MagTek Reader EMV Flowchart

Secure Card Reader Authenticator
Programmer's Reference

November 2019

Manual Part Number:
D100005143-10

REGISTERED TO ISO 9001:2015

Table 0.1 Revisions

Rev Number	Date	Notes
10	11/15/2019	Initial Release

SOFTWARE LICENSE AGREEMENT

IMPORTANT: YOU SHOULD CAREFULLY READ ALL THE TERMS, CONDITIONS AND RESTRICTIONS OF THIS LICENSE AGREEMENT BEFORE INSTALLING THE SOFTWARE PACKAGE. YOUR INSTALLATION OF THE SOFTWARE PACKAGE PRESUMES YOUR ACCEPTANCE OF THE TERMS, CONDITIONS, AND RESTRICTIONS CONTAINED IN THIS AGREEMENT. IF YOU DO NOT AGREE WITH THESE TERMS, CONDITIONS, AND RESTRICTIONS, PROMPTLY RETURN THE SOFTWARE PACKAGE AND ASSOCIATED DOCUMENTATION TO THE ADDRESS ON THE FRONT PAGE OF THIS DOCUMENT, ATTENTION: CUSTOMER SUPPORT.

TERMS, CONDITIONS, AND RESTRICTIONS

MagTek, Incorporated (the "Licensor") owns and has the right to distribute the described software and documentation, collectively referred to as the "Software."

LICENSE: Licensor grants you (the "Licensee") the right to use the Software in conjunction with MagTek products. LICENSEE MAY NOT COPY, MODIFY, OR TRANSFER THE SOFTWARE IN WHOLE OR IN PART EXCEPT AS EXPRESSLY PROVIDED IN THIS AGREEMENT. Licensee may not decompile, disassemble, or in any other manner attempt to reverse engineer the Software. Licensee shall not tamper with, bypass, or alter any security features of the software or attempt to do so.

TRANSFER: Licensee may not transfer the Software or license to the Software to another party without the prior written authorization of the Licensor. If Licensee transfers the Software without authorization, all rights granted under this Agreement are automatically terminated.

COPYRIGHT: The Software is copyrighted. Licensee may not copy the Software except for archival purposes or to load for execution purposes. All other copies of the Software are in violation of this Agreement.

TERM: This Agreement is in effect as long as Licensee continues the use of the Software. The Licensor also reserves the right to terminate this Agreement if Licensee fails to comply with any of the terms, conditions, or restrictions contained herein. Should Licensor terminate this Agreement due to Licensee's failure to comply, Licensee agrees to return the Software to Licensor. Receipt of returned Software by the Licensor shall mark the termination.

LIMITED WARRANTY: Licensor warrants to the Licensee that the disk(s) or other media on which the Software is recorded are free from defects in material or workmanship under normal use.

THE SOFTWARE IS PROVIDED AS IS. LICENSOR MAKES NO OTHER WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Because of the diversity of conditions and PC hardware under which the Software may be used, Licensor does not warrant that the Software will meet Licensee specifications or that the operation of the Software will be uninterrupted or free of errors.

IN NO EVENT WILL LICENSOR BE LIABLE FOR ANY DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE, OR INABILITY TO USE, THE SOFTWARE. Licensee's sole remedy in the event of a defect in material or workmanship is expressly limited to replacement of the Software disk(s) if applicable.

Table of Contents

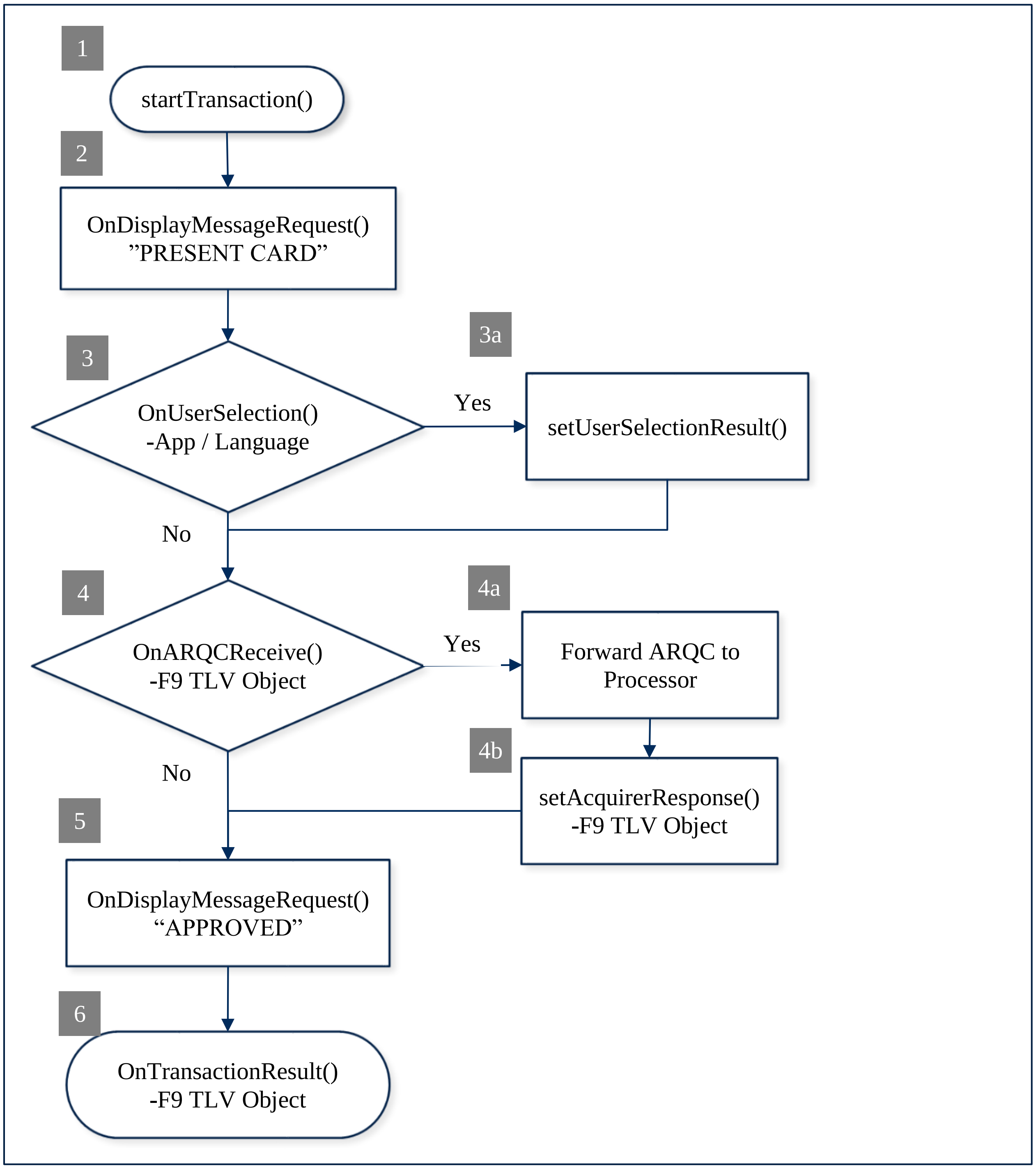
SOFTWARE LICENSE AGREEMENT 3
Table of Contents 5
1 Introduction 6
2 EMV Transaction Flow 7
  2.1 Flow Chart 7
  2.2 Sample Flow Code: C# 8
  2.3 Sample Flow Code: C++ 11
  2.4 Sample Flow Code: Java 14
  2.5 Sample Flow Code: Android (Java) 17
  2.6 Sample Flow Code: iOS 20

1 Introduction

This document provides EMV transaction flow instructions for software developers who want to create software solutions that include a MagTek Secure Card Reader / Authenticator (SCRA) device connected to a Windows PC, Android, or iOS device.

2 EMV Transaction Flow

2.1 Flow Chart


1
startTransaction()
2
OnDisplayMessageRequest() "PRESENT CARD"
3
OnUserSelection() -App / Language
Yes
3a
setUserSelectionResult()
No
4
OnARQCReceive() -F9 TLV Object
Yes
4a
Forward ARQC to Processor
4b
setAcquirerResponse() -F9 TLV Object
No
5
OnDisplayMessageRequest() "APPROVED"
6
OnTransactionResult() -F9 TLV Object

2 - EMV Transaction Flow

2.2 Sample Flow Code: C#

```
// #1

MTSCRA m_SCRA = new MTSCRA();

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

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

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

```
// #2

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

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


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

```
// #3

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

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

}
```

```
// #4

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


  // #4a Forward ARQC to Processor.

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


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



  // #4b Set Acquirer Response.

  // An application function to build Acquirer Response.
  byte[] response = buildAcquirerResponse(processorResponse);

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

}
```

```
// #5

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

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


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

```
// #6

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

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

2.3 Sample Flow Code: C++

```
// #1

// Delegate the MTSCRA Events.
::OnDisplayMessageRequest(this->OnDisplayMessageRequest);
.

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

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

```
// #2

void OnDisplayMessageRequest(const LPSTR data)
{
  // Get the message.
  if (data != NULL)
  {
    TCHAR* message = HexToASCII(A2T(data));
  }


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

```
// #3

protected void OnUserSelectionRequest(const LPSTR data)
{
  /* data[0]    - selection type
     data[1]    - timeout
     data[2..n] - remainder contains user selection strings delimited
                  by “0x00”.
  */

  // display/retrieve status and user selection.
  unsigned char status;
  unsigned char selection;
  .
  // set status and selection result.
  SetUserSelectionResult(status, selection);

}
```

```
// #4

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


  // #4a Forward ARQC to Processor.

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


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



  // #4b Set Acquirer Response.

  // An application function to build Acquirer Response.
  const char* response = buildAcquirerResponse(processorResponse);

  // Set Acquirer Response.
  SetAcquirerResponse(response);
  int result = GetResultCode();

}
```

```
// #5

void OnDisplayMessageRequest(const LPSTR data)
{
  // Get the message.
  if (data != NULL)
  {
    TCHAR* message = HexToASCII(A2T(data));
  }


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

```
// #6

void OnTransactionResult(const LPSTR data)
{
  /* data[0]    - Signature Required
     data[1..2] - Batch Data length
     data[3..n] - remainder contains the Batch Data TLV object */

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

2.4 Sample Flow Code: Java

```
// #1

m_MTSCRA = new MTSCRA();
m_MTSCRA.init(this);


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

// Start transaction.
m_MTSCRA.startTransaction(
timeLimit,
cardType,
option,
amount,
transactionType,
cashBack,
currencyCode,
reportingOption);

int result = m_MTSCRA.getResultCode();
```

```
// #2

public void onDisplayMessageRequest(String data)
{
  String message;

  // Get the message.
  if (data != NULL)
  {
    message = data;
  }


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

```
// #3

public void onUserSelectionRequest(String data)
{
  /* data[0]    - selection type
     data[1]    - timeout
     data[2..n] - remainder contains user selection strings delimited
                  by “\0”.
  */

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

}
```

```
// #4

public void onARQCReceived(String data)
{
  /* data[0..1] - ARQC length
     data[2..n] - remainder contains the ARQC TLV object */


  // #4a Forward ARQC to Processor.

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


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



  // #4b Set Acquirer Response.
  // An application function to build Acquirer Response.
  byte[] response = buildAcquirerResponse(processorResponse);

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

}
```

```
// #5

public void onDisplayMessageRequest(String data)
{
  String message;

  // Get the message.
  if (data != NULL)
  {
    message = data;
  }


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

```
// #6

public void onTransactionResult(String data)
{
  /* data[0]    - Signature Required
     data[1..2] - Batch Data length
     data[3..n] - remainder contains the Batch Data TLV object */

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

2.5 Sample Flow Code: Android (Java)

```
// #1

m_MTSCRA = new MTSCRA(this, m_scraHandler);

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

// Start transaction.
m_MTSCRA.startTransaction(
timeLimit,
cardType,
option,
amount,
transactionType,
cashBack,
currencyCode,
reportingOption);

int result = m_MTSCRA.getResultCode();
```

```
// #2

protected void onDisplayMessageRequest(byte[] data)
{
  String message;

  // Get the message.
  if (data != NULL)
  {
    message = TLVParser.getTextString(data, 0);
  }


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

```
// #3

protected void onUserSelectionRequest(byte[] data)
{
  /* data[0]    - selection type
     data[1]    - timeout
     data[2..n] - remainder contains user selection strings delimited
                  by "\0".
  */

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

}
```

```
// #4

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


  // #4a Forward ARQC to Processor.

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


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



  // #4b Set Acquirer Response.

  // An application function to build Acquirer Response.
  byte[] response = buildAcquirerResponse(processorResponse);
  // Set Acquirer Response.
  m_MTSCRA.setAcquirerResponse(response);

}
```

```
// #5

protected void onDisplayMessageRequest(byte[] data)
{
  String message;

  // Get the message.
  if (data != NULL)
  {
    message = TLVParser.getTextString(data, 0);
  }


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

```
// #6

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

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

2.6 Sample Flow Code: iOS

```
// #1

self.mtSCRALib = [[MTSCRA new];

// Delegate the MTSCRA Events.
[[NSNotificationCenter defaultCenter] addObserver:self
selector:@selector(onDisplayMessageRequest:) name:@"
onDisplayMessageRequest" withObject:obj];
.
.

// Assign parameters.
Byte timeLimit = 0x3C;
Byte cardType = 0x07;
Byte option = 0x00;
Byte amount[6] = { 0x00, 0x00, 0x00, 0x00, 0x15, 0x00 };
Byte transactionType = 0x00; // Purchase
Byte cashBack[6] = { 0x00, 0x00, 0x00, 0x00, 0x00, 0x00 };
Byte currencyCode[2] = { 0x08, 0x40 };
Byte reportingOption = 0x02;  // All Status Changes

// Start transaction.
[self.mtSCRALib startTransaction:timeLimit cardType:cardType
option:option amount:amount transactionType:transactionType
cashBack:cashBack currencyCode:currencyCode
reportingOption:reportingOption];
```

```
// #2

-(void)OnDisplayMessageRequest:(NSData *)data
{

  // Get the message.
  NSString* message = [HexUtil stringFromHexString:[self
getHexString:data]];


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

```
// #3
-(void)OnUserSelectionRequest:(NSData *)data
{
  /* data[0]    - selection type
     data[1]    - timeout
     data[2..n] - remainder contains zero-terminated string items */

  // display/retrieve user selection.
  .
  // set status and selection result.
  [self.mtSCRALib.setUserSelectionResult:(Byte)status
selection(Byte)userSelection];

}
```

```
// #4

-(void)OnARQCReceived:(NSData *)data
{
  /* data[0..1] - ARQC length
     data[2..n] - remainder contains the ARQC TLV object */


  // #4a Forward ARQC to Processor.

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


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


  // #4b Set Acquirer Response.

  // An application function to build Acquirer Response.
  NSData* response = buildAcquirerResponse(processorResponse);

  // Set Acquirer Response.
  [self.mtSCRALib.setAcquirerResponse:(unsigned char *)response
length:(int)response.length];

}
```

```
// #5

-(void)OnDisplayMessageRequest:(NSData *)data
{

  // Get the message.
  NSString* message = [HexUtil stringFromHexString:[self
getHexString:data]];


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

```
// #6

-(void)OnTransactionResult:(NSData *)data
{
  /* data[0]    - Signature Required
     data[1..2] - Batch Data length
     data[3..n] - remainder contains the Batch Data TLV object */

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