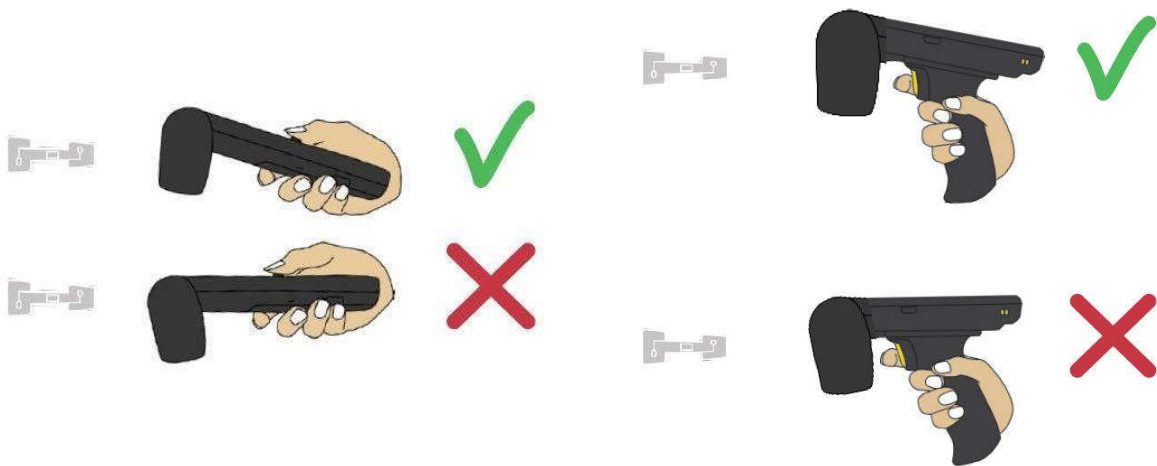


Picture 16 Correct grip of Nordic ID HH83 Barcode



Picture 17 Correct grip of Nordic ID HH83 RFID ACD and Nordic ID HH85 RFID ACD

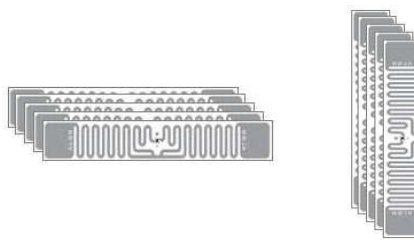
2.6. NORDIC ID HH83/HH85 RFID ACD VARIANTS

Nordic ID HH83 RFID ACD and Nordic ID HH85 RFID ACD include Advanced Cross Dipole antenna that includes SW controllable (via Nordic ID RFID demo application and NUR API) antenna polarizations (vertical and/or horizontal), enabling a nominal reading distance about 15 m / 50 ft.

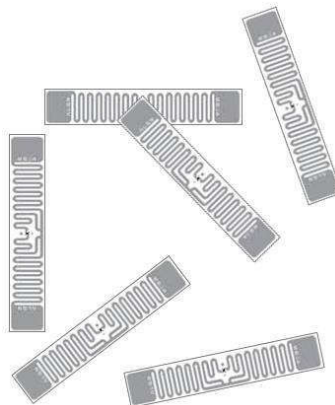
NOTE! The reading range depends on used tag and environment

The linear antenna modes (only one antenna is enabled) are intended for long range reading when tag density is high, and tags are in horizontal or vertical position (Picture 18).

Enabling both linear antennas provides a lower reading speed but it does provide the best reading performance when tags are in random positions (Picture 19).



Picture 18 RFID tags in horizontal and vertical alignment



Picture 19 RFID tags in random alignment

2.7. 2D IMAGER

This section describes methods for configuring 2D imager of Nordic ID HH83/HH85. The 2D imager module in use is Opticon MDI-4100 2D scan engine.

There are three different ways to configure the 2D imager that are

1. Using configuration barcode
2. Using Nordic ID RFID demo application
3. Configuring via NUR Accessory extension API

2.7.1. USING CONFIGURATION BARCODES

The easiest way to configure 2D imager is to read a configuration code with the 2D imager. Please use Opticon's online configuration tools to create a configuration barcode and print it onto paper. Then scan the code with the 2D imager of Nordic ID HH83 and new settings will be set and saved automatically.

Quick Instructions to generate imager configuration barcodes:

1. Opticon's online configuration tools: <http://opticonfigure.opticon.com/>
2. Select "Browse" in the left corner of the page
3. Select "Code options"
4. Select "Settings of readable codes"
5. Select "Enabling of readable codes"
6. Select a barcode from the list e.g. Code 39
7. Press "Add" button at the bottom
8. From right corner of the page, select "Barcode Type": e.g. PDF417
9. You can adjust the size of the code from the "Barcode Size"
10. Select "Advanced" from the lower part of the right column
11. The "2D code" field indicates the corresponding configuration string.

Find example configuration barcodes below. More configuration barcodes can be found at APPENDIX 1.

- 1 - Enable 1D codes: Tri-Optic, Industrial 2 of 5, Code 39 and S-Code



@MENU_OPTO@ZZ@JZ@R7@B2@R9@ZZ@OTPO_UNEM@

- 2 - Disable 1D codes: Tri-Optic, Industrial 2 of 5, Code 39 and S-Code



@MENU_OPTO@ZZ@DDJ@X4K@VB@DDK@ZZ@OTPO_UNEM@

2.7.2. USING NORDIC ID RFID DEMO APPLICATION

Nordic ID RFID Demo application allows testing of different kind of barcode configurations effortlessly. Configurations can be read and set from specific file. The specific file is a simple text file containing configuration command strings generated by the Opticon's configuration tool. The configuration settings of Nordic ID RFID demo applications can be accessed via Settings menu or barcode functionality.

Opticon's configuration tools do provide configuration strings instead of graphic barcodes when you select "Enabling a single readable code" instead of "Enabling of readable codes" in step 4. Barcode type must be 2D-Code like PDF417. Format of configuration string is:

```
@MENU_OPTO@ZZ@<config codes separated by @>@ZZ@OTPO_UNEM@
```

Opticon's configuration tools shows two or three letter configuration code for each configurable item.

Example:

```
Enable Tri-Optic = JZ, Enable Code39 = B2  

Configuration string = "@MENU_OPTO@ZZ@JZ@B2@ZZ@OTPO_UNEM@"
```

After sending configuration file to the reader, Nordic ID RFID demo will send "save settings" command automatically to the 2D imager. Source code of Nordic ID RFID demo is public, so one can study how 2D imager configuration using the specific files has been implemented on Android. See section 4.8.2 for more information.

2.7.3. CONFIGURING VIA NUR ACCESSORY EXTENSION API

NUR Accessory Extension API provides command for sending configuration string to the 2D imager:

```
byte [] imagerCmd (String cmd, int type);  

cmd: Configuration string.  

type: Type of imager in use (0= Opticon MDI-4100 2D scan engine)
```

Return value is byte array of response depending on command code(s) sent to the 2D imager. Null if command string is not valid. The first byte of array contains ACK (0x6 success) or NAK (0x15 fail).

Example:

```
//Send Enable Tri-Optic and Enable Code39 commands  

byte [] rsp = imagerCmd("@MENU_OPTO@ZZ@JZ@B2@ZZ@OTPO_UNEM@", 0);  
  

if(rsp[0] == null)  

{  

  //Not valid command  

}  

else if(rsp[0] == 0x6) //ACK  

{  

  //Config success!  

}  

else if(rsp[0] == 0x15) //NAK  

{  

  //Config failed!  

}
```

After sending configuration to the 2D imager, settings are ready to use but next power down causes settings to lost. Therefore, it's important to save settings to non-volatile memory of imager.

```
//SAVE CONFIGURATION TO IMAGER MEMORY  

imagerCmd ("@MENU_OPTO@ZZ@Z2@ZZ@OTPO_UNEM@", 0);
```

3. RF PROFILES

The Nordic ID HH83 RFID ACD and Nordic ID HH85 RFID ACD include the Nordic ID NUR2-1W UHF RFID module which supports three different kind of RF profiles. The profiles are Robust, Nominal and High speed. It is important to select the correct RF profile based on use case and environment. More detailed description about the RF profiles can be found below:

- **Robust**
 - Robust RF profile is intended to be used in challenging environments. It provides the best filtering against the interfering signals coming from nearby reader(s), other signal sources and from reflective environment. This profile uses link frequency of 250 kHz and Miller 4 coding scheme providing read rates up to 200 tags/s. Due to the low data speed and best filtering the Robust RF profile provides the best sensitivity.
- **Nominal**
 - Nominal RF-profile is the default setting of readers containing Nordic ID NUR2-1W UHF RFID module. It uses link frequency of 300 kHz and Miller 2 coding providing read rates up to 350 tags/s.
- **High speed**
 - High speed RF profile is intended to be used in use cases where the highest read rates are required. It uses link frequency of 400 kHz and FM0 coding and provides read rates up to 1000 tags/s. Due to the high data speed this profile is quite sensitive to interferences.

NOTE! Read rates will depend from the environment, reader settings, tag population and tag type.

4. SOFTWARE

Nordic ID has taken an open source SW development approach in use with the Nordic ID HH83/HH85. Nordic ID provides the SDK along with the examples through the GitHub. The Nordic ID HH83/HH85 supports powerful NUR API so developers can use familiar NUR API for application development.

Some pre-installed applications are delivered together with Nordic ID HH83/HH85 to quickly start evaluating and using the device. It also allows installation of 3rd party applications for unlimited use cases.

4.1. NORDIC ID APPLICATIONS

Nordic ID provides following feature rich yet easy-to-use applications for Nordic ID HH83/HH85.

The applications are pre-installed on Nordic ID HH83/HH85 and shortcuts added to home screen by default.



Screenshot 4

4.1.1. NORDIC ID RFID DEMO FOR ANDROID



The Nordic ID RFID Demo application for Android is a full featured application to perform different functionalities with Nordic ID HH83/HH85 and all the others Nordic ID devices supporting Android OS.



Screenshot 5

Nordic ID RFID Demo application can be used for testing the capabilities of compatible Nordic ID devices and how the various RFID settings affect the reading performance.

Nordic ID RFID Demo application enables different key features:

- RFID Inventory (EPC, TID and user memory) **
- Locate an RFID tag with a given EPC **
- Write RFID tag **
- Read NFC tag */**
- Barcode scanning */**
- Firmware update */**

* Available in Nordic ID HH83 Barcode variant

** Available in Nordic ID HH83 RFID ACD and Nordic ID HH85 RFID ACD variants

You can swipe the screens in the Nordic ID RFID Demo app to change the settings section or see the list of EPCs during an inventory.

4.1.2. NORDIC ID WEDGE SERVICE



Nordic ID Wedge Service application provides wedge functionality for Nordic ID HH8x, so that the code of the RFID tags and barcodes scanned are typed as a keyboard input.

We suggest enabling the “Automatic start” function of NUR Wedge Settings in Nordic ID HH83 Barcode variant, if you are not using an app which was developed using the NUR API. That way, any existing 3rd party application (text editors, spreadsheets, web forms, etc) can straightaway use the barcode scanning as a keyboard input.

4.1.3. NORDIC ID APP CENTER



The Nordic ID HH83/HH85 is an Android device designed for professional use. GMS (Google Mobile Services) are not part of Nordic ID Android OS, promoting greater privacy and security of personal information by preventing location tracking and data collection.

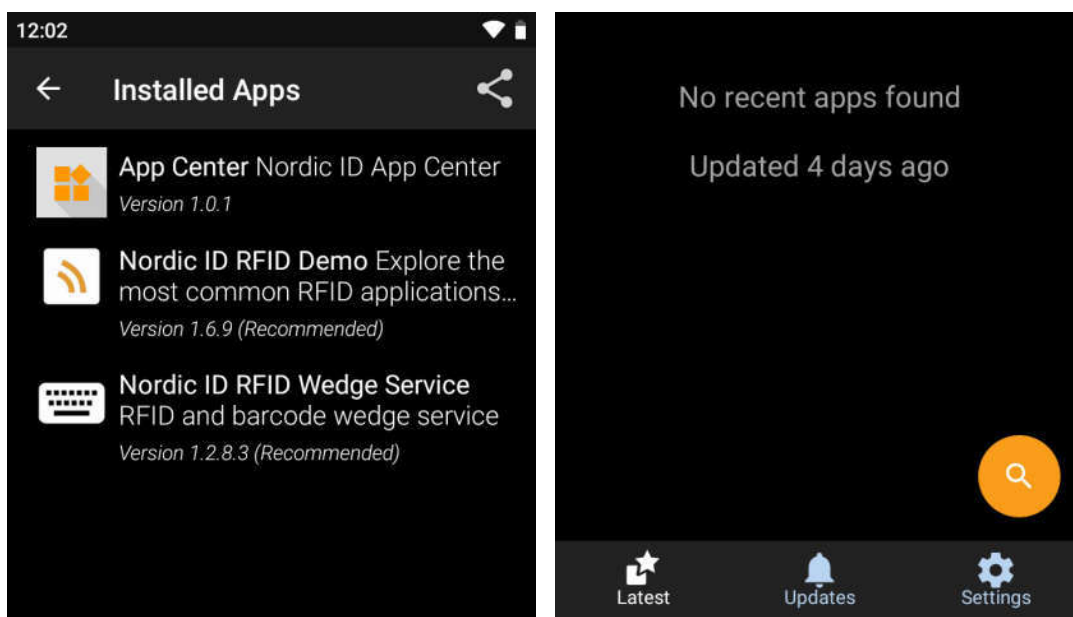
As Google Play Store is not available in Nordic ID HH83/HH85 to prevent installation of unauthorized 3rd party applications, Nordic ID delivers the Nordic ID HH83/HH85 with a customized app catalogue: Nordic ID App Center, based on the open-source Android app repository F-Droid.

Nordic ID App Center enables the installation of 3rd party apps included in the selected repositories and keeps them updated. By default, the catalogue of apps in Nordic ID App Center include two repositories:

- Nordic ID repository, which includes the essential apps for Nordic ID HH83/HH85 devices, such as Nordic ID RFID Demo or Nordic ID Wedge.
- F-Droid repository, a wide catalogue of Open-Source Software including web browsers, pdf readers, maps and navigation, etc. All of them being secure apps without malware or virus.

With Nordic ID App Center, the user has full control of the available repositories and can add new ones to extend the number of available apps. Each repository can contain certain apps, that will be the available apps on the device for being installed by the user later on.

Advanced users can also create their own app repository (<https://f-droid.org/en/tutorials/create-repo/>) and upload their own Android apps, to grant the users with easy access to them, as this configuration can be exported and restored on any other device (see section 4.5).



Screenshot 6

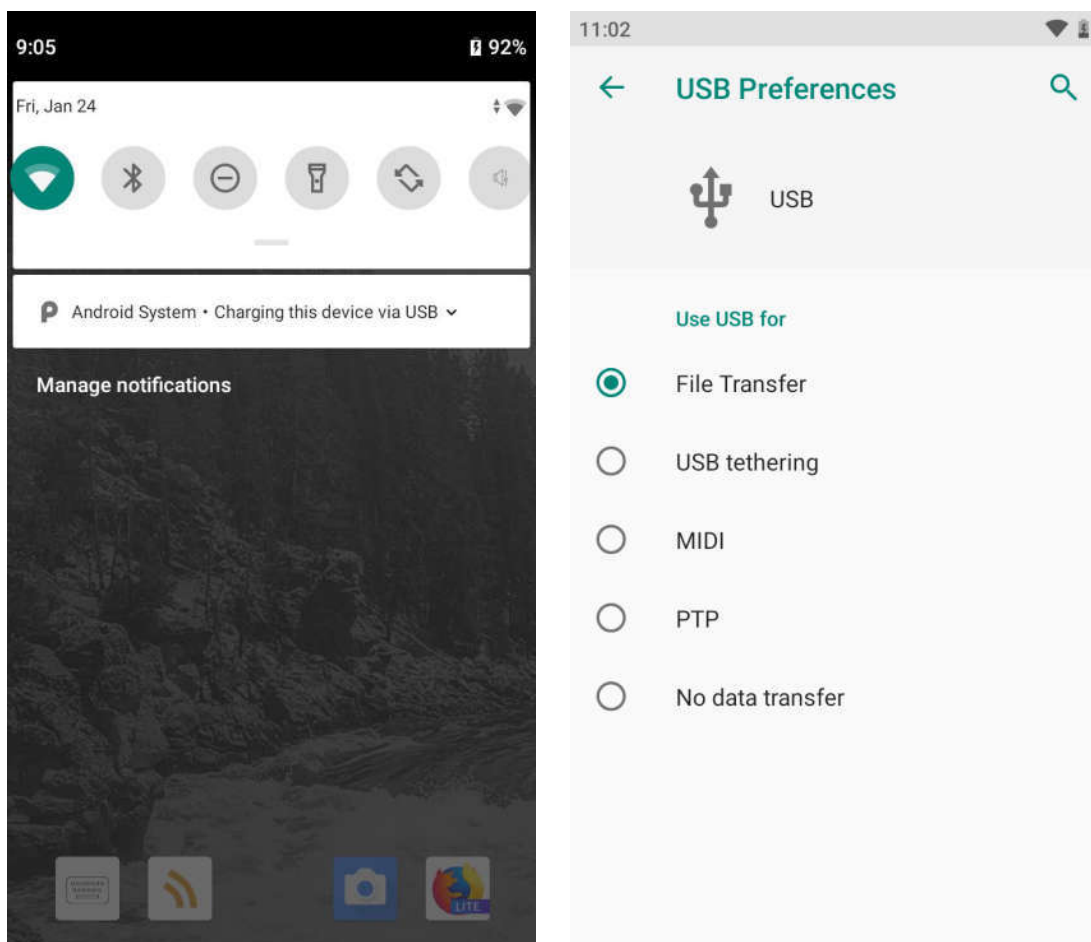
4.2. INSTALLING 3RD PARTY APPLICATIONS



A 3rd party Android app can be installed in the Nordic ID HH83/HH85 device, just by copying the APK installation file to the device and launching it using the Files app.

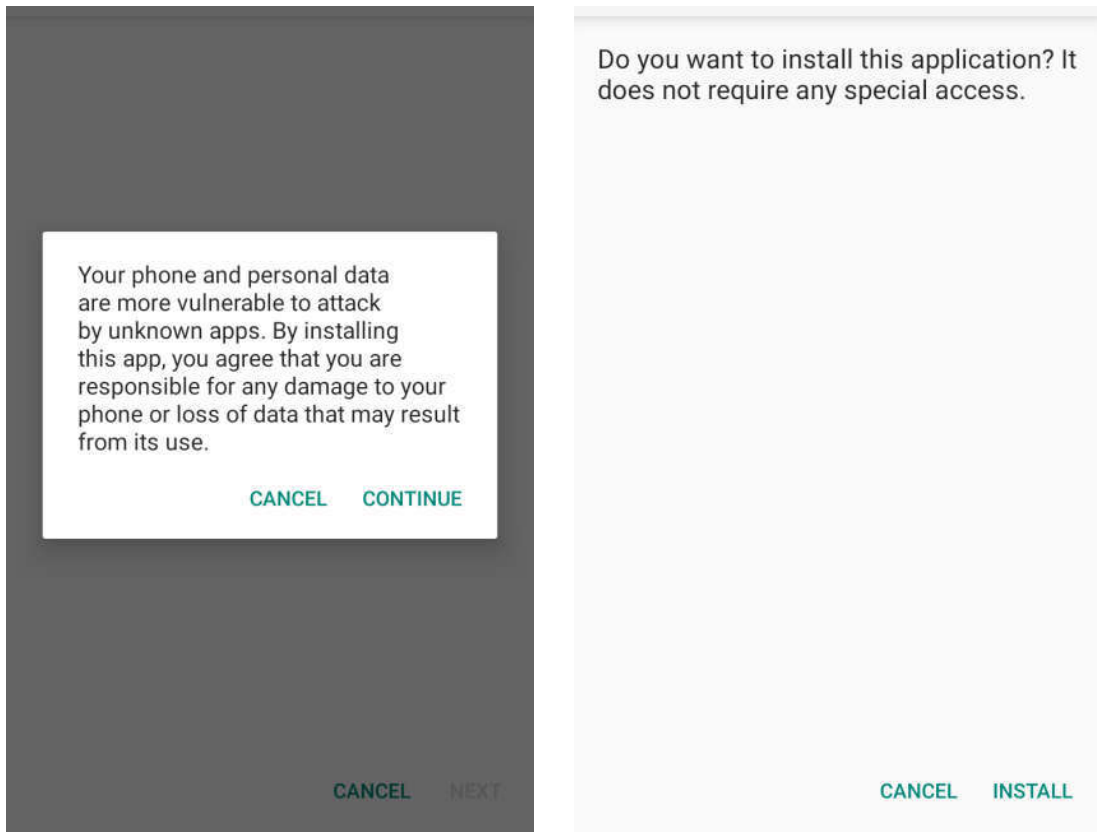
In order to copy a file to the Nordic ID HH83/HH85 device, please follow these instructions:

1. Connect the Nordic ID HH83/HH85 to your computer using a USB cable
2. “Tap for more options” in the drop-down USB notification, and then select “File Transfer”



Screenshot 7

3. You will now be warned about unknown apps, potential attacks and app permissions requests. Please make sure that you are installing a safe and known app before accepting both prompts.



Screenshot 8

4.3. LOCKING THE USER INTERFACE

Also known as “kiosk mode”, this feature is useful to prevent the user to modify certain settings and install/uninstall applications in Nordic ID HH83/HH85.

When the user interface is locked, the user cannot:

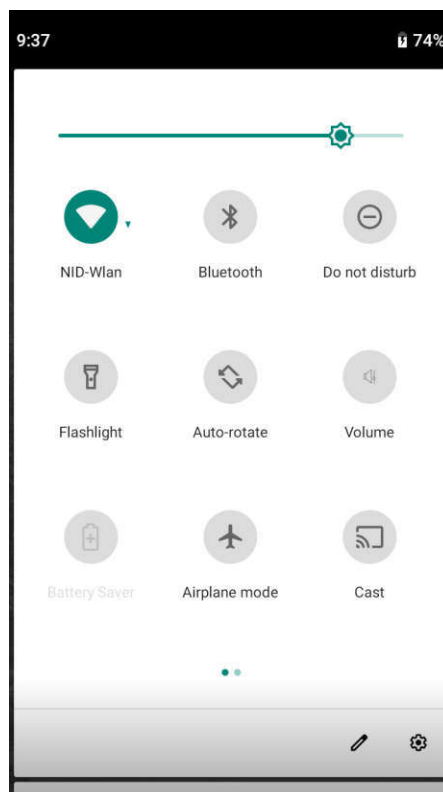
- Install additional applications.
- Uninstall existing applications.
- Add or remove app icons from the home screen.
- Access settings not available in the quick settings dropdown menu.
- Open the applications drawer.
- Update the OS.

The locking is secured using a PIN code, which is decided by the administrator of the device.

4.3.1. CREATE THE DESIRED USER INTERFACE

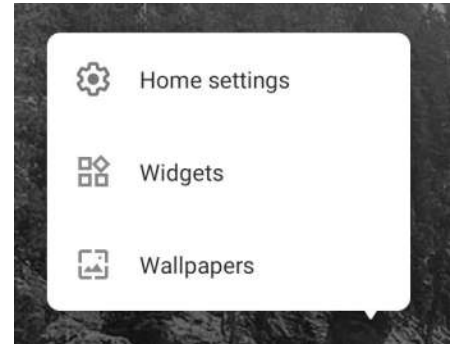
The first step before locking the user interface is creating the interface which the user will interact with, as any application or setting not included now will not be accessible to the user after locking UI. Please remember that you can have more than one screen and that locking the UI will lock all of them.

1. Install all the applications which the user should have access to, and create shortcut icons on the home screen for all of them.
2. Edit the Quick Settings Dropdown menu, if the user will be allowed to enable, disable or modify the configuration of each one of those settings, e.g., Wi-Fi, Bluetooth, Battery profile,... You can edit the menu by taping the pencil in the bottom right corner.



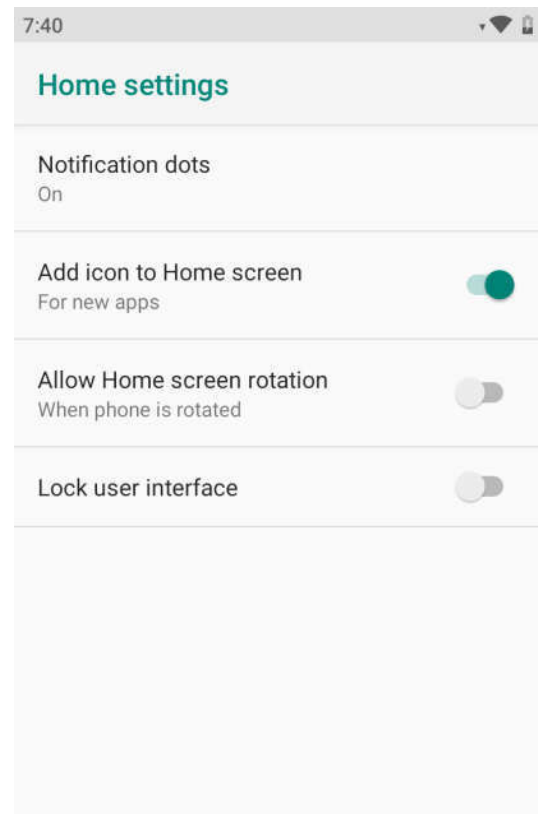
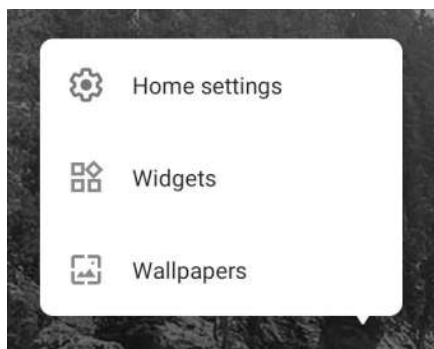
Screenshot 9

3. Select the wallpaper and add any widget which should be visible the home screen. You can configure this by long tapping the home screen background and selection the appropriate option in the pop up menu.
4. If any specific Setting has to be accessible to the user, "Settings shortcut" widgets can also be added, providing a direct access to certain settings such as Battery, Display, Hotspot, Updates, Wi-Fi, Connected devices and many others.



4.3.2. HOW TO LOCK/UNLOCK UI

Once the user interface has been created, it can be locked by long tapping the background and selecting "Lock user interface" in "Home settings".



Screenshot 10

You will be prompted to create a PIN code which will be used to unlock the UI in case it is needed.

The process to unlock the user interface is the same: long tapping the background and unchecking the "Lock user interface" option.

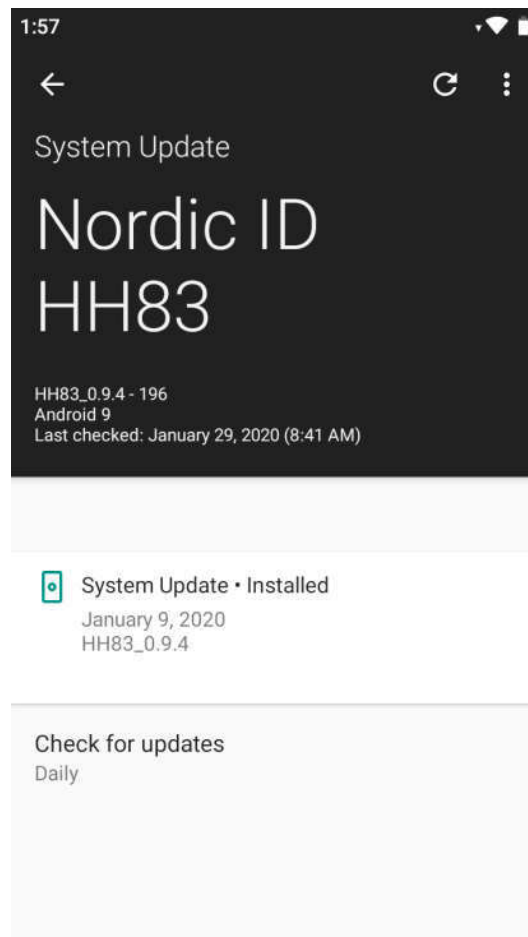
After the first locking, the device will remember the previous used PIN code and entering it again is not required, unless you want to change it.

4.4. UPDATE INSTRUCTIONS

Android OS and Nordic ID HH83/HH85 drivers/firmware can be updated by following these steps:

1. Connect to the Internet using WLAN, LTE or the desktop cradle with Ethernet adapter.
2. Open Settings menu (Android menu, not Nordic ID RFID Demo settings).
3. Select "System" → "Advanced" and tap "Additional system updates"
4. Then tap the circular refresh arrow on top right to check for an available update and download it from the Internet.

Instead of manual checking, you can also enable an automatic update checking every day, week, 2 weeks or month.



Screenshot 11

You can also subscribe to Nordic ID RSS downloads feed to get notifications about new updates without having a Nordic ID HH83/HH85 on hand:

<https://www.nordicid.com/feed/newdownloads/>