How to guides (v2.6.x)

Target Decoding

Target decoding simulates the behavior of a laser barcode scanner. Instead of looking at the entire field of view, however, the reader attempts to decode barcodes that lie only under the laser aiming dot. This prevents the operator from accidentally reading other nearby barcodes.

Supported devices:

- MX mobile terminals
- MX barcode reader
- Camera

Configuration DMCCs:

- **(GET|SET) DECODER.TARGET-DECODING [ON|OFF]**

  Enable or disable target decoding (or retrieve it's state).

  Default value: OFF

Example

readerDevice.getDataManSystem().sendCommand("SET DECODER.TARGET-DECODING ON");

- Android
- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand("SET DECODER.TARGET-DECODING ON");
```

```
self.readerDevice.dataManSystem().sendCommand("SET DECODER.TARGET-DECODING ON")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET DECODER.TARGET-DECODING ON"];
```

- **(GET|SET) DECODER.CENTERING-WINDOW [centerX centerY sizeX sizeY]**

  Set (or get) the size of the centering window. The numbers are in percent of the image.

  - centerX, centerY: location of centering window as percentage of the sensor size (50 - 50 means middle on both axis)
  - sizeX and sizeY: size of centering window also as percentage

  If a barcode has overlap with the centering window the that barcode is decoded. So the centering window does not necessarily need to contain the whole barcode .

  Default value: 50 50 10 10

Example

- Android
- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand("SET DECODER.CENTERING-WINDOW 50 50 5 5");
```

```
self.readerDevice.dataManSystem().sendCommand("SET DECODER.CENTERING-WINDOW 50 50 5 5")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET DECODER.CENTERING-WINDOW 50 50 5 5"];
```

- **(GET|SET) DECODER.DISPLAY-TARGET [ON|OFF]**

  Set (or get) if the centering window is added to the SVG result.

  Default value: ON

Example

- Android
- Swift
- Objective-C

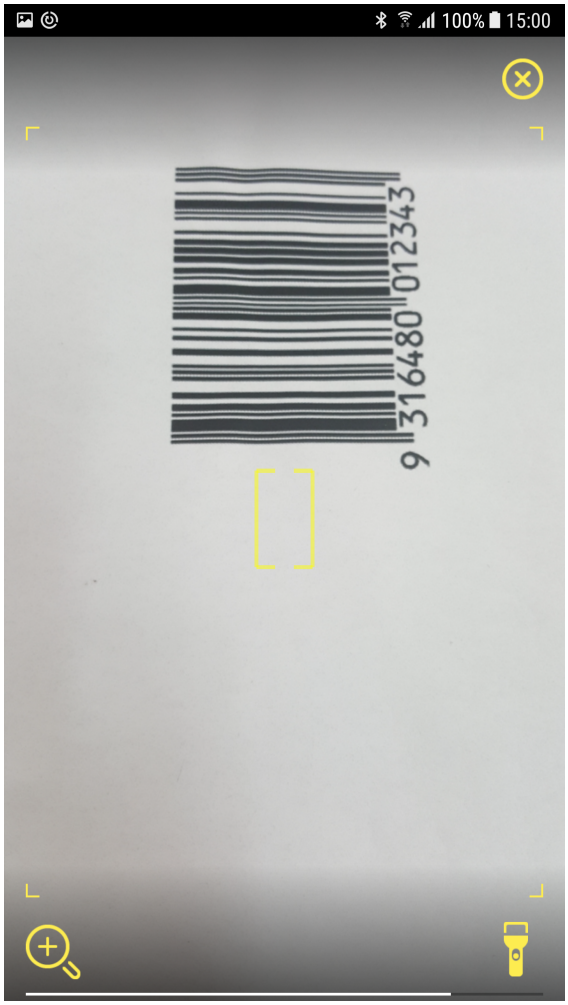
```
readerDevice.getDataManSystem().sendCommand("SET DECODER.DISPLAY-TARGET ON");
```

```
self.readerDevice.dataManSystem().sendCommand("SET DECODER.DISPLAY-TARGET ON")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET DECODER.DISPLAY-TARGET ON"];
```

Remark

Here is example of camera's scanning preview when target decoding is enabled in the camera AP (yellow, smaller rectangle is the target decoding window)I:



Target decoding window (rectangle) color and weight of the lines can be changed with:

- Android
- Swift
- Objective-C

```
MWOverlay.targetRectLineColor = Color.RED;
MWOverlay.targetRectLineWidth = 2;
```

```
MWOverlay.setTargetRectLineUIColor(UIColor.red)
MWOverlay.setTargetRectLineWidth(2)
```

```
[MWOverlay setTargetRectLineUIColor:[UIColor redColor]];
[MWOverlay setTargetRectLineWidth:2];
```

Multicode

If you want to scan more barcodes at once and in one scanning session you can use **Multicode reading.**

Supported devices:

- MX mobile terminals
- MX barcode reader
- Camera

Configuration DMCCs:

- **(GET|SET) MULTICODE.NUM-CODES [1-255]**

  Set number of codes that the decoder should find for a successful read result.

  Default value: 1

Example

- Android
- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand("SET MULTICODE.NUM-CODES 3");
```

```
self.readerDevice.dataManSystem().sendCommand("SET MULTICODE.NUM-CODES 3")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET MULTICODE.NUM-CODES 3"];
```

- **(GET|SET) MULTICODE.PARTIAL-RESULTS [ON|OFF]**

  Define how the reader interprets the number of codes to find.

  - ON = reader will return a successful read if at least 1 barcode was found
  - OFF = reader will return a successful read only if number of codes found equals to the value that is set in MULTICODE.NUM-CODES.

  Default value: OFF

Example

- Android
- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand("SET MULTICODE.PARTIAL-RESULTS ON");
```

```
self.readerDevice.dataManSystem().sendCommand("SET MULTICODE.PARTIAL-RESULTS ON")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET MULTICODE.PARTIAL-RESULTS ON"];
```

- **(GET|SET) DECODER.REREAD-NOT-LAST-N [0-100]**

  Do not read code if this code was read within the last N reads.

  Default value: 0 (no restriction)

Example

- Android
- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand("SET DECODER.REREAD-NOT-LAST-N 1");
```

```
self.readerDevice.dataManSystem().sendCommand("SET DECODER.REREAD-NOT-LAST-N 1")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET DECODER.REREAD-NOT-LAST-N 1"];
```

- **(GET|SET) MULTICODE.MAX-NUM-CODES [0-5] [0-255]**

  Define expected maximum number of codes to find for each symbology group:

  0. Sets the same maximum number of codes for each groups.In this case the second parameter cannot be 0.
  1. DataMatrix
  2. QR Code/MaxiCode/AztecCode
  3. Linear/ Postal/ Stacked
  4. VeriCode
  5. DotCode

  No expected value for any single symbology can exceed parameter MULTICODE.NUM-CODES, the total number of codes to find. 1st param is symbology group, second one is max number of codes.

  Default value: 1 for all group

Example

- Android

- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand("SET MULTICODE.MAX-NUM-CODES 1 3");
```

```
self.readerDevice.dataManSystem().sendCommand("SET MULTICODE.MAX-NUM-CODES 1 3")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET MULTICODE.MAX-NUM-CODES 1 3"];
```

Remark

If multicode reading is enabled, you get in the onReadResultReceived callback function the list of all results by using **getSubResults()** method of ReadResults object. If multicode reading is disabled this method returns null.

Parsers

Parser help us to extract decoded results into a structured format (JSON, Key-Value) for search, sort, and validation. There are six types of parser:

1. AAMVA
2. GS1
3. HIBC
4. ISBT128
5. IUD
6. SCM

Also there is option to use AUTO parser type in cmbSDK and it tries to find which one fits the best.

Supported devices:

- MX mobile terminals
- MX barcode reader
- Camera

Use **setParser()** method from ReaderDevice object to set parser type that you want to use, or **getParser()** to get selected type. Set parser type after valid connection to reader device. **None by default.**

Example

- Android
- Swift
- Objective-C

```
readerDevice.setParser(ResultParser.AAMVA);
```

```
self.readerDevice.parser = CMBResultParserAAMVA
```

```
self.readerDevice.parser = CMBResultParserAAMVA;
```

You can get structured format from received result in onReadResultReceived callback function of ReadResult after you enable the required parser type:

- Android
- Swift
- Objective-C

```
//Returns parsed text in json format from the result
results.getResultAt(0).getParsedJSON();
//Returns parsed text from the result
results.getResultAt(0).getParsedText();
```

```
let results:[CMBReadResult] = readResults?.readResults as? [CMBReadResult] ?? []
//Returns parsed text in json format from the result
let parsedJSON = results.first?.parsedJSON
//Returns parsed text from the result
let parsedText = results.first?.parsedText
```

```
NSArray<CMBReadResult*>* results = readResults.readResults;
//Returns parsed text in json format from the result
NSString* parsedJSON = [[results firstObject] parsedJSON];
//Returns parsed text from the result
NSString* parsedText = [[results firstObject] parsedText];
```

Region of Interest (ROI)

You can use this feature to specify the exact region of the image that will be used to locate and decode a symbol. This can be helpful if two barcodes are in close proximity to each other and you need to ensure you only read the code along the target area. Reducing the region of interest does not necessarily reduce the decoding time or increase the image transfer rate.

Supported devices:

- MX mobile terminals
- MX barcode reader
- Camera

Configuration DMCCs:

(GET|SET) DECODER.ROI-PERCENT [X W Y H]

- X and Y represent the starting point of the RoI in each axis
- W and H represent the RoI width and height starting from the starting point, with values in **percentages.**

The range of 0-100 is checked, as well as minimum values of 5 for width and height, and the constraints implied between args, such as the total sum for a given axis to be no more than 100.

Example

- Android
- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand("SET DECODER.ROI-PERCENT 10 80 10 80");
```

```
self.readerDevice.dataManSystem().sendCommand("SET DECODER.ROI-PERCENT 10 80 10 80")
```

```
[self.readerDevice.dataManSystem sendCommand:@"SET DECODER.ROI-PERCENT 10 80 10 80"];
```

Scan barcodes from an image

The SDK can decode barcodes from image files (camera API only). Supported image formats include BMP, PNG, and JPG. The image can not be any larger than 5000 x 5000 pixels.

Supported devices:

- Camera API

To scan an image, your application must first read the image into memory, then use the **IMAGE.LOAD** DMCC command to decode it. The readerDevice object must be initialized and configured before sending the **IMAGE.LOAD** command. Below is an example of using the sendCommand method to initiate the **IMAGE.LOAD** function.

Example

- Android
- Swift
- Objective-C

```
readerDevice.getDataManSystem().sendCommand(String.format("IMAGE.LOAD %d", imageData.length), imageData, 500, false, (dataM
   if (response.getError() != null) {
      // IMAGE.LOAD DMCC finished with error, handle the error here
   }
});
```

```
self.readerDevice.dataManSystem()?.sendCommand("IMAGE.LOAD \(imageData.count)", with: imageData, timeout: 100, expectBinary
    if response?.status != DMCC_STATUS_NO_ERROR {
        // IMAGE.LOAD DMCC finished with error, handle the error here
    }
})
```

Note: imageData is the Data of the image.

```
[self.readerDevice.dataManSystem sendCommand:[NSString stringWithFormat:@"IMAGE.LOAD %lu", [imageData length]] withData:ima
    if (response.status != DMCC_STATUS_NO_ERROR) {
        // IMAGE.LOAD DMCC finished with error, handle the error here
    }
}];
```

Note: imageData is the NSData of the image.

Just like with live scanning, when the **IMAGE.LOAD** command completes, results are received in a read result array in your *ReaderDevice's* delegate using the following method:

- Android
- Swift
- Objective-C

```
void onReadResultReceived(ReaderDevice reader, ReadResults results)
```

```
func didReceiveReadResult(fromReader reader: CMBReaderDevice, results readResults: CMBReadResults!)
```

```
- (void)didReceiveReadResultFromReader:(CMBReaderDevice *)reader results:(CMBReadResults *)readResults;
```

Below you will find an example for selecting and scanning an image from your device's photo library

- Android
- Swift
- Objective-C

```
private void pickImageFromGallery(){
    Intent pickPhoto = new Intent(Intent.ACTION_PICK, android.provider.MediaStore.Images.Media.EXTERNAL_CONTENT_URI);
        startActivityForResult(pickPhoto, PICK_IMAGE);
}

@Override
protected void onActivityResult(int requestCode, int resultCode, Intent data) {

        if(requestCode == PICK_IMAGE && resultCode == RESULT_OK && data != null && data.getData() != null
                && readerDevice != null && readerDevice.getConnectionState() == ConnectionState.Connected)
        {
                try (InputStream imageStream = getContentResolver().openInputStream(data.getData());
                         ByteArrayOutputStream buffer = new ByteArrayOutputStream()) {

                        int nRead;
                        byte[] bytes = new byte[1024];
                        while ((nRead = imageStream.read(bytes, 0, bytes.length)) != -1) {
                                buffer.write(bytes, 0, nRead);
                        }

                        buffer.flush();
                        final byte[] byteArray = buffer.toByteArray();

                        readerDevice.getDataManSystem().sendCommand(String.format("IMAGE.LOAD %d", byteArray.length), byteA
                                        500, false, (dataManSystem, response) -> {
                                                if (response.getError() != null) {
                                                        Toast.makeText(MainActivity.this, "ERROR [" + response.getError().t
                                           response.getError().getLocalizedMessage(), Toast.LENGTH_LONG).show();
                                                }
                                        });

                } catch (IOException e) {
                        e.printStackTrace();
                }
        }

        super.onActivityResult(requestCode, resultCode, data);
}
```

```
func showImagePicker() {
    let imagePickerController = UIImagePickerController()
    imagePickerController.allowsEditing = false
    imagePickerController.delegate = self
    imagePickerController.sourceType = .photoLibrary

    self.present(imagePickerController, animated: true, completion: nil)
}

// MARK: UIImagePickerControllerDelegate methods

func imagePickerController(_ picker: UIImagePickerController, didFinishPickingMediaWithInfo info: [UIImagePickerController.
    picker.dismiss(animated: true, completion: nil)

    let imagePath = info[UIImagePickerController.InfoKey.imageURL] as! NSURL
    guard let imageData = try? Data.init(contentsOf: imagePath.absoluteURL!) else { return }

    self.readerDevice.dataManSystem()?.sendCommand("IMAGE.LOAD \(imageData.count)", with: imageData, timeout: 100, expectBi
        if response?.status != DMCC_STATUS_NO_ERROR {
            // IMAGE.LOAD DMCC finished with error, handle the error here
        }
    })
}
```

```
- (void)showImagePicker {
    UIImagePickerController *imagePickerController = [[UIImagePickerController alloc] init];
    imagePickerController.allowsEditing = NO;
    imagePickerController.delegate = self;
    [imagePickerController setSourceType:UIImagePickerControllerSourceTypePhotoLibrary];

    [self presentViewController:imagePickerController animated:YES completion:nil];
}

#pragma mark - UIImagePickerControllerDelegate

- (void)imagePickerController:(UIImagePickerController *)picker didFinishPickingMediaWithInfo:(NSDictionary *)info{
    [self dismissViewControllerAnimated:YES completion:nil];

    NSURL *imagePath = [info valueForKey:UIImagePickerControllerImageURL];
    NSData *imageData = [NSData dataWithContentsOfURL:imagePath];

    if (imageData) {
        [self.readerDevice.dataManSystem sendCommand:[NSString stringWithFormat:@"IMAGE.LOAD %lu", [imageData length]] with
            if (response.status != DMCC_STATUS_NO_ERROR) {
                // IMAGE.LOAD DMCC finished with error, handle the error here
            }
        }];
    }
}
```

1D Barcodes Verification

Due to lack of error correction and even checksum values in some one-dimensional barcodes, many are prone to misreads and short-reads (where only a portion of the barcode is decoded). Factors such as poor print quality, inconsistent lighting, blurry images, extreme skew, and others variables can all contribute.

One of the ways the SDK mitigates misreads and short-reads is to use a feature called location verification. When enabled, the SDK will work harder to verify the edges and full location of a one-dimensional barcode; thus greatly minimizing read errors. Be aware that location verification can reduce scanning performance, especially when more than a few symbologies are enabled or when used on value line devices with slower CPUs.

Location verification can be used for the following barcode types (those in bold have this feature enabled by default): **Code 11, Code 25**, **Codabar**, Code 93, Code 39, **Code 128**, Telepen, **MSI Plessey**, UPC/EAN.

When combating read errors, consider using location verification in combination with other features of the SDK such as setting minimum read lengths and adjusting the decoder's effort level (see the DMCC command DECODER.EFFORT).

Supported devices:

- Camera API

Configuration API:

- Android
- Swift
- Objective-C

- **GET**: MWBgetParam([1D_CODE_MASK], MWB_PAR_ID_VERIFY_LOCATION)
- **SET**: MWBsetParam([1D_CODE_MASK], MWB_PAR_ID_VERIFY_LOCATION, [STATUS])
    - 1D_CODE_MASK: barcode type (check OS specific cmbSDK API reference for further details)
    - STATUS can be:
        - MWB_PAR_VALUE_VERIFY_LOCATION_ON to enable verification
        - MWB_PAR_VALUE_VERIFY_LOCATION_OFF to disable verification

- **GET**: MWB_getParam([1D_CODE_MASK], MWB_PAR_ID_VERIFY_LOCATION)
- **SET**: MWB_setParam([1D_CODE_MASK], MWB_PAR_ID_VERIFY_LOCATION, [STATUS])
    - 1D_CODE_MASK: barcode type (check OS specific cmbSDK API reference for further details)
    - STATUS can be:
        - MWB_PAR_VALUE_VERIFY_LOCATION_ON to enable verification
        - MWB_PAR_VALUE_VERIFY_LOCATION_OFF to disable verification

- **GET**: MWB_getParam([1D_CODE_MASK], MWB_PAR_ID_VERIFY_LOCATION)
- **SET**: MWB_setParam([1D_CODE_MASK], MWB_PAR_ID_VERIFY_LOCATION, [STATUS])
    - 1D_CODE_MASK: barcode type (check OS specific cmbSDK API reference for further details)
    - STATUS can be:
        - MWB_PAR_VALUE_VERIFY_LOCATION_ON to enable verification
        - MWB_PAR_VALUE_VERIFY_LOCATION_OFF to disable verification

Example

- Android
- Swift
- Objective-C
-

```
BarcodeScanner.MWBsetParam(BarcodeScanner.MWB_CODE_MASK_39, BarcodeScanner.MWB_PAR_ID_VERIFY_LOCATION, BarcodeScanner.MWB_P
```

```
MWB_setParam(MWB_CODE_MASK_39, UInt32(MWB_PAR_ID_VERIFY_LOCATION), UInt32(MWB_PAR_VALUE_VERIFY_LOCATION_ON))
```

```
MWB_setParam(MWB_CODE_MASK_39, MWB_PAR_ID_VERIFY_LOCATION, MWB_PAR_VALUE_VERIFY_LOCATION_ON);
```

Partial screen preview

By default when you create reader device using camera API, full screen preview is in use. If you want to use partial screen preview you need to create **ViewGroup** container in your layout for android or **View** container in your main storyboard for iOS and later send that container as parameter in reader device constructor, otherwise if that parameter is not set or if **null** is set, full screen preview will be used.

When partial screen preview is in use, frames from the camera are filled inside preview container, and if preview container have aspect ratio different than camera aspect ratio we are performing cropping to avoid distorsion.

Supported devices:

- Camera API

Example

First create container in your layout / storyboard.

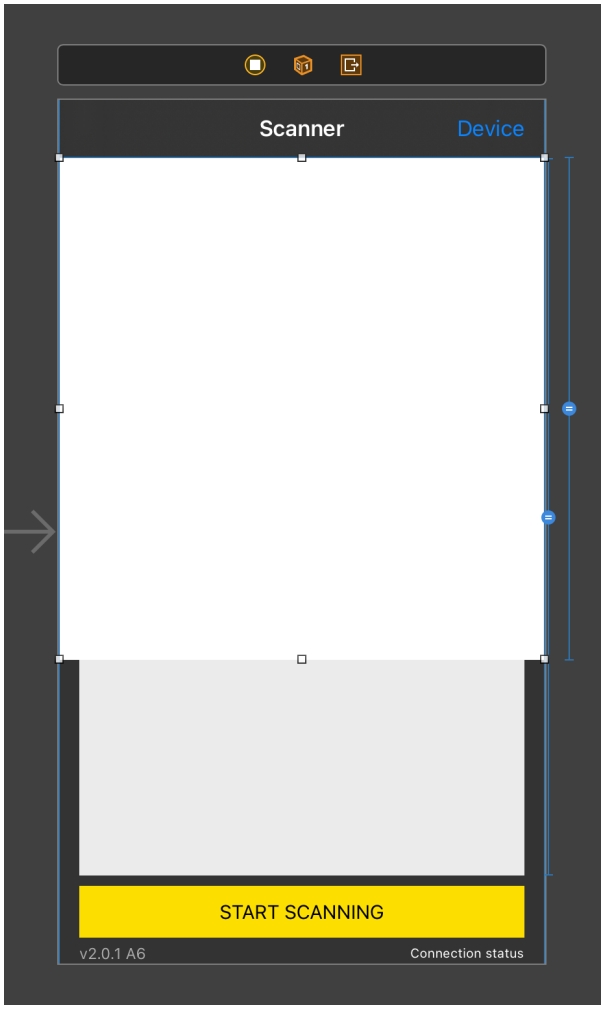
- Android
- iOS

```
<?xml version="1.0" encoding="utf-8"?>
<android.support.constraint.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="#333333"
    tools:context="cognex.com.cmbcamerademo.ScannerActivity">

    <RelativeLayout
        android:id="@+id/rlPreviewContainer"
        android:layout_width="match_parent"
        android:layout_height="0dp"
        app:layout_constraintBottom_toTopOf="@id/listResult"
        app:layout_constraintStart_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

....
```

Add a UIView in your storyboard. This view will be used as a container for the camera preview. Add constraints to set it's position and size to represent how you would like the camera preview to be displayed in your app.



Later when you create reader device send that container as parameter in reader device constructor

- Android
- Swift
- Objective-C

```
readerDevice = ReaderDevice.getPhoneCameraDevice(this,
        param_cameraMode, PreviewOption.DEFAULTS, (ViewGroup) findViewById(R.id.rlPreviewContainer));
```

Connect the newly added UIView to an outlet in your ViewController

```
@IBOutlet weak var previewContainer: UIView!
```

Then create the readerDevice using the previewContainer as a parameter in the constructor

```
let readerDevice = CMBReaderDevice.readerOfDeviceCamera(with: self.cameraMode, previewOptions:CDMPreviewOption.init(rawValu
```

Connect the newly added UIView to an outlet in your ViewController

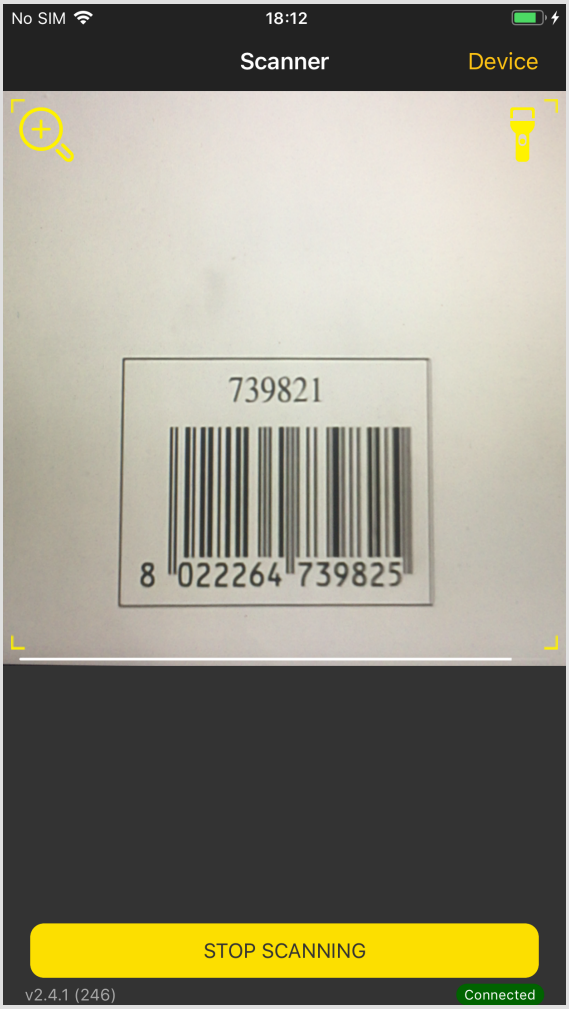
```
@property (weak, nonatomic) IBOutlet UIView *previewContainer;
```

Then create the readerDevice using the previewContainer as a parameter in the constructor

```
CMBReaderDevice *readerDevice = [CMBReaderDevice readerOfDeviceCameraWithCameraMode:cameraMode previewOptions:kCDMPreviewOp
```

Here is how it looks

- Android
- iOS


No SIM
18:12
Scanner
Device
739821
8 022264 739825
STOP SCANNING
v2.4.1 (246)
Connected