

User's Guide

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1. Introduction.

Barcode Decoding Suite – DMPS for Android is based on 2DTG Software Development Kit (SDK) for mobile platforms powered by Android and provides functionality upgrade for Data Matrix (DM) decoder allowing not only to decode DM symbol, but to perform its Authentication/Decryption to ensure that it is not counterfeited or tampered with.

DMPS for Android is built for mobile platforms powered by **Android 8.0 and higher** and equipped either with an auto-focus camera, or specialized barcode imager by Honeywell (N56XX or N66XX) or both. These platforms include:

- any Android smartphone, mobile computer or Tablet PC equipped with a rear-view camera,
- Dolphin CT60 mobile computers by Honeywell,
- Nautiz X41 mobile computers by Handheld.

Bluetooth Barcode Decoder and **BarcodeKey APPs**, designed as a “ready-to-go” data collection tools for the industrial and office applications, where they might be a cost effective, still powerful replacement of traditional barcode scanner.

Android Barcode Decoder – DMPS

1.1 Scope and SDK composition

Barcode Decoding Suite – DMPS is notated as **Android_SDK_DMPS_v.4.8.zip** and includes the following applications/folders/files:

- **BarcodeKey_DMPS.apk** – Keyboard Wedge Software utilizing 2DTG’s barcode decoding libraries to decode and forward captured data to data collection applications installed on a mobile Android platform.
- **BarcodeReader2DTG_DMPS.apk** – provides barcode decode output to:
 - Message box – Demo application to demonstrate libraries decoding performance, or
 - Bluetooth COM port of your PC – data collection tool (like **BarcodeKey.apk**)
- **SerialToKeyboardSrv.exe** – Keyboard Wedge type software for Windows (7-10) PC capable of “reading” COM port and sending data to any active window on your PC.
- **AndroidSDK_DMPS (Folder)** – **sample project and decoding libraries, for building your own application.**
- **Authentication/UserID Data Matrix** (for evaluation purposes)
- **DMPS Samples** (for evaluation purposes):
 - NotProt.bmp (not protected)
 - USig.bmp (protected with User ID - Data Matrix Authentication is enabled)
 - PSig.bmp (protected with Product ID - Data Matrix Encryption)
 - USigPSig.bmp (protected both with User ID and Product ID - combined Data Matrix authentication and encryption)

Library features are the same as for the Industrial Barcode Decode for Android and Windows versions. They are described in detail in the corresponding **User’s Guides**. Authentication/Decryption features are built as an extension of the Data Matrix decoding algorithm, so the decoder can be used both for the DM protection purposes, as it’s described in this User’s Guide, and regular decoding:

- decoding data encoded into Data Matrices ECC200 in accordance with ISO/IEC 16022 Symbology specification; and
- authenticating Data Matrix symbol if it was enabled for authentication utilizing **DMPS_E** encoding software (User ID/**Authentication key**); and/or
- decrypting Data Matrix symbol if it was encrypted utilizing **DMPS_E** software (Product ID/ **Encryption key**).

Both applications and library are provided as a time-limited (30 days) fully functional trial version. Purchased license unlocks both library and decoders. Unlocking license mechanism is built into the BarcodeReader2DTG_DMPS application.

License is transferable from one Android platform to another.

Android Barcode Decoder – DMPS

1.2 References

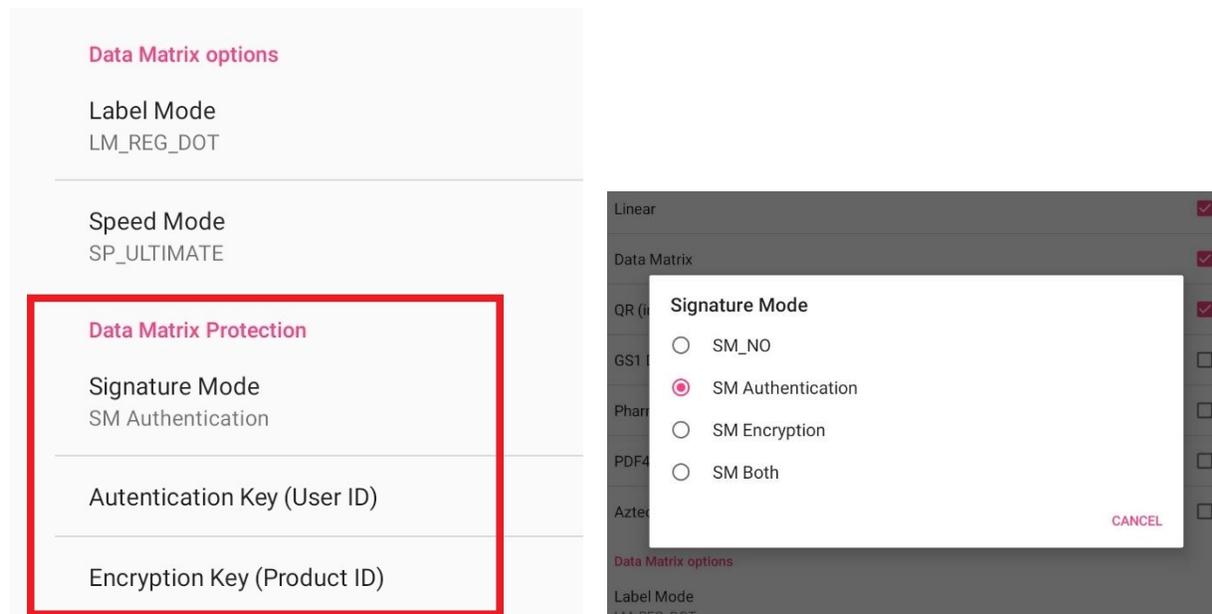
- 2DTG User’s Guide “[Android Barcode Decoding SDK, Industrial Suite](#)”.
- ISO/IEC 16022 - Symbology specification - Data Matrix
- U.S. Patent No.: 8,297,510 B1 “Mathematical method of 2D barcode authentication and protection for embedded processing”

2. Deployment and Settings

Procedure for the deployment of the **Barcode Decoding Suite – DMPS** is pretty much the same as for the regular Barcode Decoding Suite for Android Industrial Applications, but Settings are slightly different.

2.1 “BarcodeReader2DTG_DMPS” General Settings

DMPS settings (“Data Matrix Protection”) can be found below “Data Matrix Options” of the general Settings screen:

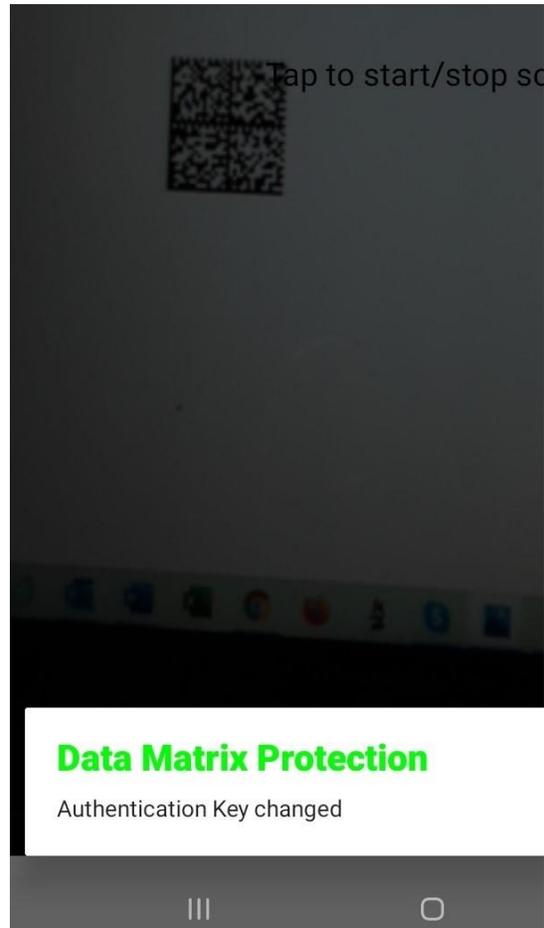
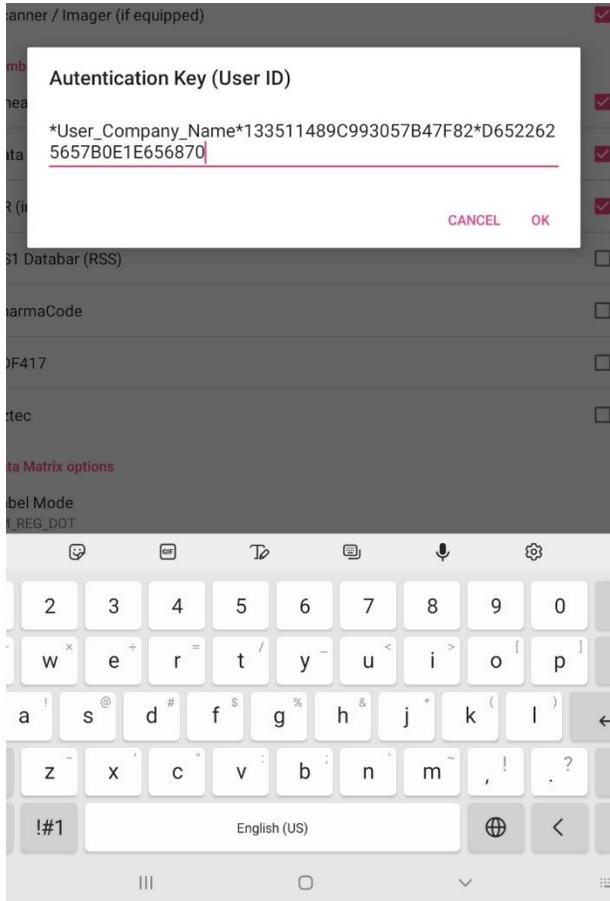


If Signature Mode is set to “SM_NO” (Default setting) – Application works as a regular Data Matrix decoder - no authentication vetting (or decryption) is assumed.

“**Authentication Key (User ID)**” menu allows to enter/change Authentication key/UserID. It can be done manually, but we recommend entering it by scanning unique service symbol (Data Matrix) that 2DTG provides when the product is purchased. That Data Matrix can be scanned in

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a main scan window as regular symbol. A pop-up message “Authentication Key changed” will confirm the transaction. After that it will show up in the “Authentication Key (User ID)” menu.



Important!

Scanning Data Matrix containing Authentication Key can be done **ONLY** when Signature Mode is set to "SM_NO" or "SM Authentication".

Encryption Key (Product ID) can be entered in the “Encryption Key (Product ID)” menu either by originating party or receiving one (establishing Key Exchange Protocol between the parties is assumed).

Note:

Encryption Key and **Product ID** are two different parameters. Product ID might be a Serial Number, or Model Number, or any other number that customers want to use to differentiate their products. Encryption Key on the other hand is generated by the program from the Product ID and User ID.

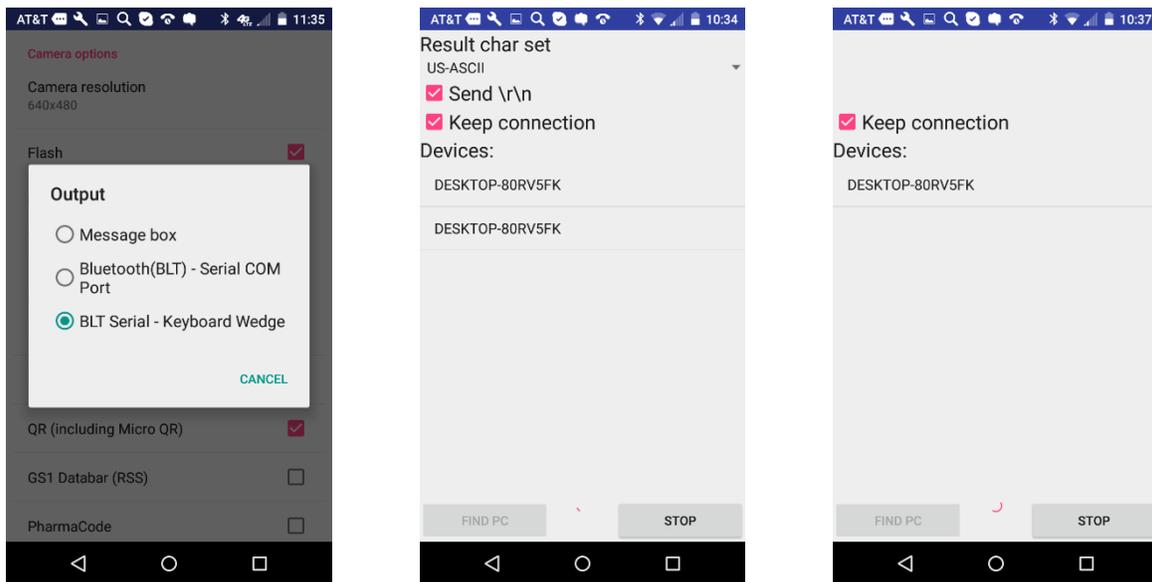
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2.2 “Bluetooth Barcode Reader DMPS” Settings

BarcodeReader2DTG_DMPS is built both for DMPS Decoder performance evaluation and as a data collection tool if Bluetooth communication can be established between your mobile device and “outside” computer.

I. Output Settings allow to choose out of three possible Output options:

- **Message box** on your Android device.
- **Virtual COM port** on Windows PC - for the customers who have already their own data collection software capable of reading decoded data from COM port.
- **Keyboard wedge data transfer** to any “active” application on your Windows PC (through Virtual COM port by means of 2DTG’s provided keyboard wedge software: **SerialToKeyboardSrv.exe**).



BLT_BarcodeReader (Android Bluetooth module) can be set to be connected to the PC continuously (default mode), or “under the necessity” of transferring decode data to the PC (uncheck “**Keep connection**” box).

“Continuous” mode allows for faster data transfer but is not very economical on battery charge. It is recommended when you have “sizeable” scanning job.

Second mode is thrifter on battery charge but is slower on data transfer - recommended for occasional scanning.

II. Enable connection

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After choosing “Bluetooth connection mode”, tap your PC name on the screen of your device to establish connection with Com port.

III. Keyboard Wedge application / Character table:

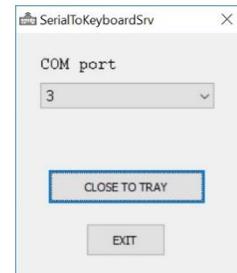
There are two ways to read data, transferred to the virtual COM port of your PC:

- **Option 1** - for the customers who have already their own data collection software capable of reading decoded data from COM port.
- **Option 2** - 2DTG’s provided keyboard wedge software - **SerialToKeyboardSrv.exe**, that would pass data to any “active” application on your Windows PC.

In this case, copy **SerialToKeyboardSrv.exe** to the folder of your choosing and click/tap on it. Virtual COM port will be auto detected.

You may close it to a tray before opening data collection application and starting scanning barcodes using your Android device.

Default Character table for this application is UTF-16 (Unicode).



If you choose Option 1, you can also choose Character table – “**Result char set**” that fits your application and “**Send \r\n**” option if required. Default setting is “US-ASCII” that corresponds to the Character table of most scanners.

Important!

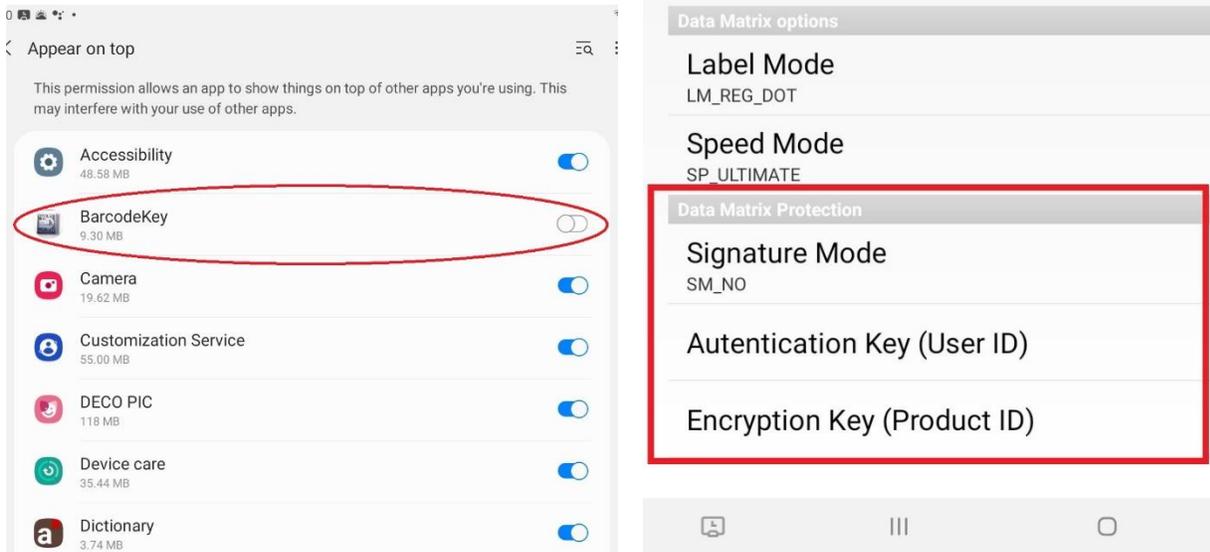
If you want to use our application “SerialToKeyboardSrv” with Option 1, you must change “Result char set” to UTF-16LE.

2.3 “BarcodeKey-DMPS” Settings

BarcodeKey-DMPS software reroute the data received from decoding a barcode, making it appear as if it entered the system through the keyboard. In other words, it converts received data into virtual keystrokes, replacing in this sense the virtual keyboard of your Android platform for this operation. It also adds “Enter” key at the end of the data string to prepare system for the next entry.

Since we utilize virtual keyboard, Android system requests one more permission during the installation process – “Appear on Top”, tap BarcodeKey “ON” to enable virtual keyboard:

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DMPS settings (“Data Matrix Protection”) are placed after “Data Matrix Options” on the general Settings screen – the same way as its described in the previous section.

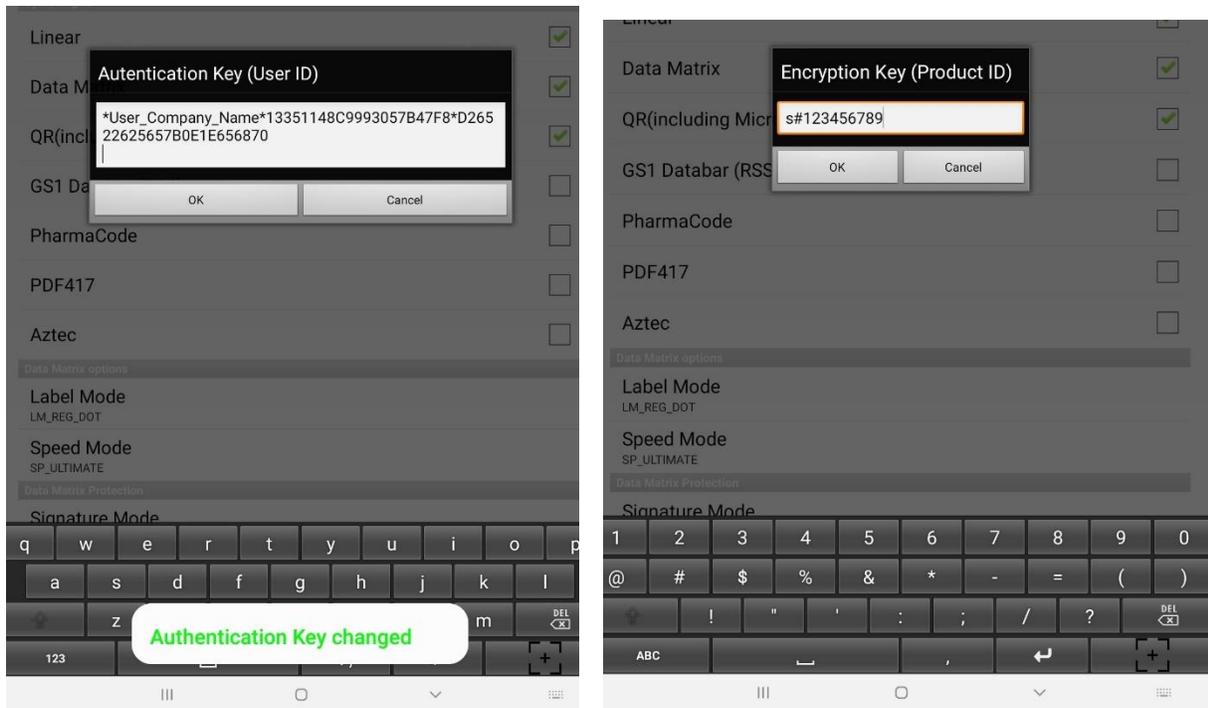
All “DM Protection” menus have the same meaning as before. However, Authentication key/UserID can be entered by scanning Data Matrix, containing it, directly from “Authentication Key (User ID)” if BarcodeKey keyboard is selected/enabled in the settings:

Important!

Scanning Data Matrix containing Authentication Key can be done ONLY when Signature Mode is set to “SM_NO” or “SM Authentication”.

Encryption Key (Product ID) can be entered in the “Encryption Key (Product ID)” menu either by originating party or receiving one (establishing Key Exchange Protocol between the parties is assumed).

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3. How to operate DMPS Decoders

It's recommended to try Message box Output option first to get more familiar with reading technique, your platform (and camera) performance before performing data authentication/collection tasks.

To decode sample:

- Touch/tap screen to activate Reader.
- Position the device over the barcode to ensure it's in the camera's Field of View and center the "red aimer crosshair" on the Image Preview screen over barcode.
- Touch/tap flash icon to enable camera's flash-light (lower-right corner) if necessary. This option is recommended for some decoding. However, for some DPM (Direct Part Marking) reading – mostly laser etched marks on shiny surfaces – this option might better be off to avoid patches of reflected light that can "blind" the camera.
- Touch/tap magnification icon at the bottom of the screen if necessary.
- The Decoder will automatically scan and decode symbol presented in the Field of View.

The result of the Authentication check (or decryption, or both) and decode result is printed to the "pop-up" Message Box. (Tap screen anywhere to make message box disappear.)

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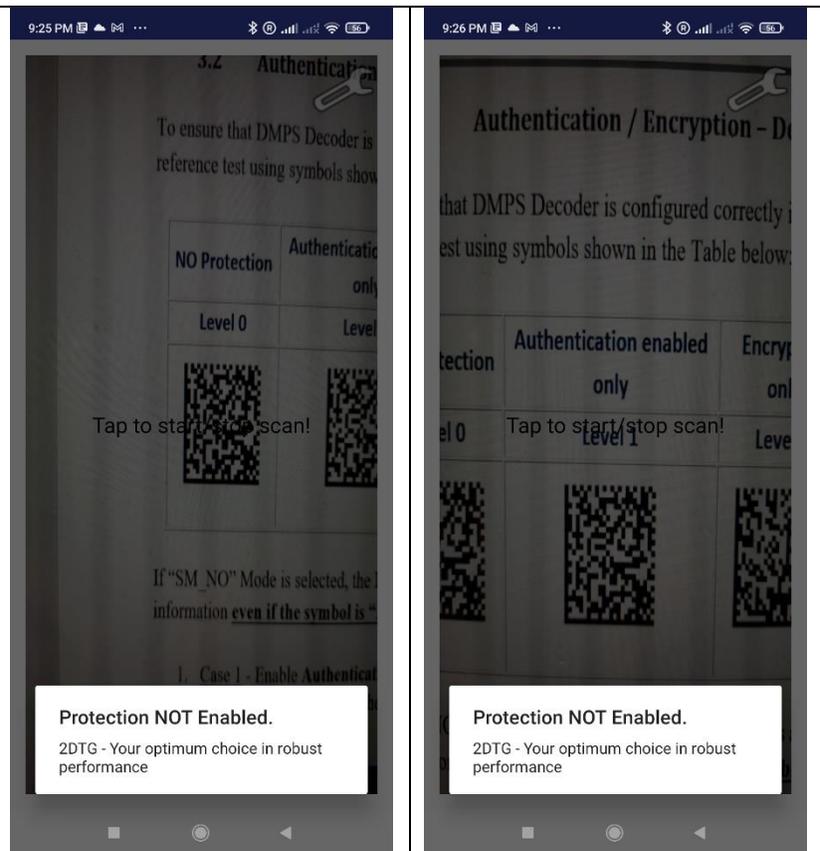
3.1 Authentication / Encryption - Demo DMPS

To ensure that DMPS Decoder is configured correctly it is recommended to perform the reference test using symbols shown in the Table below and demo Authentication and Encryption keys provided by 2DTG:

| NO Protection | Authentication enabled only | Encryption only | Authentication + Encryption |
|---|---|---|---|
| Level 0 | Level 1 | Level 2 | Level 3 |
|  |  |  |  |

Test “0”

If “SM_NO” in the Signature Mode menu is selected, the DMPS Reader works as a regular decoder returning decode information even for Authentication enabled Data Matrix – “read” Data Matrix symbols of Level 0 & 1 in the Table above. The “Authentication return” shall be as follows:



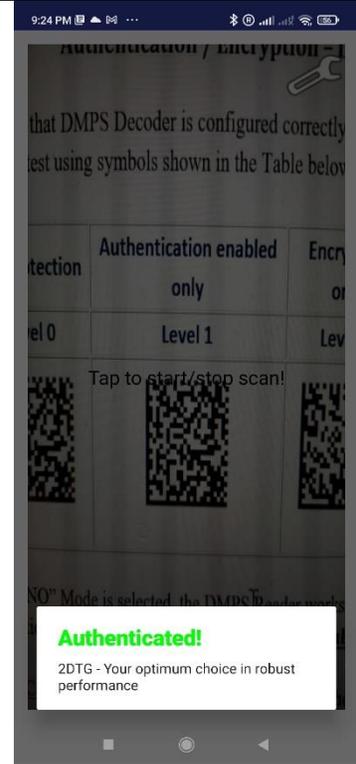
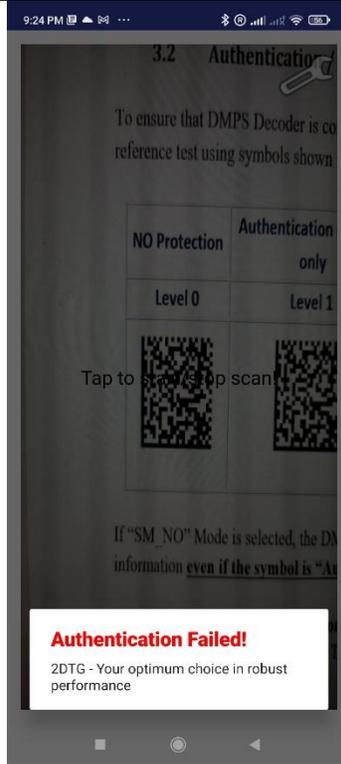
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Test 1

Authentication Mode enabled (tap “SM Authentication” in the Signature Mode menu) - “read” Data Matrix symbols of Level 0 & 1 in the Table above. The “Authentication return” shall be as follows:

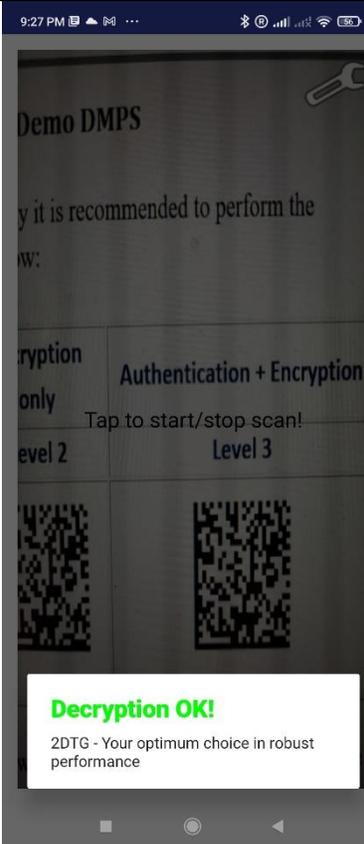
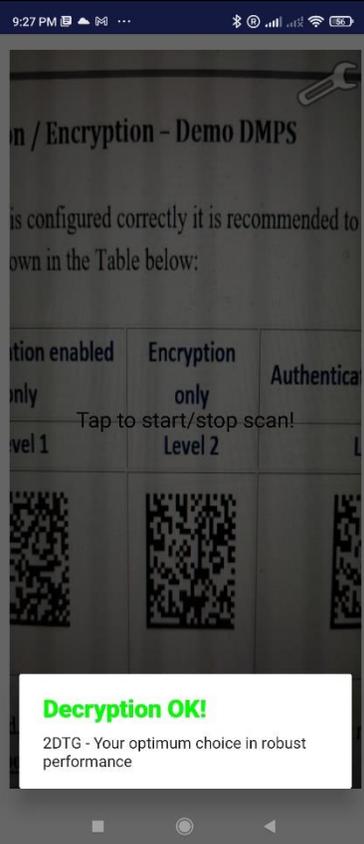
Note:

If **Authentication** vetting returns “**Failure**”, the matrix can still be decoded, meaning that counterfeiter has not even recognized that symbol is protected.

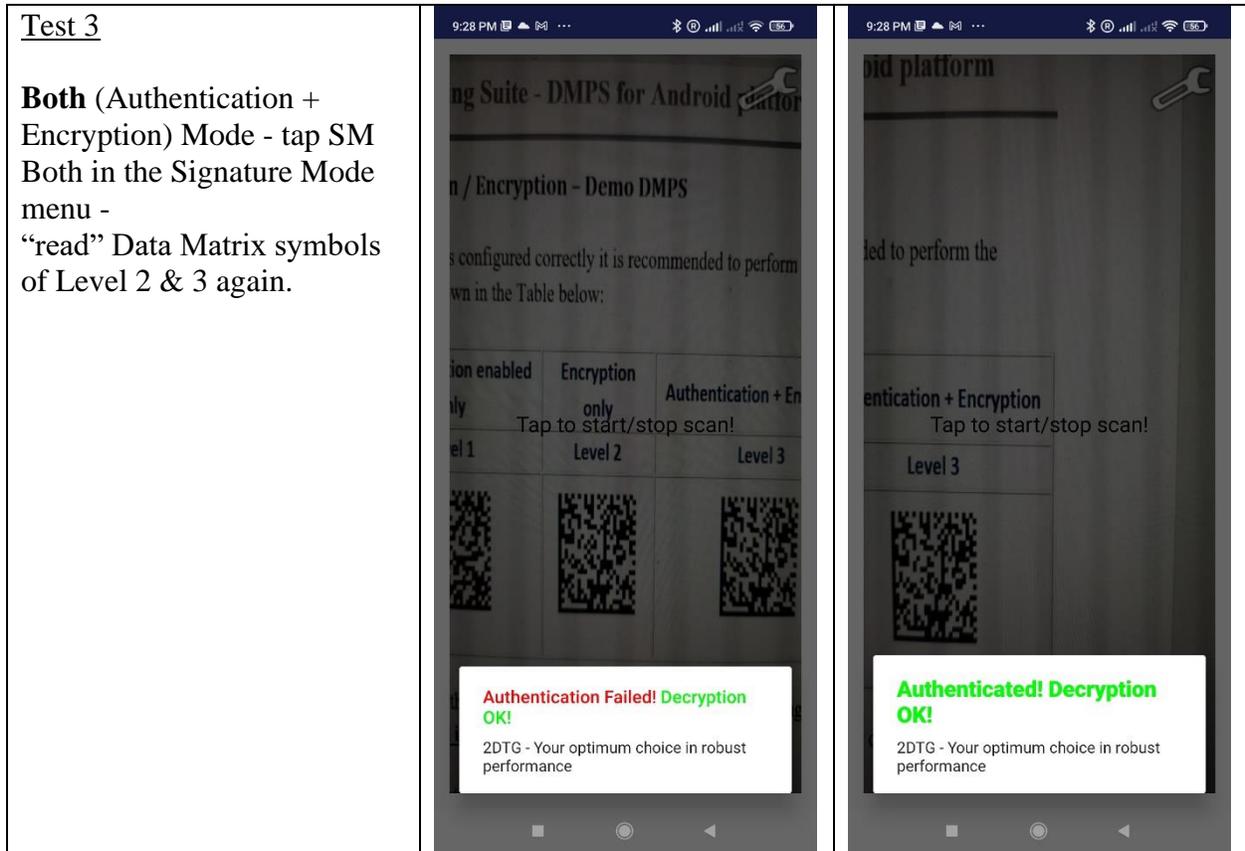


Test 2

Trial Encryption Key (Product ID = s#123456789). Enable Encryption Mode (tap SM Encryption in the Signature Mode menu) and “read” Data Matrix symbols of Level 2 & 3 in the Table above. The “Encryption mode return” is shown on the right:



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Authentication Failure (Test 1) indicates that vetted symbol was counterfeited. Most probably, original authentication enabled Data Matrix was captured, decoded using regular DM decoder and the obtained data were used for generating counterfeited symbols for placing them on counterfeited goods, documents, etc. It is strongly recommended to replace Authentication key immediately.

Authentication Failure (Test 3) indicates that since the symbol is successfully decrypted, but Authentication failed - Encryption Key was possibly compromised. Authentication Key might be intact - authentication possibly was not enabled – but might be compromised too. In any case, it is strongly recommended to replace both key immediately in this case.

Additional comments on vetting results:

User ID is required not only for authentication process, but for encryption as well. **Encryption Key** is built both from Product ID that is entered into the system by the user and unique User ID / Authentication Key provided by 2DTG. That is why it is important that Authentication Key must be scanned in the system even if DMPS software seems to be used only for encryption/decryption purposes.

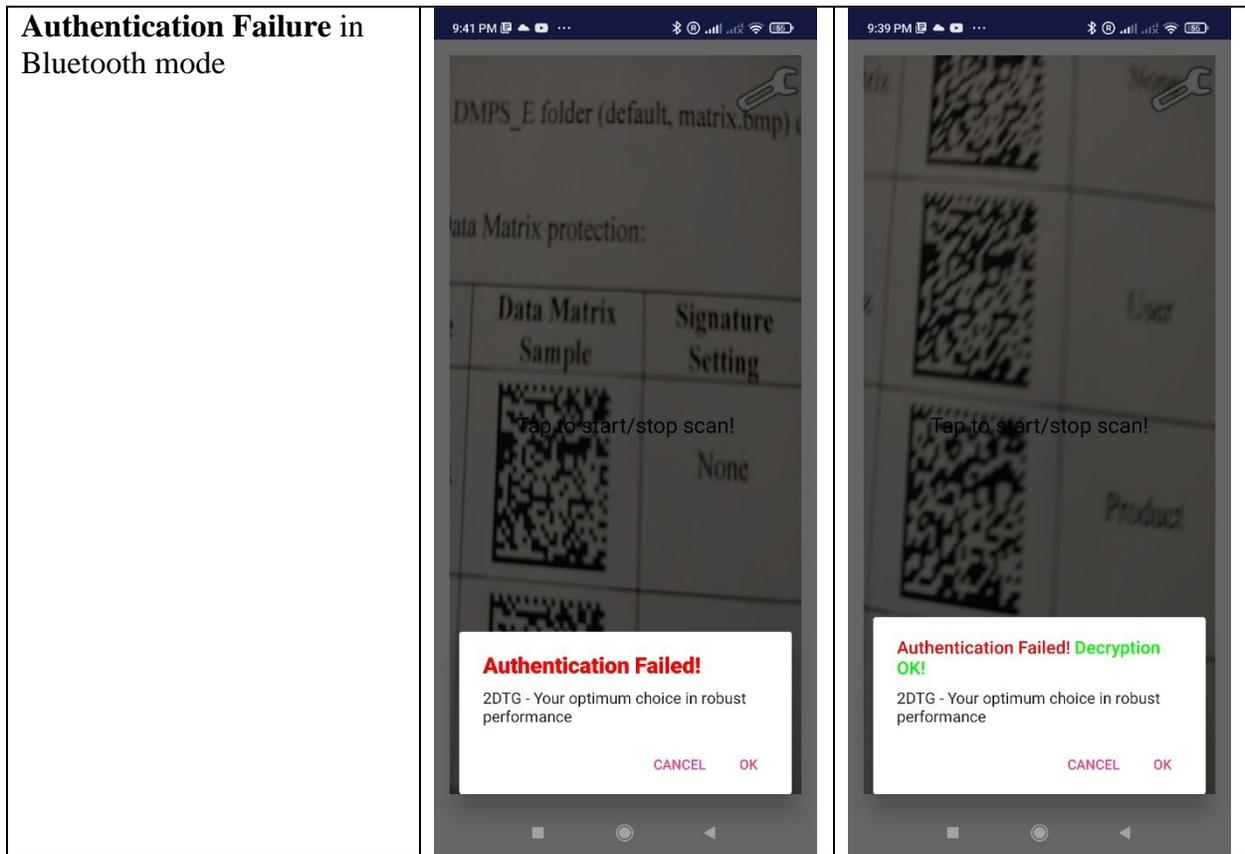
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3.2 Authentication / Encryption – Bluetooth Keyboard Wedge Reading

Operating DMPS software in “Bluetooth Output Mode” - using it as data collection tool - is basically similar to using it in a “Message Box Mode” with one exception. If authentication failed, user has an option:

- to “Cancel” the transmission of the decoded content to the external PC, or
- to accept it (“OK”) to have a record of this transaction in the database. In this case the content will be transmitted over the Bluetooth channel, but it will come to the PC with a prefix “AUTENTICATION_FAILED_”:

AUTENTICATION_FAILED_2DTG - Your optimum choice in robust performance



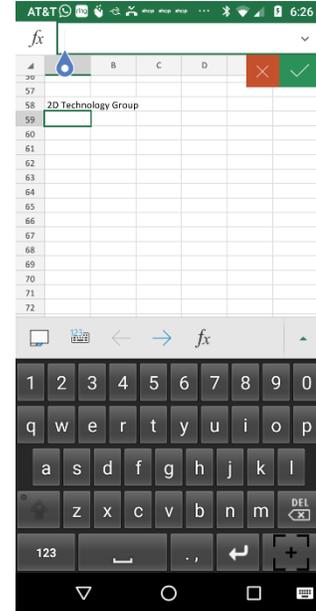
3.3 BarcodeKey_DMPS - Keyboard Wedge Reading

Though **BarcodeKey_DMPS** is built as “Keyboard Wedge software” and would work basically with any Android application on your platform, which is compatible with virtual keyboard, it

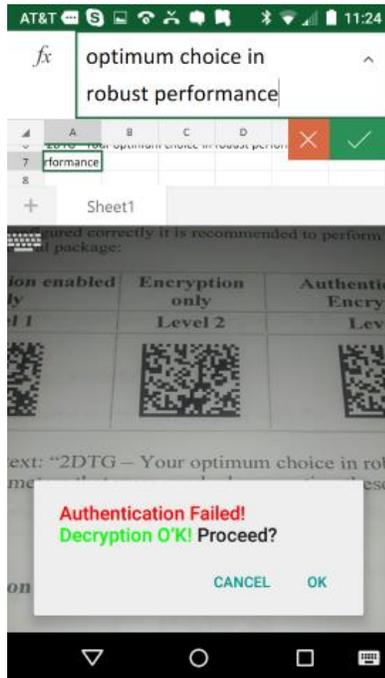
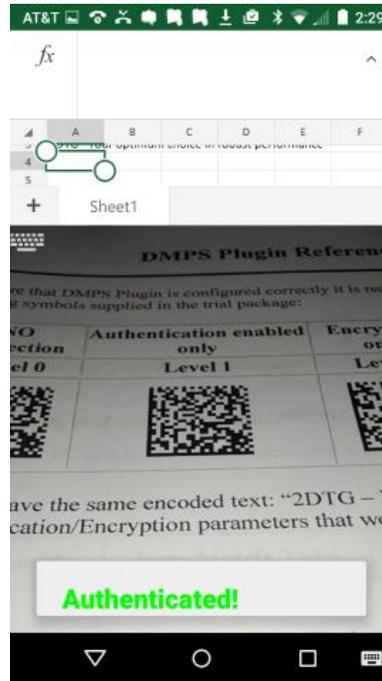
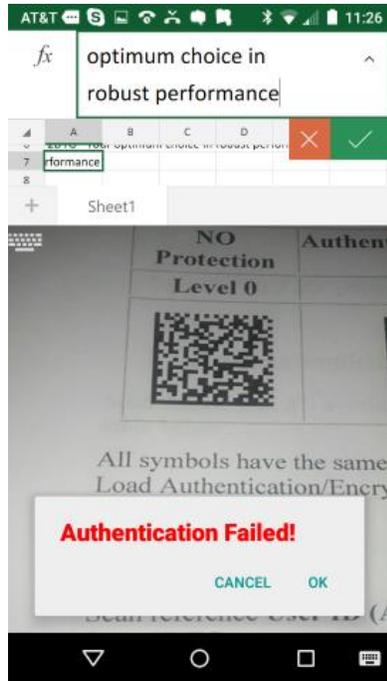
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was particularly tested with WPS Office and MS Office - probably the most widely used data collection systems on Android.

- Open an application (Excel, Word, ...). BarcodeKey keyboard will open “inside the application” automatically.
- To send decoded data to a document in place of the cursor just tap the soft [+] icon on the keyboard (or hard SCAN button/trigger on Dolphin terminal).
- “BarcodeKey” window that features ZOOM button and flash button to adjust the image quality when scanning will replace keyboard.
- “BarcodeKey” allows monitoring the “image quality” ensuring faster and more reliable way to “read” complicated (DPM) barcodes by adjusting camera position (distance, angle) and symbol illumination and magnification. It is particularly useful with devices having large form-factor (Tablet Pcs, etc.) because their size may preclude user from seeing label when capturing picture.
- “BarcodeKey” would reroute the data received from decoding a barcode, making it appear as if it entered the system through the keyboard.
- Authentication/Decryption procedures are the same as for the BarcodeReader2DTG_DMPS APP .
- If “Authentication failed” dialog windows open, you have an options similar to “Bluetooth Output Mode”:
 - to “Cancel” the transfer of the decoded content to the Office, or
 - to accept it (“OK”) - the content will be transferred to the Office (without the prefix “AUTENTICATION_FAILED_” in this case).



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4. Licensing DMPS-Android Decoders/Library

2DTG provides stand-alone (single) licenses that are intended for use on one Android platform (smartphone, mobile computer, tablet PC, etc.) – one license per platform. Every stand-alone license comes with its own **License id** and **License password**, which unlocks the software for perpetual use. Those unlocking parameters are good for any number of stand-alone licenses of one software product purchased within the **single Order**. Software activation can be done on-line with a single click over the Internet or manually:

- by logging into the customer’s account on 2DTG’s site (*Customer Center > My Account > Orders > Manually Unlock License*)
- via e-mail
- over the phone.

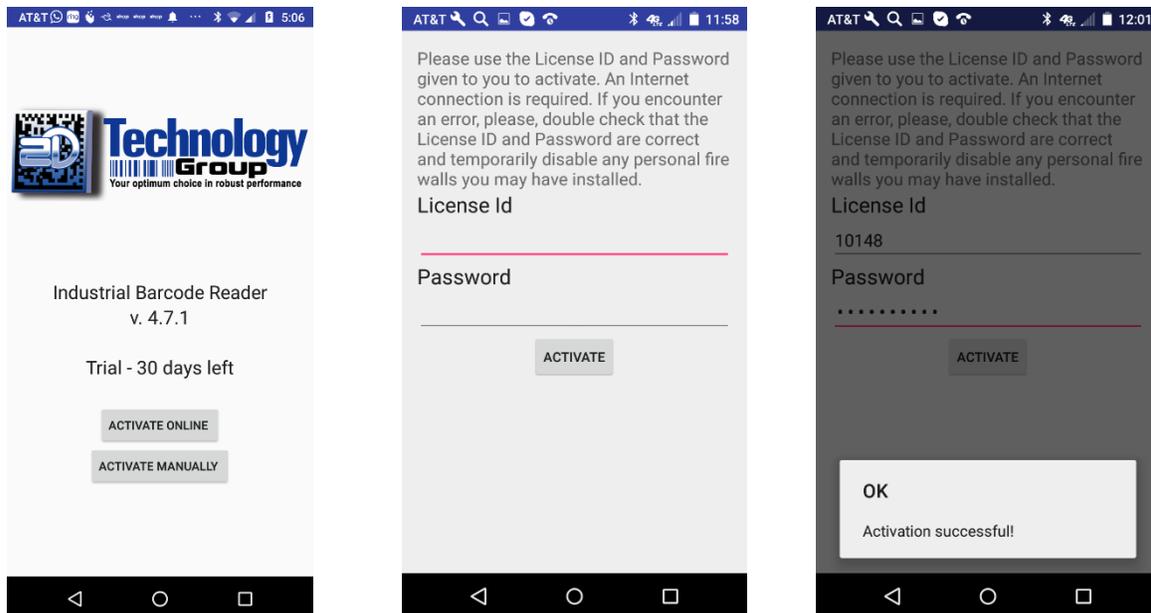
Stand-alone license is locked to the platform, on which it was activated, but may be transferred to another one if required.

Activation mechanism is incorporated into **BarcodeReader2DTG_DMPS**. Its activation means licensing decoding library it is using. In other words, **BarcodeKey_DMPS** and/or any other app on this platform using decoding library will also be licensed.

Online Activation

Start the **Barcode Reader**. Activation dialog shows up every time when you start the Product, showing a number of days left in your evaluation period. Once the product is purchased you will be supplied with a **License ID** and a **Password**, which will be sent to you in purchase confirmation e-mail. Keep it handy when you are ready to activate.

Tap “**Activate online**“ - new window opens (if your platform has a connection to Internet):



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In the new Window enter your **License ID** and **Password** received from 2DTG.

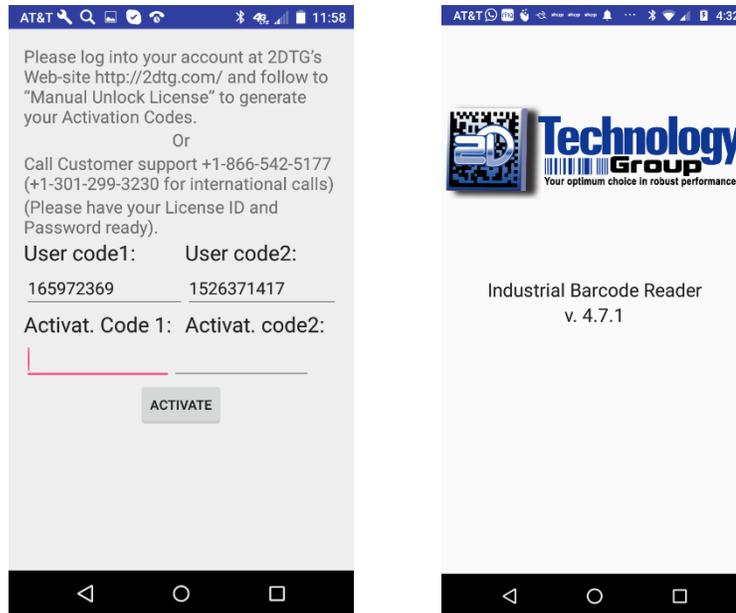
Once you press the **Continue** button the Product will communicate to our server. If the license is validated the Product will activate.

You will receive a confirmation message in the pop-up Text box at the lower part of the screen. Tap anywhere on the screen -> starting page of activated app opens (see below). In 5 seconds “operational page” opens (Pic.2) ... or you can tap starting page and it will open “operational page” right away.

Manual Activation

If you do not have a connection to the Internet, you can activate the Product manually.

Click “**Activate Manually**” ...



Manual activation assumes two possible options, as follows:

- **Manual Unlock on the 2DTG site.**
Login into **My Account** (*Customer Center>My Account>Order # >Manual Unlock*). On that page you will need the same parameters to Unlock the license: License ID, License Password, User Code 1 and User Code 2.

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- **Telephone activation** - requires you to call to obtain the activation codes. You shall give us two “User codes” from the activation dialog above, and we will use these codes to create the activation codes for you.

After you received the **Activation Code 1** and **Activation Code 2** enter them in the activation dialog above and click Continue.

You will receive a confirmation message that your license is activated on the next dialog window – tap anywhere on the screen -> starting page of activated app opens. In 5 seconds “operational page” opens (Pic.2) ... or you can tap starting page and it will open “operational page” right away.

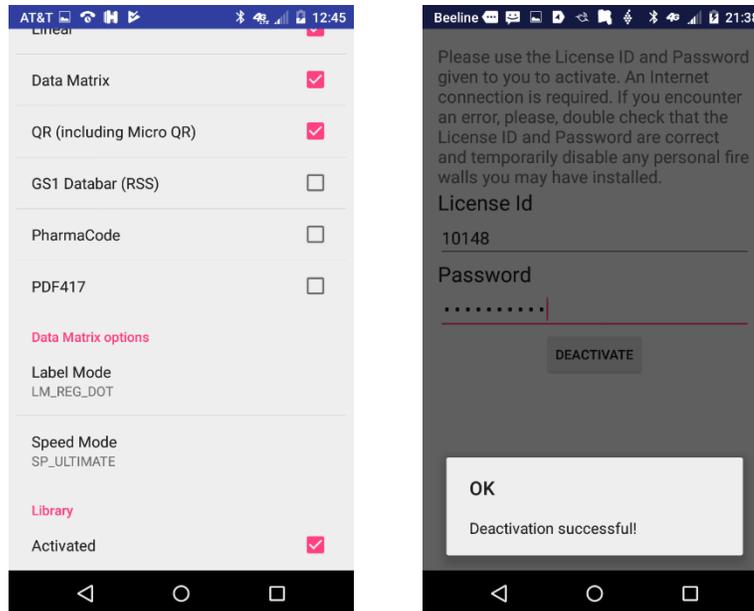
Online De-Activation

Start the **Barcode Reader**.

Open the **Settings** menu and scroll to the bottom of the list (left Pic. below).

Uncheck “Activated” box.

Enter License Id and Password that you received when you purchased the license on the new screen.



Once you tap the “Deactivate” button the Product will communicate to our server. If the license is validated the Product will be deactivated and your license is released. You will receive confirmation message box on your device.

You can activate the released license on the other Android platform now.