



nRF Connect v1.1.0

Getting Started Guide

v1.1

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Revision history

Table 1: Revision history

| Date | Version | Description |
|--------------|---------|---|
| January 2017 | 1.1 | <ul style="list-style-type: none">• Added Secure DFU• Added support for nRF52 Development Kit PCA10056 |
| July 2016 | 1.0 | First release |

Chapter 1

nRF Connect

nRF Connect is a desktop application for getting familiar with, developing, and testing Bluetooth® low energy. nRF Connect allows you to set up a local device, connect it to advertising devices and discover their services, maintain the connection and the connection parameters, pair the devices, and change the server setup for your local device. nRF Connect also offers a detailed log for troubleshooting purposes.

Supported devices

- PCA10028 nRF51 Development Kit
- PCA10040 nRF52 Development Kit
- PCA10056 nRF52 Development Kit
- PCA10031 nRF51 Dongle

Supported operating systems

- Microsoft Windows 7, 8, and 10
- OS X 10.11
- Ubuntu Linux 14.04 and 16.04

Chapter 2

Installing nRF Connect

This section describes the installation procedure for nRF Connect.

In order to install nRF Connect for Microsoft Windows, you need to have nRF Command Line Tools installed, which includes SEGGER J-Link Software. See [nRF5x Command Line Tools](#) for installation instructions.

In order to install nRF Connect for OS X and Linux, you need to have SEGGER J-Link Software installed. You can download and install it from [SEGGER J-Link Software](#).

To install the nRF Connect application, complete the following steps:

1. Download the nRF Connect application from the nRF Connect product page at www.nordicsemi.com.
2. Install the application on your system.
 - Windows: Run the installer and start the application from the Start menu.
 - OS X: Unpack the archive and start the application by running the nRF Connect app bundle file.
 - Linux: Unpack the archive and start the application by running the nRF Connect executable file.

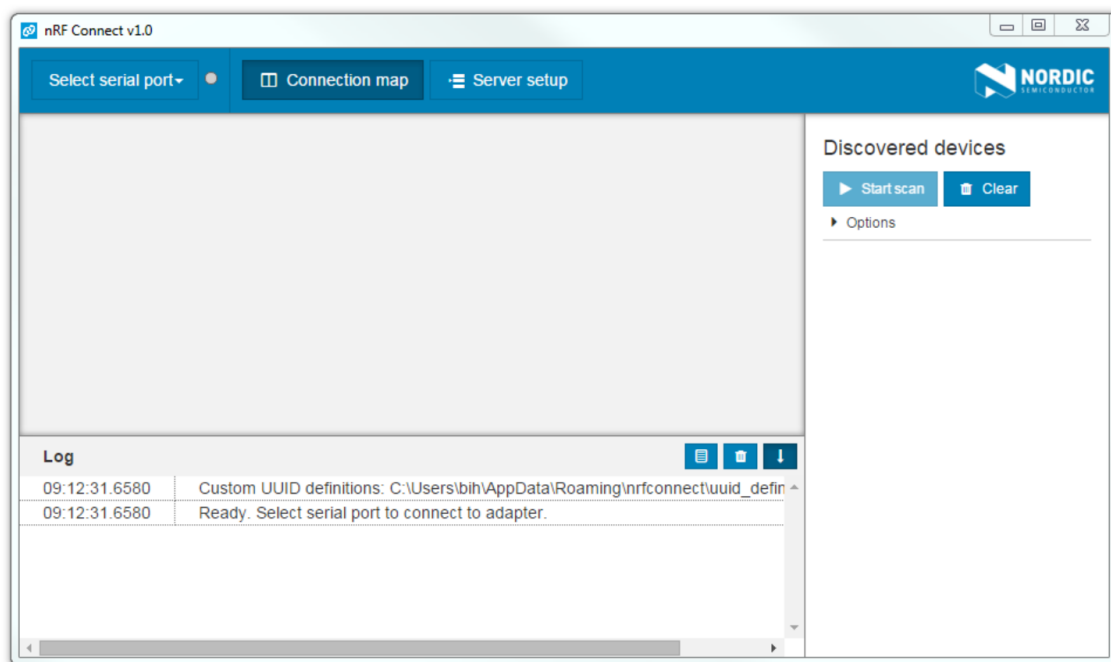


Figure 1: Application window

After starting nRF Connect, a window consisting of the following main elements is displayed:

- Main view in the center: Initially empty, but will be populated with local and remote *Bluetooth*® devices.
- Navigation bar at the top: Select serial port, application screen selection.
- Discovered devices view on the right side: Option to start scan and view discovered devices.
- Log view at the bottom: Shows the most important log events tagged with a timestamp.

Chapter 3

Establishing serial port connection to a local device

nRF Connect requires a serial port connection to a local development kit or dongle. The nRF SoC (System on Chip) on the development kit or dongle is controlled by nRF Connect which sends serialized commands to it over a serial port.

To set up a local device, complete the following steps:

1. Connect a development kit or dongle to the computer with USB.
2. In the navigation bar, click on the **Select serial port** menu.
3. Select a serial port for the device.

When the serial port is selected, the **Select serial port** menu shows the name of the selected port.

If the development kit or dongle has not been used with nRF Connect before, you may be asked to update the J-Link firmware and connectivity firmware for the device. You need to have the correct connectivity firmware on the nRF SoC to proceed. When the nRF SoC has been programmed with the correct firmware, nRF Connect proceeds to connect to it over UART. When the connection is established, the device appears in the main view.

Important: When using OS X, an issue with the SEGGER J-Link OB firmware leads to the corruption of long packets over UART. See www.nordicsemi.com/nRFConnectOSXfix for more information.

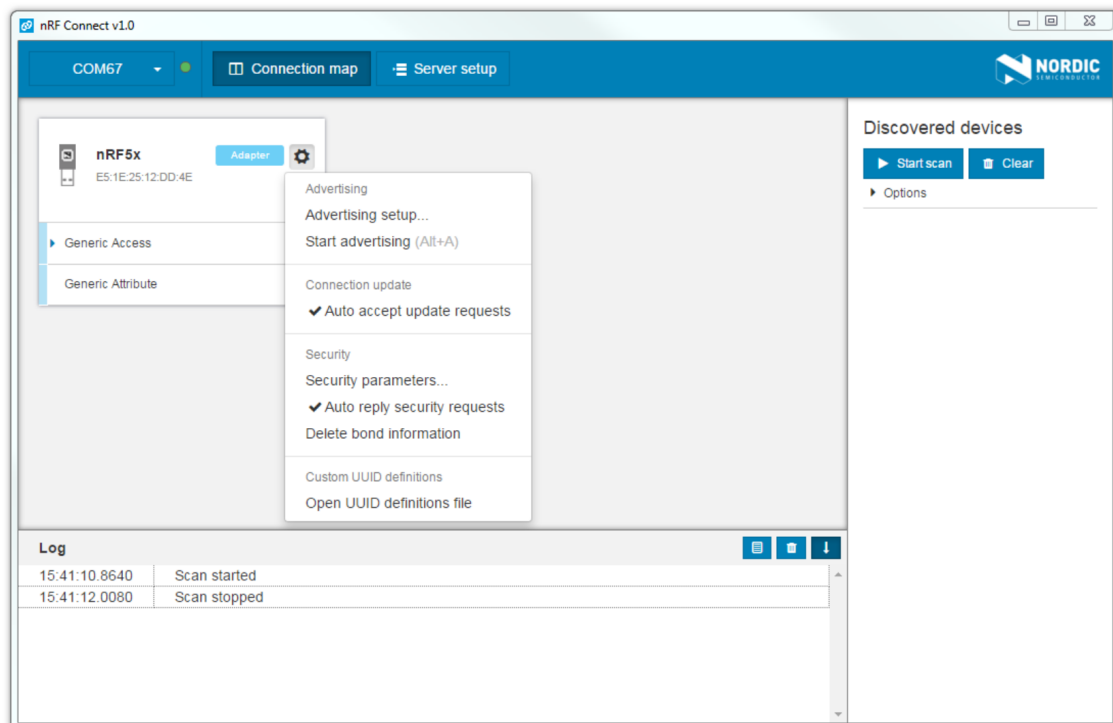



Figure 2: Local device view

The local device is labeled adapter to signal that it is connected locally to the computer. The device name and *Bluetooth*[®] device address are shown at the top. The attribute table of the device is shown below them.

To expand a menu that shows actions and configurations available for the local device, click the Device options icon .

Chapter 4

Establishing *Bluetooth*[®] low energy connections

nRF Connect can establish and maintain up to eight simultaneous *Bluetooth*[®] low energy connections.

To connect to devices, complete the following steps:

1. To scan for nearby *Bluetooth*[®] devices, click the **Start scan** button in the Discovered devices view.

The advertising devices start to appear in a list in the Discovered devices view. Each entry in the list shows the name, address, and RSSI of the received advertising packet. For information on how to set up advertising for a device, see [Setting up advertising](#) on page 16.

2. To view the advertising type and data fields of a packet, select the packet entry in the list.
3. To sort the list according to signal strength and thus according to which device is closest, click **Options** and select **Sort by signal strength**.
4. To establish a *Bluetooth*[®] connection with a peer device, click the **Connect** button associated with the device.

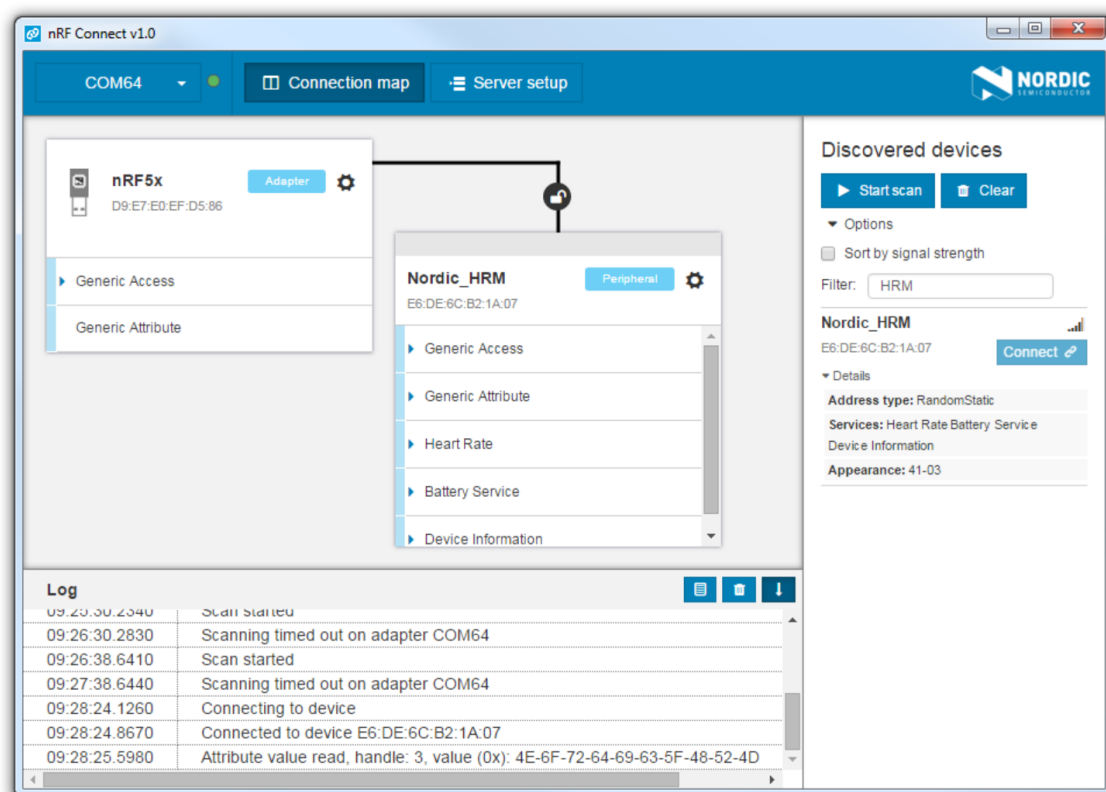


Figure 3: Discovered services

When the connection has been established, a new device appears in the main view to the right of the local device. nRF Connect automatically performs an initial service discovery. The discovered services are listed below the connected device. Attributes that are known to the application are shown by their name. Attributes that are unknown to the application are shown by their UUID only. For information on how to add UUID definitions, see [Adding UUID definitions](#) on page 20.

A line connects the local and remote device to signal that they are connected over *Bluetooth*[®]. Move the mouse pointer over the padlock icon on the line to open a connection info dialog that shows the parameters of the connection as well as the encryption and bond state.

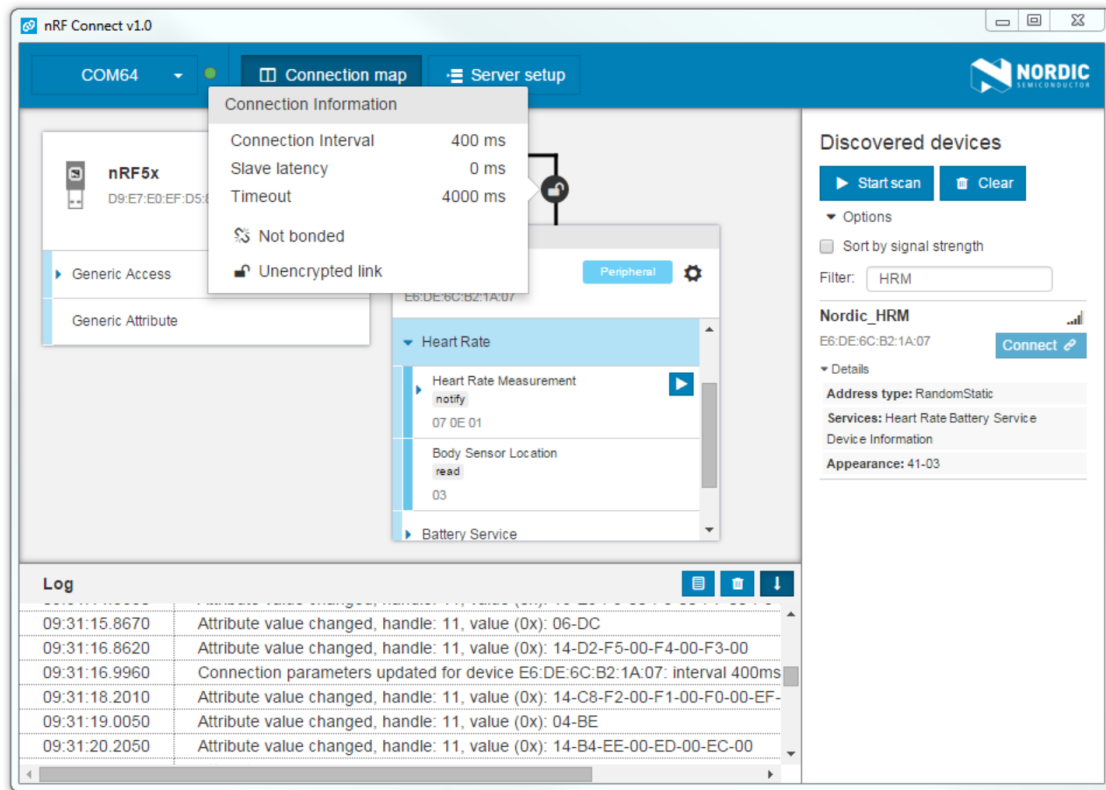




Figure 4: Hovering over the padlock icon

Chapter 5

Viewing service details

nRF Connect can discover and display services, characteristics, and descriptors of a connected peer device's attribute table.

- To view the handle and UUID of an attribute, move the mouse pointer over the attribute name.
A hover text is displayed.
- To view the characteristics of a service, click the Expand/collapse icon .
The characteristics have different buttons available depending on the associated properties. Read, write, and notify actions are available if the corresponding properties are available for the characteristic.
- To view descriptors, expand the characteristics.
- To configure the peer device to start sending notifications, click the Toggle notifications icon .

If a notification has been received on a device, it is displayed with a highlight color on the corresponding attribute and its value is updated.

If a service or characteristic does not have any child attributes, the list is empty when you click the Expand/collapse icon.

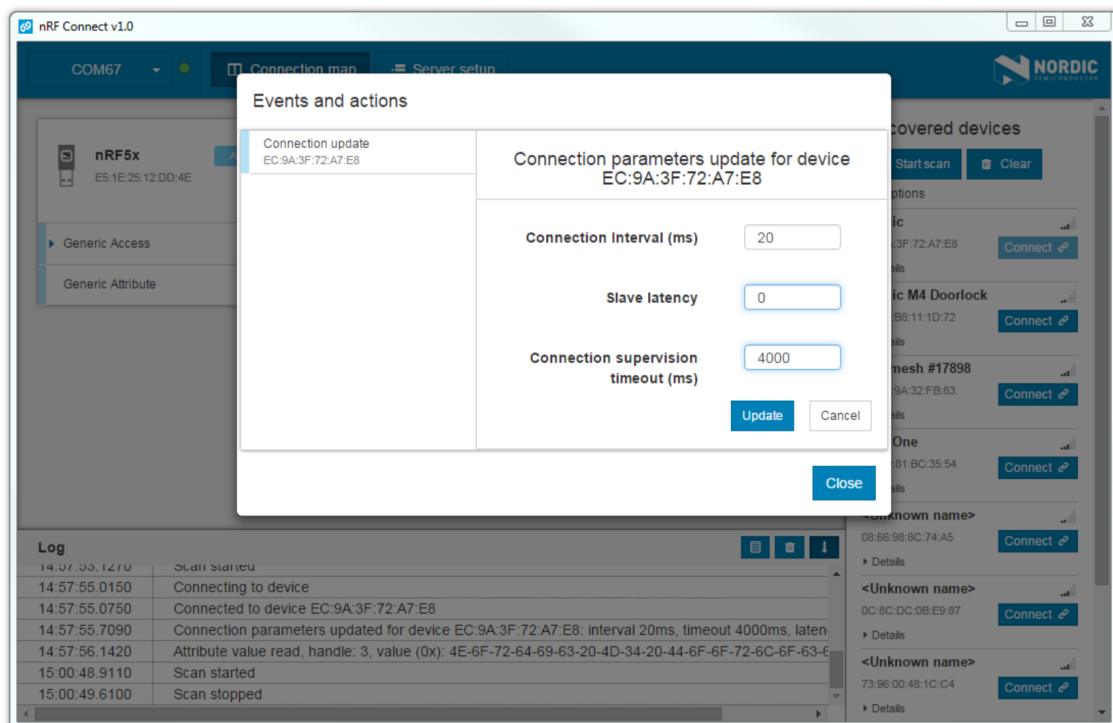
Chapter 6

Updating the connection parameters

In a connection, you can request new connection parameters and respond to an incoming connection parameter update request.

To define connection parameters, complete the following steps:

1. To expand the device options for the connected device, click the Device options icon ⚙️.
2. To open the Connection update dialog, click **Update connection....**



3. Set the desired parameters in the dialog, then click **Update**.
4. To close the Connection update dialog, click **Close**.

There are two main options for responding to update requests: Letting nRF Connect accept the request automatically (default) or responding to the request manually.

To select the responding option, complete the following steps:

1. Click the local Device options icon ⚙️.
2. Select or deselect **Auto accept update requests**.

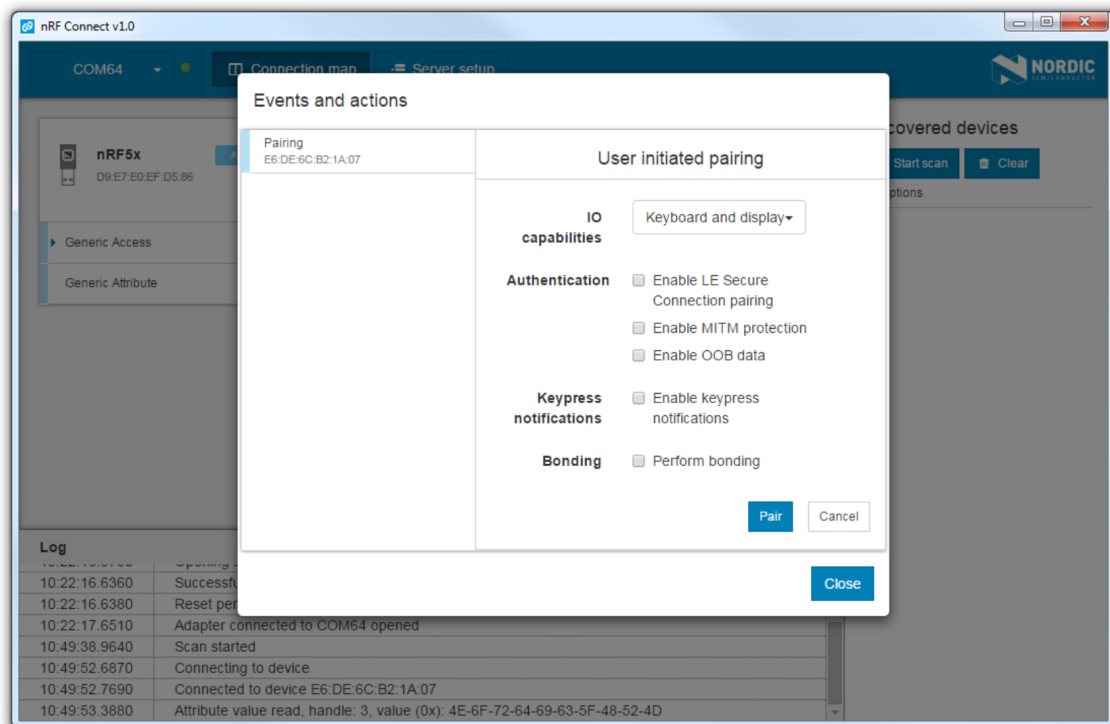
Chapter 7

Pairing devices

Pairing is the process of exchanging security keys and establishing an encrypted link. The level of security is configurable, and it ranges from an unencrypted link with no security to an encrypted link with authentication and protection against man-in-the-middle attacks.

To pair with a connected device, complete the following steps:

1. To expand the device options for the connected device, click the Device options icon ⚙️.
2. To open the Pairing dialog, click **Pair....**



3. Set the desired parameters in the dialog, then click **Pair**.

Depending on the chosen security parameters, an additional dialog may be shown for passkey, out-of-band data, or numerical comparison input.

4. To close the Pairing dialog, click **Close**.

When the pairing procedure has been completed, the following changes are displayed:

- A log entry shows the new security level of the connection.
- The connection info padlock changes to locked if the connection is encrypted.
- The event view text turns green to indicate success.

Bonding can also be established, which means creating and exchanging long term keys that are used for reestablishing an encrypted link without having to go through the pairing process.

Incoming pairing requests can be replied to automatically by nRF Connect (default), or they can be handled by the user.


To select the replying option for pairing requests, complete the following steps:

1. Click the local Device options icon ⚙️.

2. Select or deselect **Auto reply security requests**.

When **Auto reply security requests** is selected, nRF Connect uses the settings specified in the **Security parameters** when automatically replying to the request.

To edit the **Security parameters**, complete the following steps:

1. Click the local Device options icon .
2. To open the **Security parameters** dialog, click **Security parameters**.
3. Click **Apply** when done.

Important:

- Bonding is supported, but the keys are not retained across application restarts.
- Address resolving is currently not supported. Therefore, using keys from a bond after the device has changed address will most likely fail.

Chapter 8

Configuring the server setup

nRF Connect supports the configuration of the local device's GATT (Generic Attribute profile) attribute table, also known as server setup. Adding attributes to the server setup allows the local device to exchange data with a connected peer device.

The default server setup consists only of the two mandatory services: GATT and GAP (Generic Access Profile). These services can be modified, but they cannot be removed, and you cannot extend them with more characteristics or descriptors.

To add new attributes to the server setup, complete the following steps:

1. In the navigation bar, click the **Server setup** button.

Initially, the default server setup that is displayed contains only GAP and GATT services.

2. Click **New service**.

3. Select the added service.

A form is displayed.

4. Define the attribute values, then click **Save**.

5. To add a new characteristic, expand the added **New Service**, then click **New characteristic**.

6. Select the added characteristic.

A form is displayed.

7. Define the attribute values, then click **Save**.

Important:

When adding a notify or indicate property on a characteristic, you need to add a Client Characteristic Configuration Descriptor (CCCD) for that characteristic.

8. To add a new descriptor, expand the added **New Characteristic**, then click **New descriptor**.

9. Select the added descriptor.

A form is displayed.

10. Define the attribute values, then click **Save**.

11. When you have completed the server setup, click **Apply to device** to upload the setup to the local device.

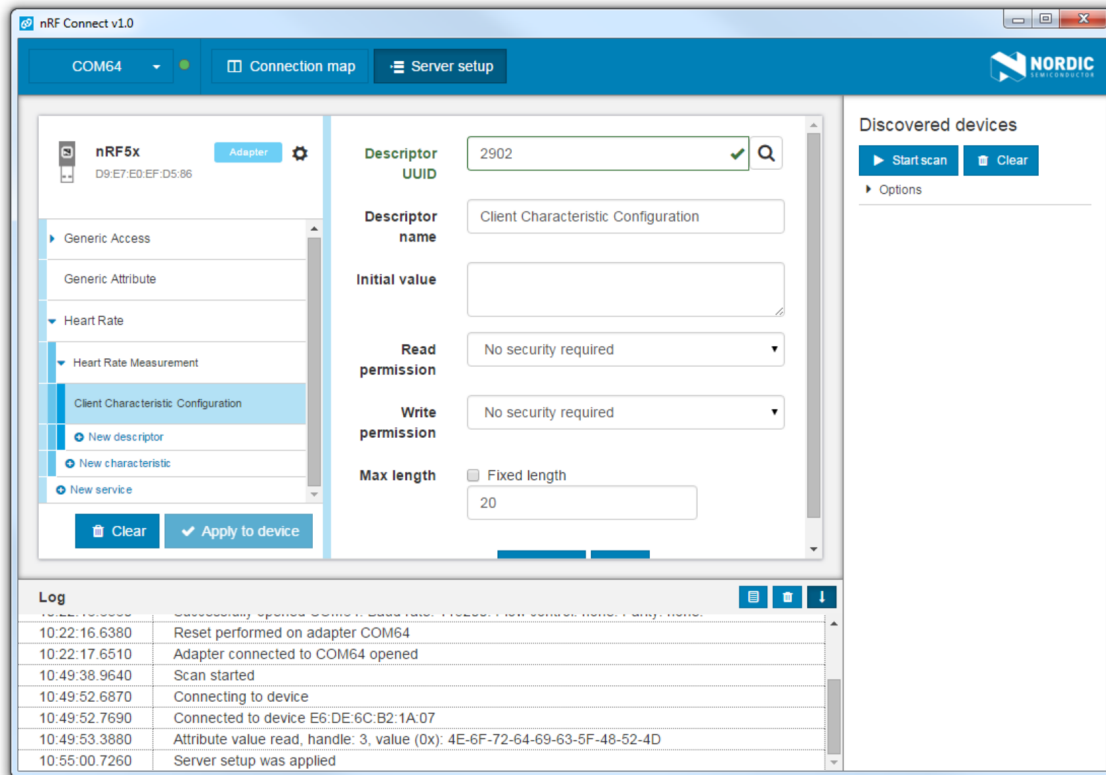




Figure 5: Server setup

To save a server setup to file for later use, complete the following steps:

1. Click the local Device options icon .
2. Click **Save setup...**
3. Choose a directory and type a file name, then click **Save**.

To load a previously saved server setup from file, complete the following steps:

1. Click the local Device options icon .
2. Click **Load setup...**
3. Navigate to the right directory and select the file, then click **Open**.

Important: You cannot remove or overwrite a setup from the device. To enable the uploading of a new server setup, hit the Reset button on the development kit. This updates the application state appropriately. Alternatively, close and open the serial port in the device selector.

After the setup has been applied to the device, you can view the resulting setup by clicking the **Connection map** button in the navigation bar. The new setup is reflected in the local device.

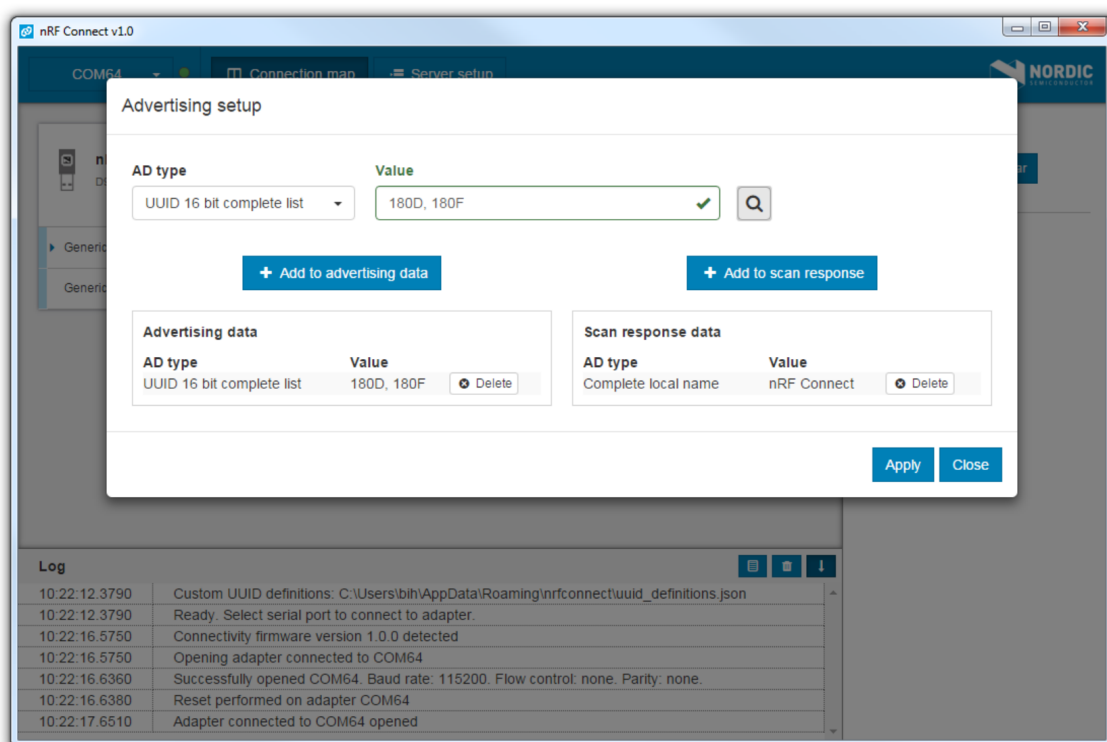
Chapter 9

Setting up advertising

nRF Connect can make the local device operate as a peripheral and start sending connectable advertising packets. The contents of the advertising packets can be configured in the advertising setup.

To start sending advertising packets, complete the following steps:

1. Click the local Device options icon ⚙️.
2. To start advertising the device, click **Start advertising**.
3. Specify the contents of the advertising packets:



- a) Click the local Device options icon ⚙️.
- b) To display the Advertising setup dialog, click **Advertising setup**.
- c) From the AD type drop-down menu, select an AD type.
- d) In the Value field, add a data value.
- e) Select **Add to advertising data** or **Add to scan response**.
- f) Repeat until all wanted fields are present.
- g) Click **Apply**, then click **Close**.

Chapter 10

Updating firmware over the air

If the connected device has Nordic Device Firmware Update (DFU) Service, you can update the firmware on the device.

For more information on the DFU process, see [Device Firmware Update process](#). For DFU bootloader examples, see [DFU bootloader examples](#).

For a device that has DFU Service, Secure DFU appears in the device's list of discovered services and the Start Secure DFU button appears in the list header.

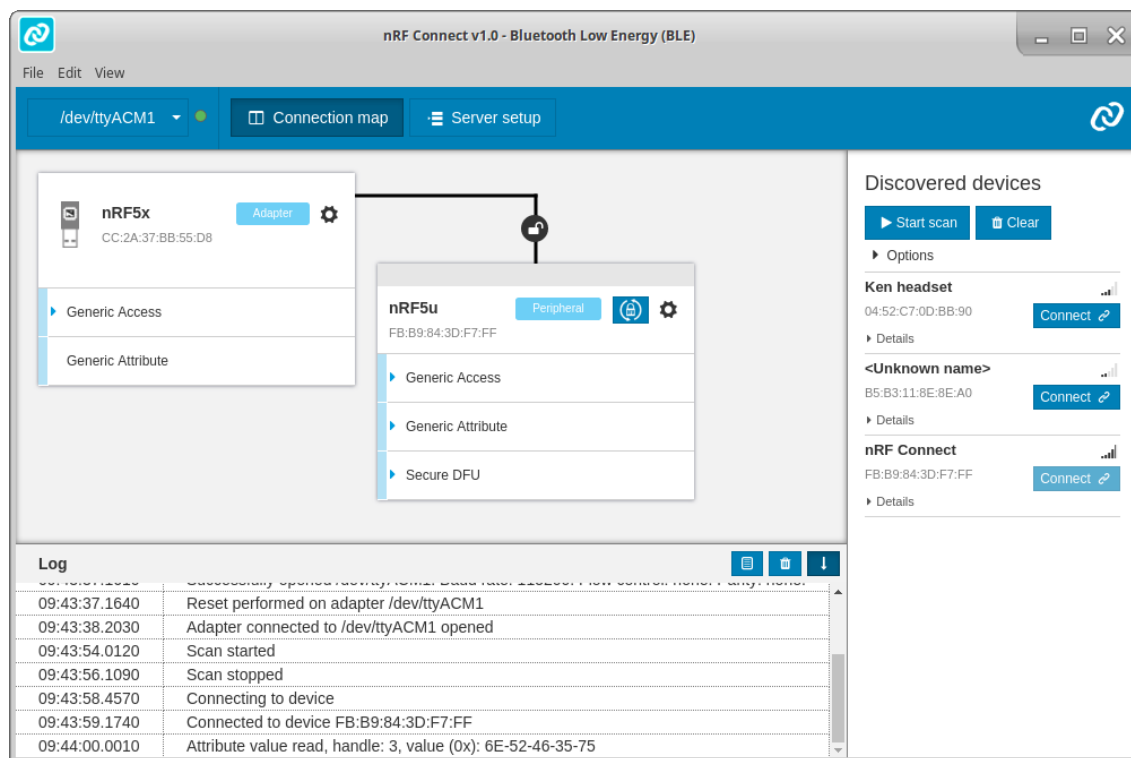



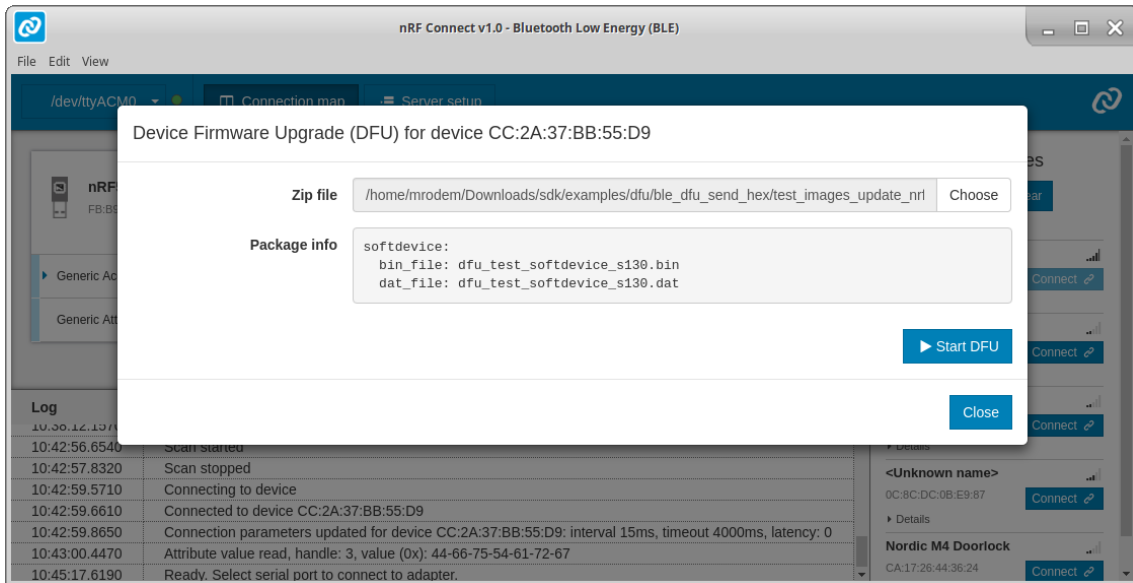
Figure 6: Secure DFU in the list of discovered services

To update the firmware, complete the following steps:

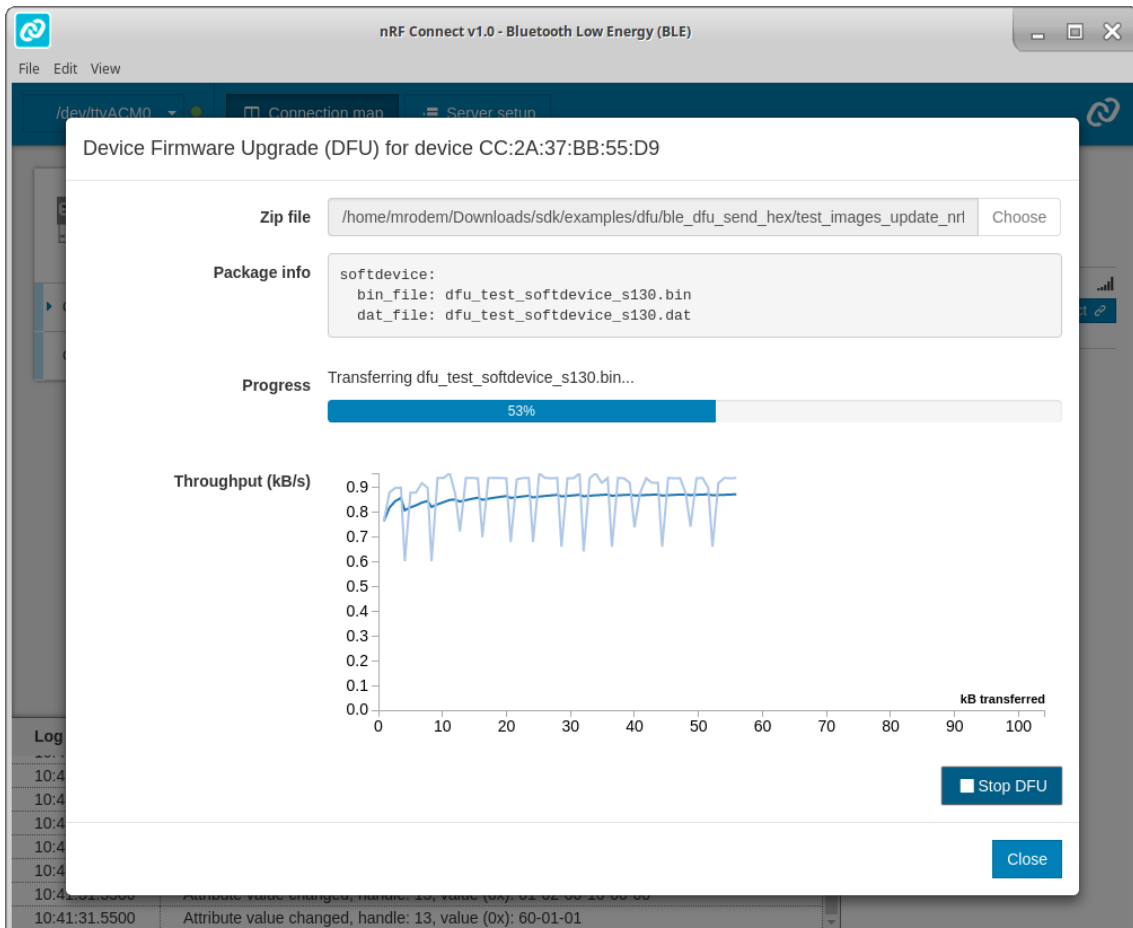
1. To open the DFU dialog, click the **Start Secure DFU** button .
2. Browse and select a DFU zip package file on your computer.

Important: To create the DFU zip package file, use the nrfutil tool. See the [nrfutil documentation](#) for more information.

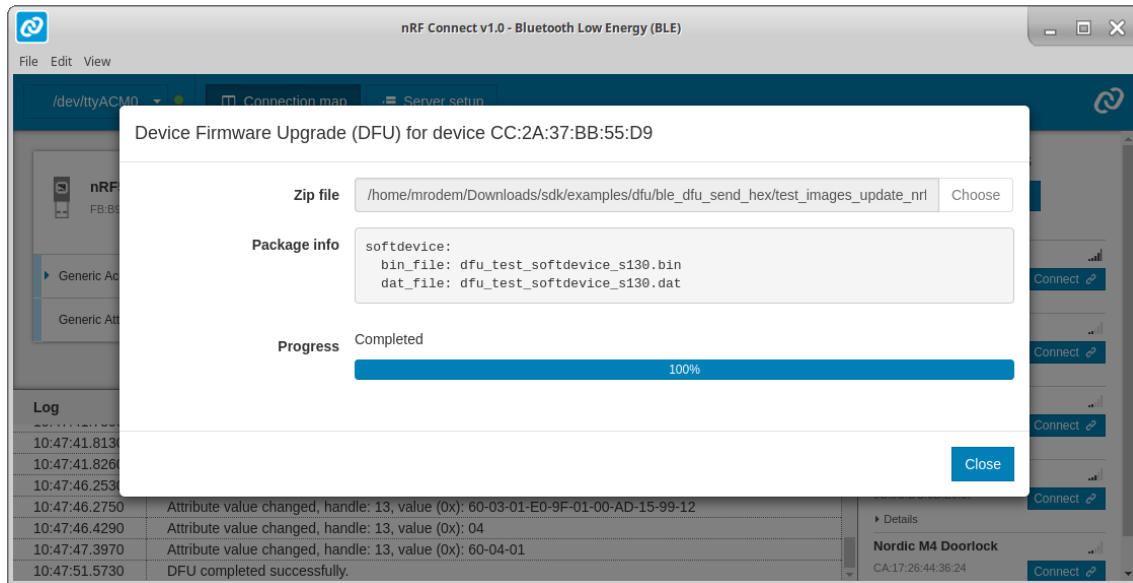
Information on the content of the DFU zip package is displayed in the **Package info** field.



3. To start the transfer of the DFU package to the connected peer device, click **Start DFU**.
The progress bar shows the progress of the transfer.



4. When the progress bar has reached 100%, click **Close**.



To stop the transfer, click **Stop DFU**. The transfer continues from where it was stopped when you click **Start DFU** again.


If you click **Close** before the DFU transfer has completed, a confirmation dialog appears. If you click **OK** in the confirmation dialog, the transfer is canceled.

Chapter 11

Adding UUID definitions

nRF Connect comes with a list of predefined names and UUIDs for some well-known profiles. You can extend this list with custom definitions.

To extend the list of known UUIDs, complete the following steps:

1. To expand the device options for the local device, click the Device options icon .
2. Click **Open UUID definitions file**.
The definitions file is opened in your default application for `.json` files.
3. Following the examples in the file, add your UUIDs, then save the file.
4. To load the changes, reconnect to the adapter or reload the application (**CTRL + r**).

Chapter 12

Troubleshooting

For troubleshooting nRF Connect has a more detailed log file than the one shown in the log view. To open the detailed log file, click the **Open log file** button in the log view.

Firmware programming

If you receive the error **Could not connect to debug probe**, verify that J-Link software is properly installed on the system.

If the device has been programmed with memory protection, nRF Connect cannot program the firmware. To erase the device, download nRF Command Line Tools from Nordic Semiconductor and issue the following command from the command line:

```
nrfjprog -e -f <nrf51 or nrf52>
```

In Windows: If you receive the error **Could not load nrfjprog DLL**, verify that nRF Command Line Tools are installed.

OS X J-Link issue

In OS X: An issue with the SEGGER J-Link OB firmware leads to the corruption of long packets over UART. See www.nordicsemi.com/nRFConnectOSXfix for more information.

Serial port access permissions on Ubuntu Linux

If you receive errors when trying to open the serial port in nRF Connect on Ubuntu Linux, you may need to grant serial port access permissions to your user. To do this, run the following command:

```
sudo usermod -a -G dialout <username>
```

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