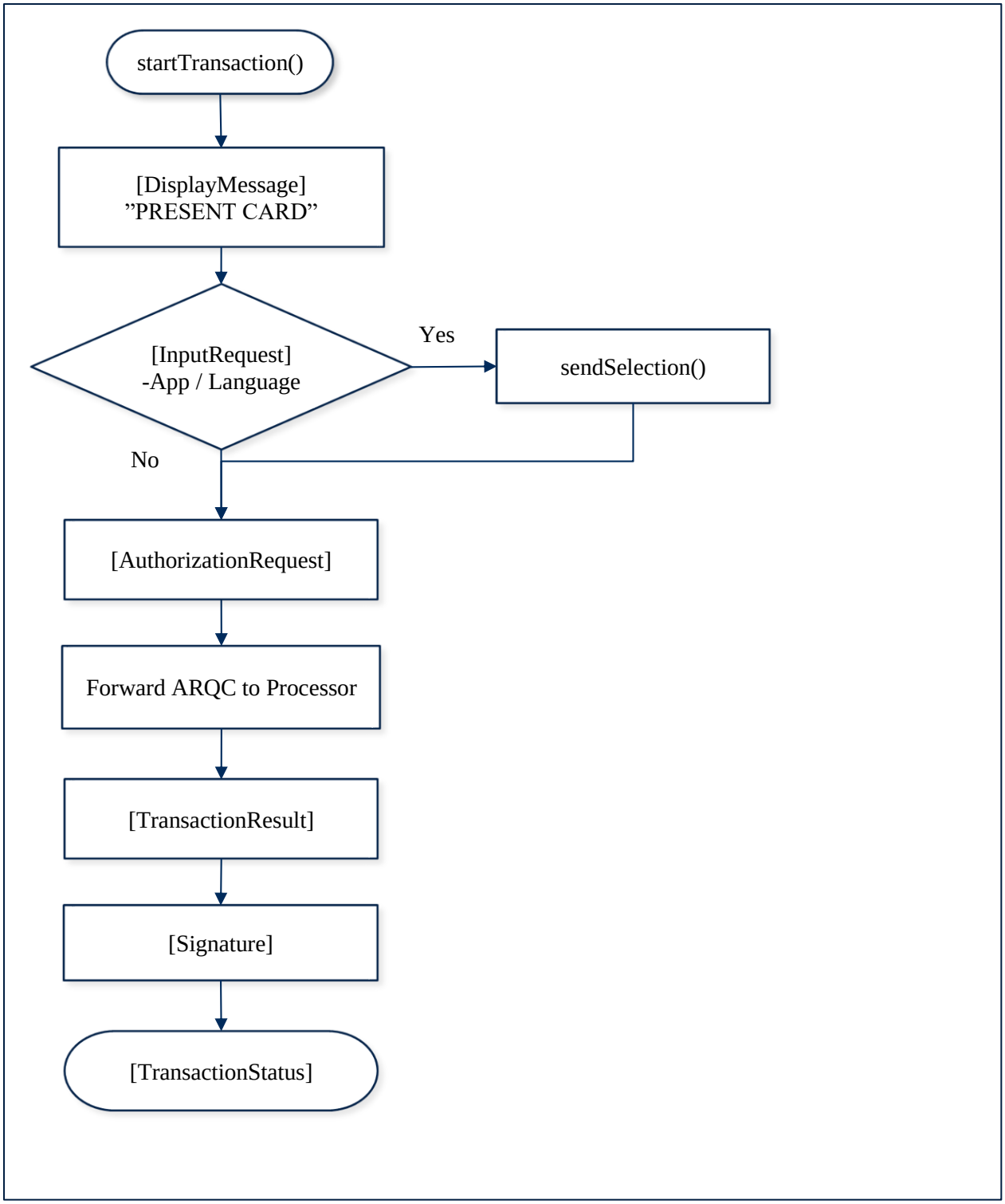
```
public void OnEvent(EventType eventType, IData data)
```

```
{
  byte[] ARQC = null;
  switch (eventType);
    {
      case EventType.AuthorizationRequest:
        // Forward ARQC to processor.
        /* data[0..1] – ARQC length
           data[2..n] – remainder contains the ARQC TLV object */
    }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.DisplayMessage:
        // Display approval message.
        message = data.StringValue();

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

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.TransactionResult:
         /* 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].
    }
}
```

C.3 Flow Chart – Signature Capture



C.4 Sample Code – Signature Capture

The following breaks out the EMV flow chart into code. Events are shown separately and in the order received.

```
// Assign parameters.
List<PaymentMethod> paymentMethod = new List<PaymentMethod>();
paymentMethod.Add(PaymentMethod.MSR);
paymentMethod.Add(PaymentMethod.Contact);
paymentMethod.Add(PaymentMethod.Contactless);

Transaction transaction = new Transaction();
transaction.setAmount("1.00");
transaction.setCashBack("0.00");
transaction.setEMVOnly(true);
transaction.setPaymentMethods(paymentMethod);
transaction.setQuickChip(true);

// Start transaction.
boolean result = device.startTransaction(transaction);
```

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.DisplayMessage:

        // Get the message.
        message = data.StringValue();
  }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.InputRequest:
        // Get the message.
        message = data.StringValue();

        // display/retrieve user selection.

        // set status and selection result.
        IData selectionData = new BaseData(new Byte[] {status,
selection});
        device.sendSelection(selectionData);
    }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
  byte[] ARQC = null;
  switch (eventType);
    {
      case EventType.AuthorizationRequest:
        // #4a
        // Forward ARQC to processor.
        /* data[0..1] – ARQC length
           data[2..n] – remainder contains the ARQC TLV object */
    }
}
```

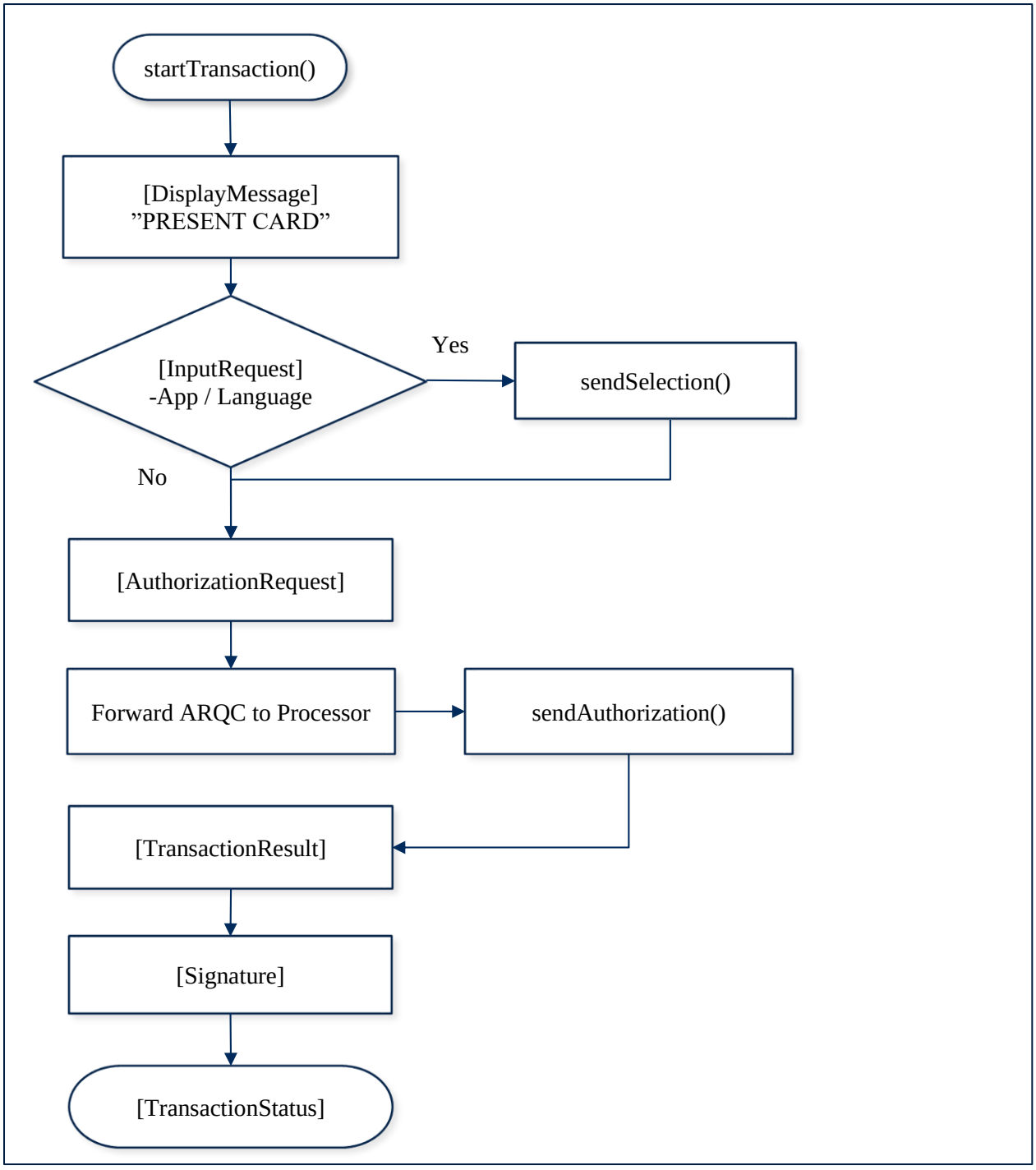
```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.DisplayMessage:
        // Display approval message.
        message = data.StringValue();

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

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.TransactionResult:
         /* 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].
    }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
```

```
  String signature;
  switch (eventType);
    {
      case EventType.Signature:
         signature = data.StringValue();
    }
}
```

C.5 Flow Chart – With ARPC



C.6 Sample Code – With ARPC

The following breaks out the EMV flow chart into code. When disabling QuickChip mode, host must send the ARPC to the device to complete the transaction. Events are shown separately and in the order received.

```
// Assign parameters.
List<PaymentMethod> paymentMethod = new List<PaymentMethod>();
paymentMethod.Add(PaymentMethod.MSR);
paymentMethod.Add(PaymentMethod.Contact);
paymentMethod.Add(PaymentMethod.Contactless);

Transaction transaction = new Transaction();
transaction.setAmount("1.00");
transaction.setCashBack("0.00");
transaction.setEMVOnly(true);
transaction.setPaymentMethods(paymentMethod);
transaction.setQuickChip(false); //QuickChip mode disabled.

// Start transaction.
boolean result = device.startTransaction(transaction);
```

```
public void OnEvent(EventType eventType, IData data)
{
  string message;
  switch (eventType);
    {
      case EventType.DisplayMessage:

        // Get the message.
        message = data.StringValue;
  }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
  string message;
  switch (eventType);
    {
      case EventType.InputRequest:
        // Get the message.
        message = data.StringValue;

        // display/retrieve user selection.

        // set status and selection result.
        IData selectionData = new BaseData(new Byte[] {status,
selection});
        device.sendSelection(selectionData);
    }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
  byte[] ARQC = null;
  switch (eventType);
    {
      case EventType.AuthorizationRequest:
        // Forward the ARQC to the processor.
        /* data[0..1] – ARQC length
           data[2..n] – remainder contains the ARQC TLV object */

        ARQC.ByteArray = data.ByteArray;
        // App function to send the request to the processor.
        ARPC = sendARQCToProcessorForApproval(ARQC.ByteArray());

    }
}
```

After the ARPC is returned from the processor, it is constructed into a TLV container and then sent to the device. The ARPC for approved (00) is set in ASCII 3030.

The optional tags 91, 71, and 72 (Issuer Authentication Data, Issuer Script Template 1, and Issuer Script Template 2) are not included in this example.

See the construction of the ARPCTLV in the table below.

```
String ARPC = "8A3030";
IData ARPCTLV = new BaseData("FF7413DFDF250742363243413546FA067004" +
ARPC);

device.sendAuthorization(ARPCTLV);
```

ARPC TLV object for sendAuthorization().

Tag	Len	Value / Description	Typ	Req	Default
FF74	var	Container for non-MAC ARPC	T	R	
/DFDF25	var	Device Serial Number (IFD Serial Number)	B	R	
/FA	var	Container for generic data	T	R	
//70	var	Container for ARPC	T	R	
///8A	02	Authorization Response Code • 0x3030 = Approved • 0x3031 = Issuer Referral • 0x3035 = Declined • 0x3132 = Switch Interface • 0x3133 = Request Online PIN	AN	R	
///91	var	Issuer Authentication Data As defined in ***EMV Integrated Circuit Card Specifications for Payment Systems 4.3***	B	O	

Tag	Len	Value / Description	Typ	Req	Default
///71	var	Issuer Script Template 1 As defined in ***EMV Integrated Circuit Card Specifications for Payment Systems 4.3***. The host may include as many instances of this parameter as needed, up to a maximum length of 128 bytes including Tags and Lengths.	B	O	
///72	var	Issuer Script Template 2 As defined in ***EMV Integrated Circuit Card Specifications for Payment Systems 4.3***. The host may include as many instances of this parameter as needed, up to a maximum length of 128 bytes including Tags and Lengths.	B	O	

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.DisplayMessage:
        // Display approval message.
        message = data.StringValue();

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

```
public void OnEvent(EventType eventType, IData data)
{
  String message;
  switch (eventType);
    {
      case EventType.TransactionResult:
         /* 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].
    }
}
```

```
public void OnEvent(EventType eventType, IData data)
{
  String signature;
  switch (eventType);
    {
      case EventType.Signature:
         signature = data.StringValue();
    }
}
```

C.7 MSR Fallback Flow

The use case for an MSR fallback is when communication with the chip results in a terminated transaction and the `TransactionStatus` is reported as `MSRFallback`.

The host application will re-attempt the transaction. To invoke this use case, here are the following pre-requisites.

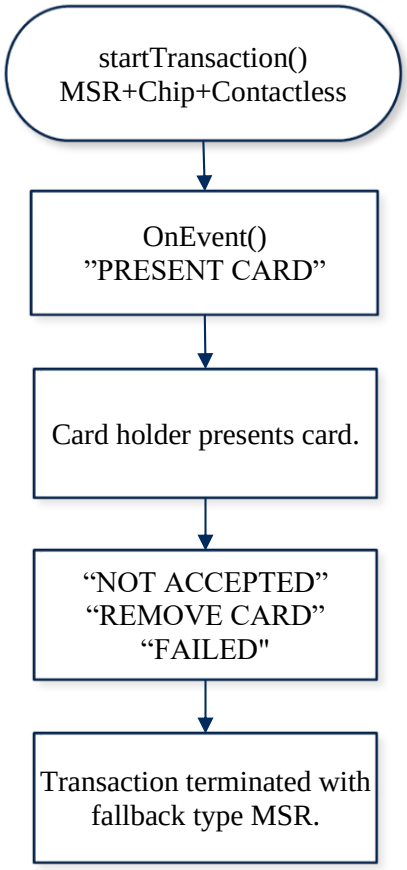
Pre-requisites:

- Device already configured for Device-Driven Fallback = Disabled.
- A card to cause the fallback. Example but not limited to a card with no applications programmed or a card with an application not configured on the device.

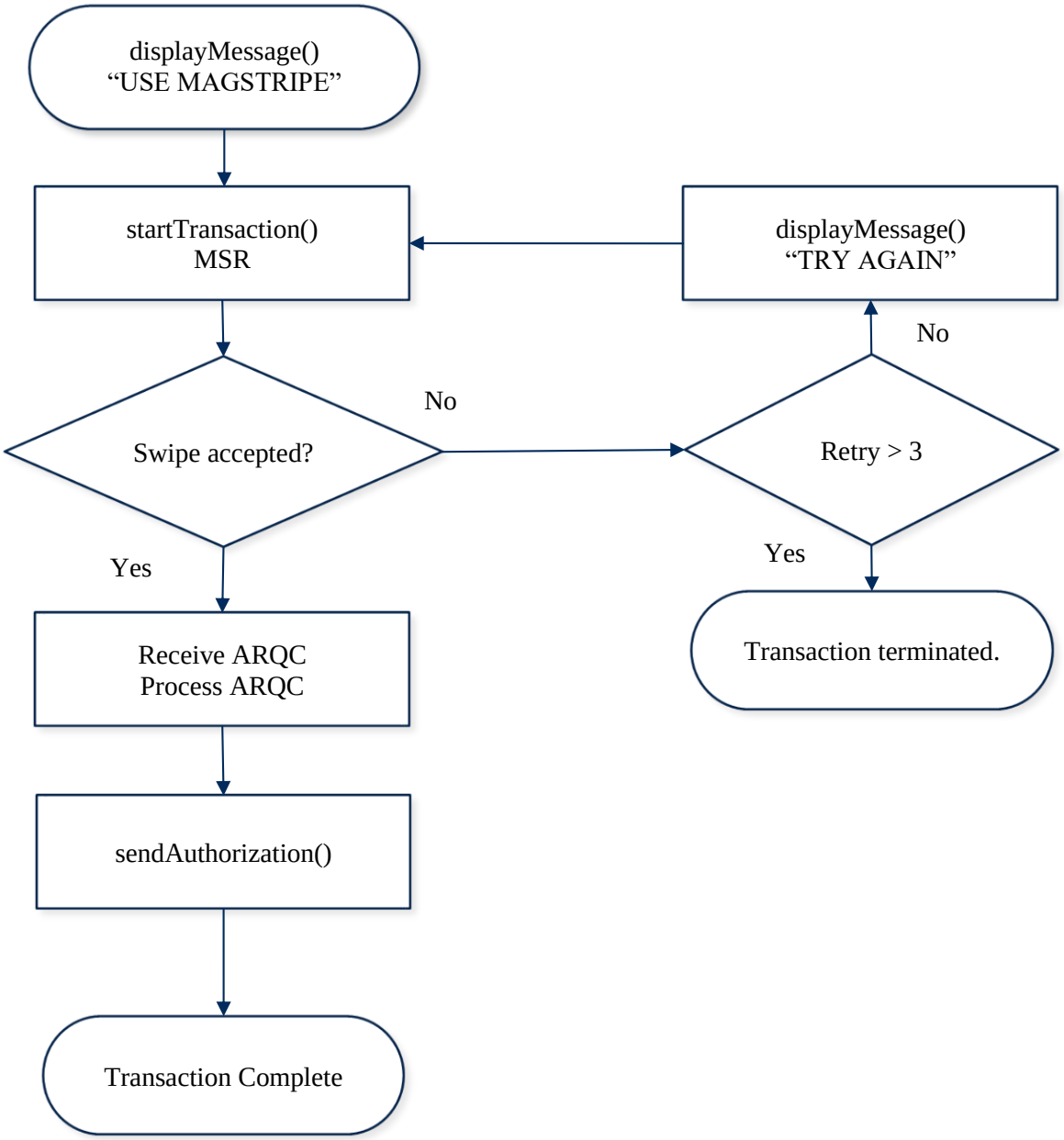
Scheme:

- →Host begins an initial transaction with `PaymentMethod` set to `MSR+Chip+Contactless`.
- ←Device responds with fail and with status of `MSRFallback`.
- →Host displays a message to use magstripe.
- →Host starts a transaction with `PaymentMethod` set to `MSR`.
- ←Device may respond with transaction cancelled card read error.
- →Host displays a message each time the transaction fails until successful or until Host decides to end the transaction.
- ←Device sends the transaction result.

Begin initial transaction:



Continue with Fallback transaction:



Appendix D Apple VAS

These instructions are for preparing Apple VAS (value-added service) transactions.

D.1 Merchant ID and URL Slots

- Set the Apple VAS Merchant ID and URL property for each slot 1 to 6 using IDeviceControl → `setConfigInfo()`.

D.2 POS Capabilities

- Set the POS capabilities property using IDeviceControl → `setConfigInfo()`.

D.3 Start Transaction

- Set the PaymentMethods to include `PaymentMethod.AppleVAS`.
- Set AppleVASMode to: `VASMode.Single`, `VASMode.Dual`, or `VASMode.VASOnly`.
- Set AppleVASProtocol to: `VASProtocol.Full` or `VASProtocol.URL`.

D.4 Transaction Response

- Data from an Apple VAS (9F27 and 9F2A) is returned in separate Apple VAS slot containers.

Tag	Length	Value /Description
FE	var	VAS Data Container
//FF01	var	Apple VAS Container Slot 1 Container
///9F27	var	VAS Data. Up to 128 bytes.
///9F2A	var	Mobile Token. Up to 36 bytes.
//FF02	var	Apple VAS Container Slot 2 Container
///9F27	var	VAS Data. Up to 128 bytes.
///9F2A	var	Mobile Token. Up to 36 bytes.
//FF03	var	Apple VAS Container Slot 3 Container
///9F27	var	VAS Data. Up to 128 bytes.
///9F2A	var	Mobile Token. Up to 36 bytes.
//FF04	var	Apple VAS Container Slot 4 Container

Tag	Length	Value /Description
///9F27	var	VAS Data. Up to 128 bytes.
///9F2A	var	Mobile Token. Up to 36 bytes.
//FF05	var	Apple VAS Container Slot 5 Container
///9F27	var	VAS Data. Up to 128 bytes.
///9F2A	var	Mobile Token. Up to 36 bytes.
//FF06	var	Apple VAS Container Slot 6 Container
///9F27	var	VAS Data. Up to 128 bytes.
///9F2A	var	Mobile Token. Up to 36 bytes.

Appendix E Google Wallet Smart Tap VAS

These instructions are for preparing Google Wallet Smart Tap VAS (value-added service) transactions.

E.1 Mobile Device

- Configure the mobile device for Google Wallet Smart Tap Pass.

E.2 Load Key

- Load the LTPK protection key (Long Term Private Key) into the MagTek device.
- Upload a Public Key to the Google Pay & Wallet Console for the issuer account associate with the Google Wallet Pass.

E.3 Collector ID Slots

- Set the Google Smart Tap Collector ID property for each slot 1 to 6 using IDeviceControl → `setConfigInfo()`.

E.4 POS Capabilities

- Set the POS capabilities property using IDeviceControl → `setConfigInfo()`.

E.5 Start Transaction

- Set the PaymentMethods to include `PaymentMethod.GoogleVAS`.
- Set AppleVASMode to: `VASMode.Single`, `VASMode.Dual`, or `VASMode.VASOnly`.

E.6 Transaction Response

- Data from a Google Wallet Smart Tap (DF7B) is returned in separate Collector ID slot containers associated with the Google Wallet Pass.

Tag	Length	Value /Description
FF41	var	Google Smart Tap Container
//FF01	var	Collector ID Slot 1 Container
///DF7B	var	Service Response NDEF Record
//FF02	var	Collector ID Slot 2 Container
///DF7B	var	Service Response NDEF Record

Tag	Length	Value /Description
//FF03	var	Collector ID Slot 3 Container
///DF7B	var	Service Response NDEF Record
//FF04	var	Collector ID Slot 4 Container
///DF7B	var	Service Response NDEF Record
//FF05	var	Collector ID Slot 5 Container
///DF7B	var	Service Response NDEF Record
//FF06	var	Collector ID Slot 6 Container
///DF7B	var	Service Response NDEF Record