ISA100.11a Field Tool

Phase 2

User Manual

Version 1.0

Date: November 2, 2012

Revision History

Date	Version	Description
9/28/2012	1.0	Document released
11/2/2012	1.1	Added a note about default login password in paragraph 3.1

Contents

1 Introduction

1.1 Document Purpose

This User Manual provides information on how to use Nivis ISA100.11a Field Tool (Phase 2).

Nivis ISA100.11a Field Tool is a provisioning device (PD) designed to interact with ISA100.11a field devices that use Nivis' VN210 or VN310 radio modules. This tool was not tested with field devices powered by other ISA100.11a radios and stacks vendors.

Nivis ISA100.11a Field Tool provides an over-the-air (OTA) method to provision field devices that are not already provisioned (DBP), and to reset-to-factory-default field devices that are provisioned, un-joined in a network, and for which the original provisioning information (the .ypif file) is available.

1.2 Audience

This document is intended for ISA100.11a integrators who need to provision their field devices for network join to Yokogawa gateways.

1.3 Acronyms and Abbreviations

DBP	Device to be provisioned
DBR	Device to be reset
FD	Field device
FT	Nivis ISA100.11a Field Tool
FTA	Nivis ISA100.11a Field Tool's pc application
FWC	Field Wireless Configurator application
OBB	Out-of-band
OTA	Over-the-air
PD	Provisioning device
VN210	Nivis Versa Route 210 radio module
VN310	Nivis Versa Route 310 radio module

2 Overview

The Nivis Field Tool kit contains several items:

- Nivis ISA100.11a Field Tool device
- mini-USB cable to power on the device
- Flash drive containing
  - Nivis Field Tool PC application for Microsoft Windows (XP, Vista, 7)
  - User Manual

2.1 Installing the software and hardware

2.1.1 Minimum hardware requirements for Nivis ISA100.11a Field Tool's PC application

- 1 GHz i86 CPU
- 128 MB of RAM or more;
- USB 1.1/2.0 powered port, capable of supplying at least 250 mA current
- Operating system: Windows 2000/XP/2003/Vista/7, 32-bit or 64-bit.

Administrator rights might be required during installation of the application.

2.1.2 Installing the Nivis Field Tool Application

Run *setup.exe* from the provided installation kit, and follow the steps indicated by the installation wizard.

Once the application is installed, a shortcut is placed on the desktop screen of your PC, and an entry is added to *All Programs/ Nivis Field Tool*.

2.1.3 Connecting Nivis Field Tool device to the PC

There are two ways to connect the Field Tool device to the PC, via de mini-USB cable provided with the Field Tool kit or via Bluetooth.

When using the Bluetooth, the device will run on battery, therefore the battery status must be checked periodically by the user.

- Using the mini-USB cable provided with the Nivis Field Tool kit

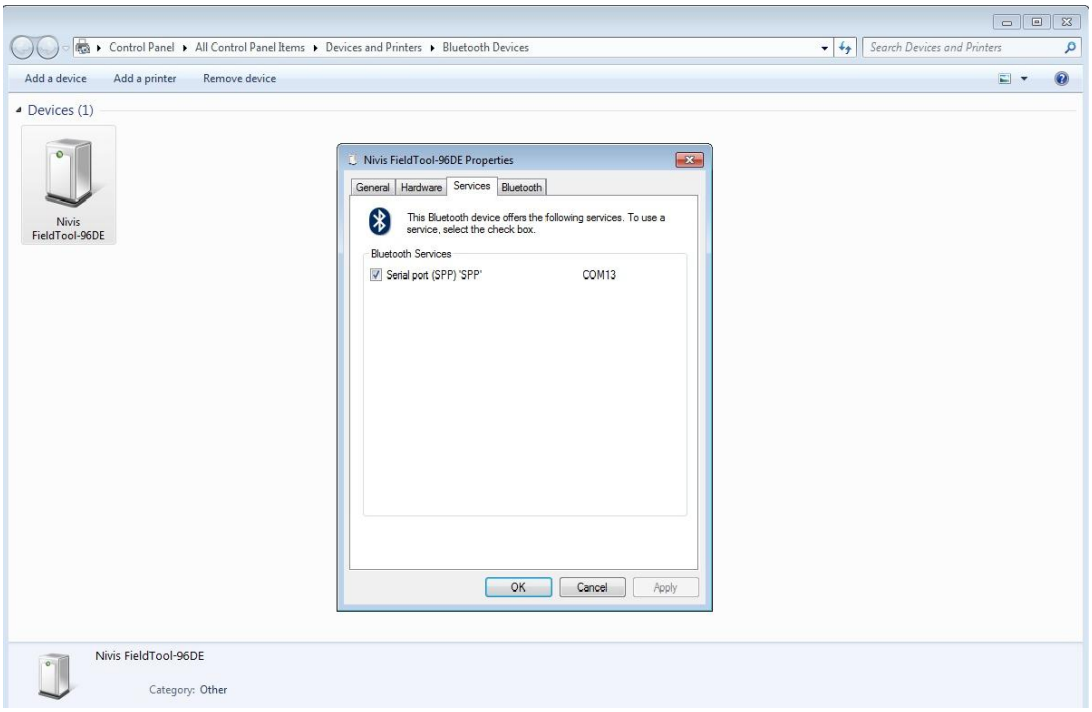
The built-in USB-to-Serial adapter is automatically detected by the Windows operating system. The required driver is a CP210x USB to UART Bridge and can be downloaded from Silicon Laboratories website.

Once the driver is installed, a virtual COM port is created and associated with Nivis Field Tool device. This COM port is further needed in order for the application to communicate with the device. Use Control Panel's Device Manager to detect the COM port number.

- Using the Bluetooth module

The Bluetooth must be enabled on both the PC and the Field Tool. To enable the Bluetooth on the Field Tool device, move the outside switch to the BT position.

Once the Bluetooth is enabled on both the PC and the Field Tool device, use Control Panel's Bluetooth Devices utility to add the Field Tool device to the PC's Bluetooth devices list. A virtual COM port will be automatically created once the PC and the Field Tool devices are connected via the Bluetooth. This COM port is further needed in order for the application to communicate with the device. Use the Properties -> Services tab to find out the COM port used by the Bluetooth connection.

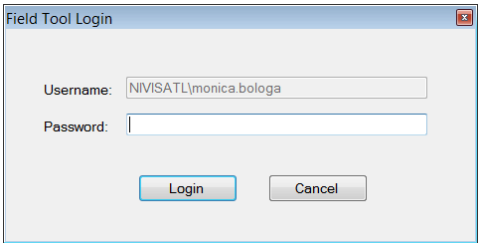


3 Using the Nivis Field Tool Application

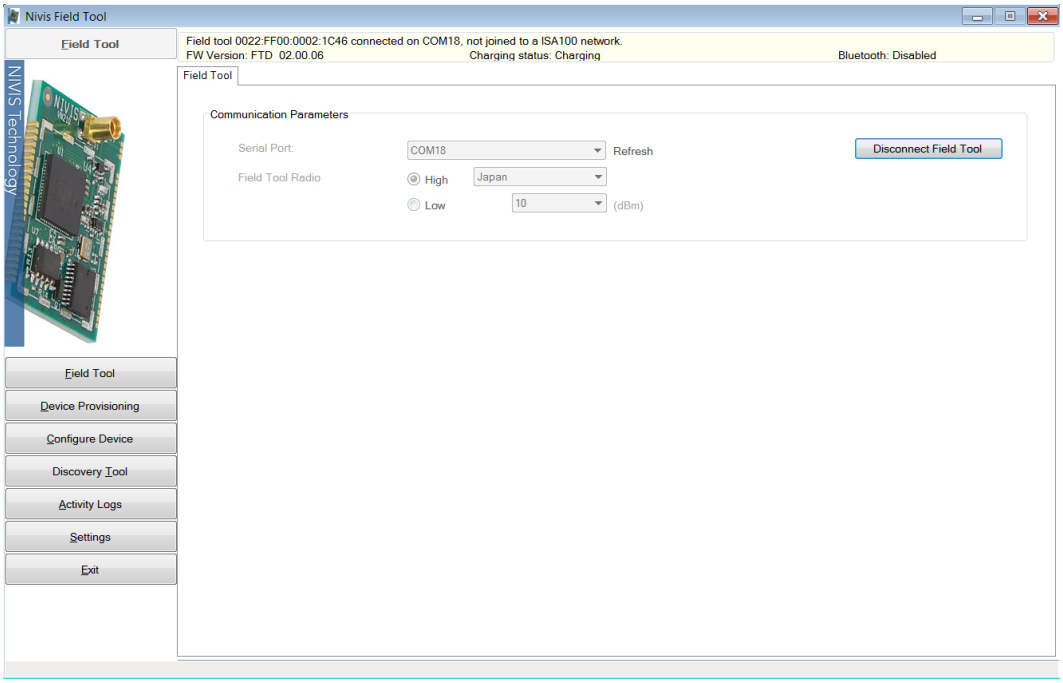
3.1 Connecting the Nivis Field Tool device to the Application

Launch the Nivis Field Tool application from the installation location.

You will be prompted for a password. Default password at installation is ***admin***. You may change this password from **Settings** section.



Select the COM port on which the Field Tool device is plugged into the PC and click the *Connect to Field Tool* button. In the example below, the COM18 is used by the Field Tool device.



Once the connection is made, information about the Field Tool device will be displayed in the application header, like EUI-64 of the device, firmware version, battery charging status and Bluetooth connection status.

3.2 Provisioning ISA100.11a Field Devices

Once the Field Tool application is connected with the Field Tool device, you can provision field devices from *Device Provisioning* tab. The current Field Tool version supports only over the air (OTA) provisioning method, but future versions will add support for provisioning via infrared port.

The devices to be provisioned, must be in the factory defaults state, as required by the ISA100.11a standard and the network provisioning data (EUI-64, Device Tag, Join Key and Network ID) provided to

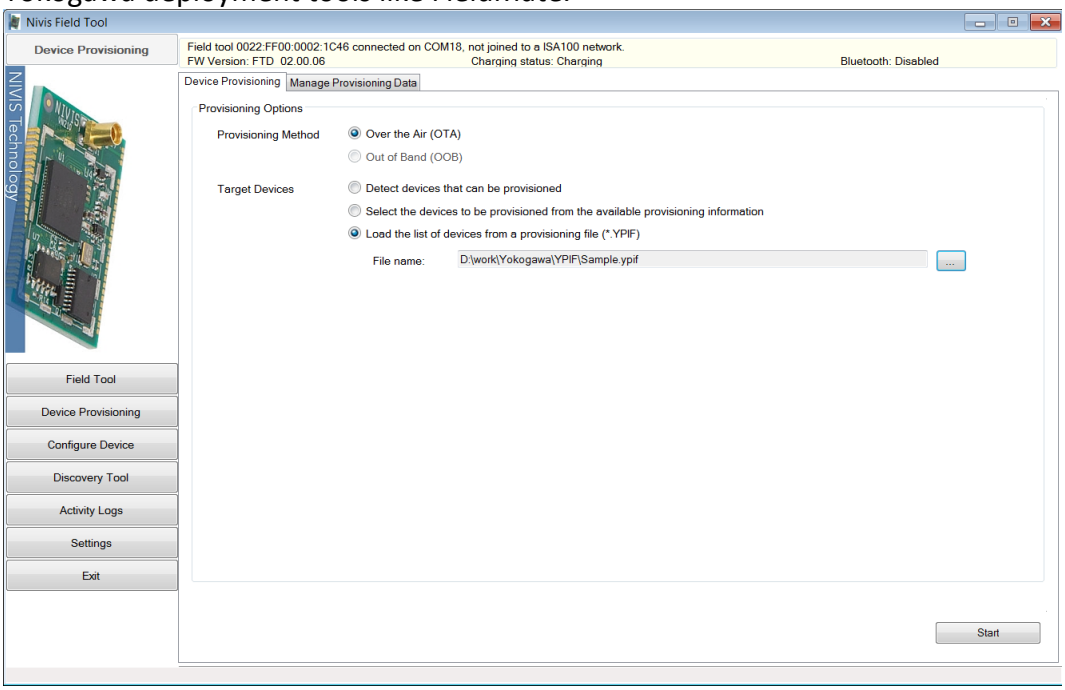
the application through *.YPIF files. The other provisioning parameters like System Manager EUI-64, channel hopping, DL configuration can be provided by the user manually in the application.

The provisioning process is a wizard like process with 4 steps. The application will guide you step by step, but you are free to stop the process anytime by clicking *Cancel*. The provisioning process will be aborted.

3.2.1 Step 1 - Select the devices to be provisioned

The first step of the provisioning is to select the devices to be provisioned, for which the application provides three modes to do it:

- Detect the devices that can be provisioned
  - When *Detect the devices that can be provisioned* option is selected, the Field Tool will discover automatically the devices in factory defaults state that are in its range, normally within 2-3 meters. One can select the devices to be provisioned from the list and click *Next* to start the provisioning process. The application will show in the *Notes* column if the provisioning information is available. If provisioning information is missing, the user has to load it into the application via *.YPIF files in order to be able to provision the selected device.
- Select the devices to be provisioned from the available provisioning information
  - The Field Tool application stores in a local database a list with provisioning information for devices that were previously provisioned. This list will be presented to the user for selection. One can add or remove devices from this list, as described in **Manage Provisiong Data** section.
- Load the list of devices from a provisioning file (*.YPIF)
  - The application will expect the user to load a file with the *.YPIF format containing the provisioning information. This format is Yokogawa specific and will be obtained from Yokogawa deployment tools like FieldMate.

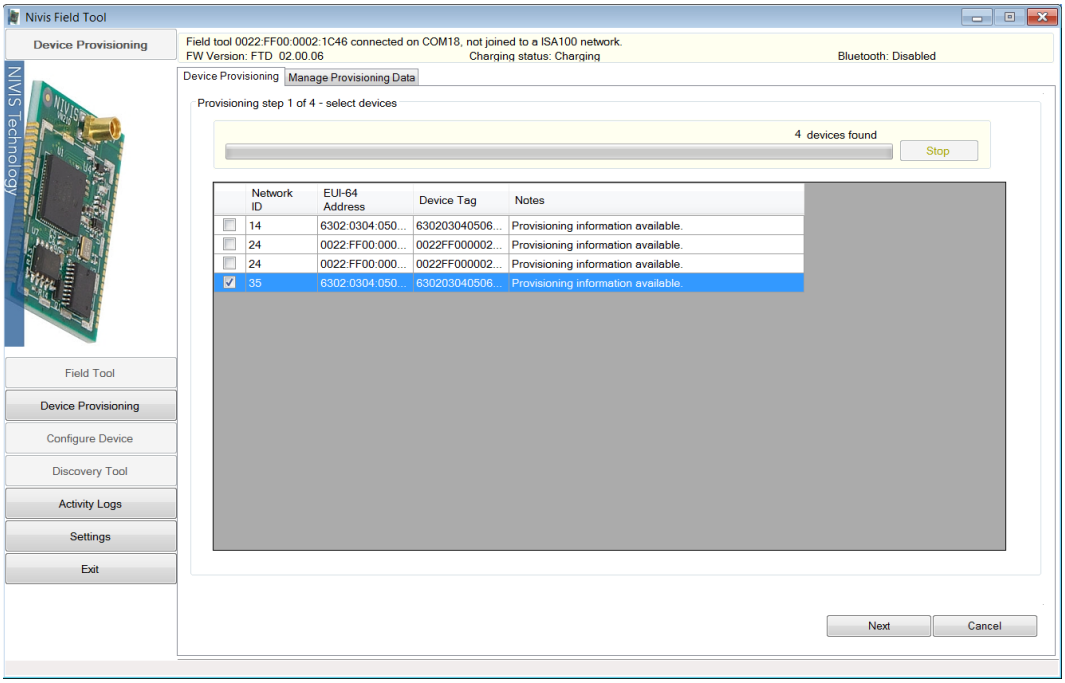


After loading the *.YPIF file, the application will display the list with provisioning information entries contained in the file.

For usability reasons, the path to the *.YPIF files can be configured by the use in the **Settings** section.

Select one of the options and click on *Start* to begin the provisioning.

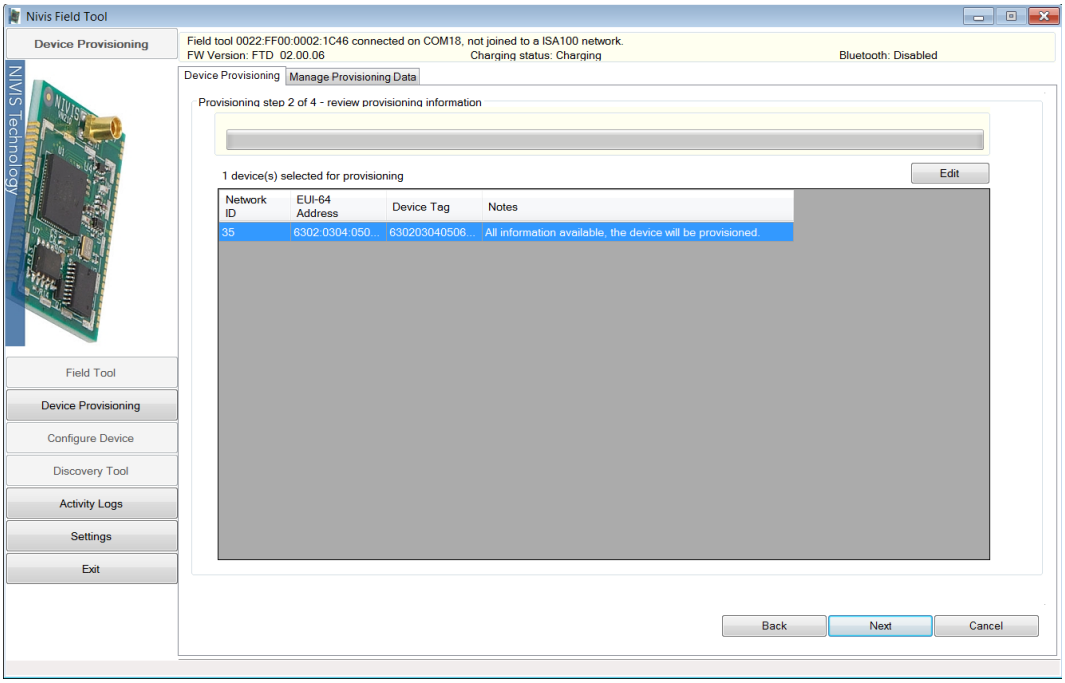
Regardless the option you choose, the application will present a list of devices from where you can select the devices to be provisioned.



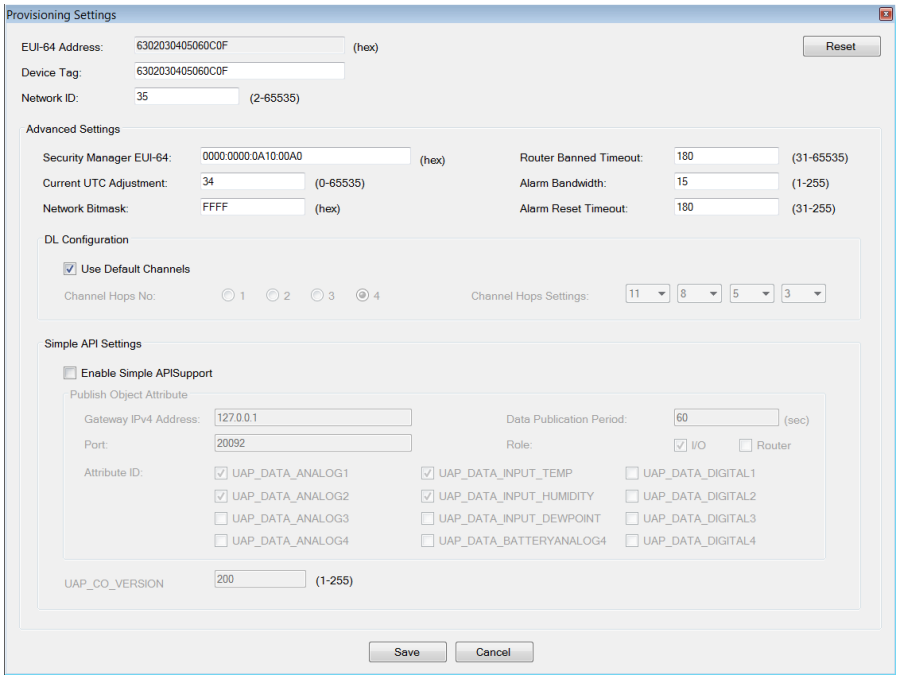
Clicking on the *Next* button will lead you to the second step of the provisioning process.

3.2.2 Step 2 – Review provisioning information

In this step you are presented with the list of selected devices and you can review and/or edit the provisioning information for a specific device.



The *Edit* button will lead you to a window displaying all the provisioning parameters, except the Join key, for the selected device.



The *Next* button will lead you to the step 3 of the provisioning process.

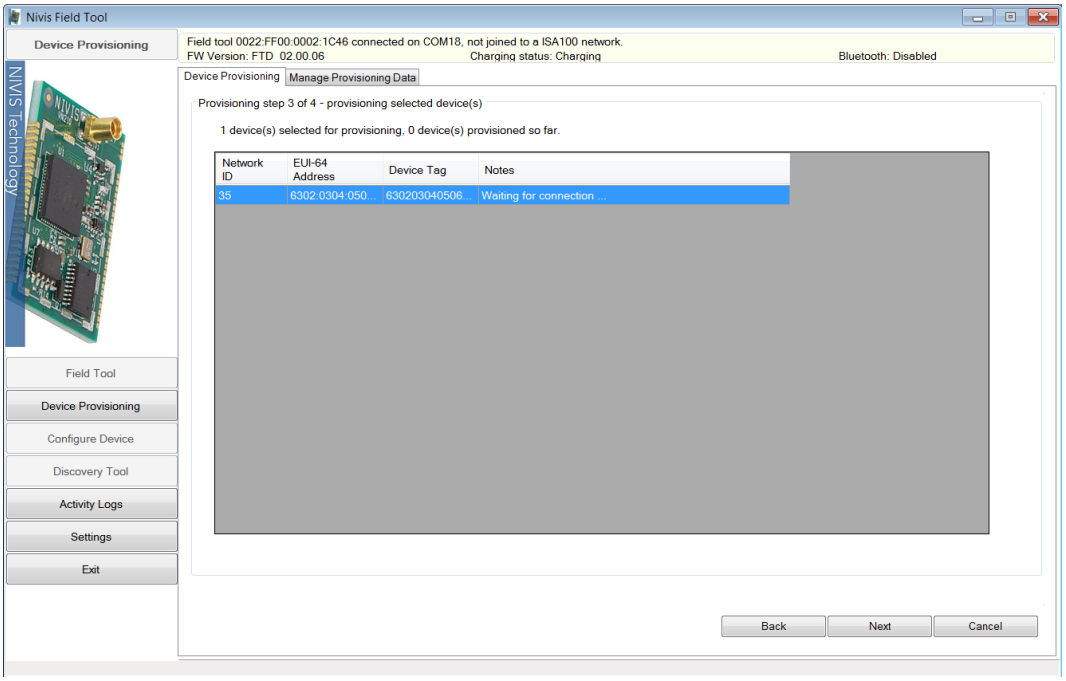
3.2.3 Step 3 – Provisioning selected device(s)

This is the actual step where the provisioning process will be done and the setting will be sent to the device to be provisioned through the Field Tool device. The *Notes* column will display the provisioning states:

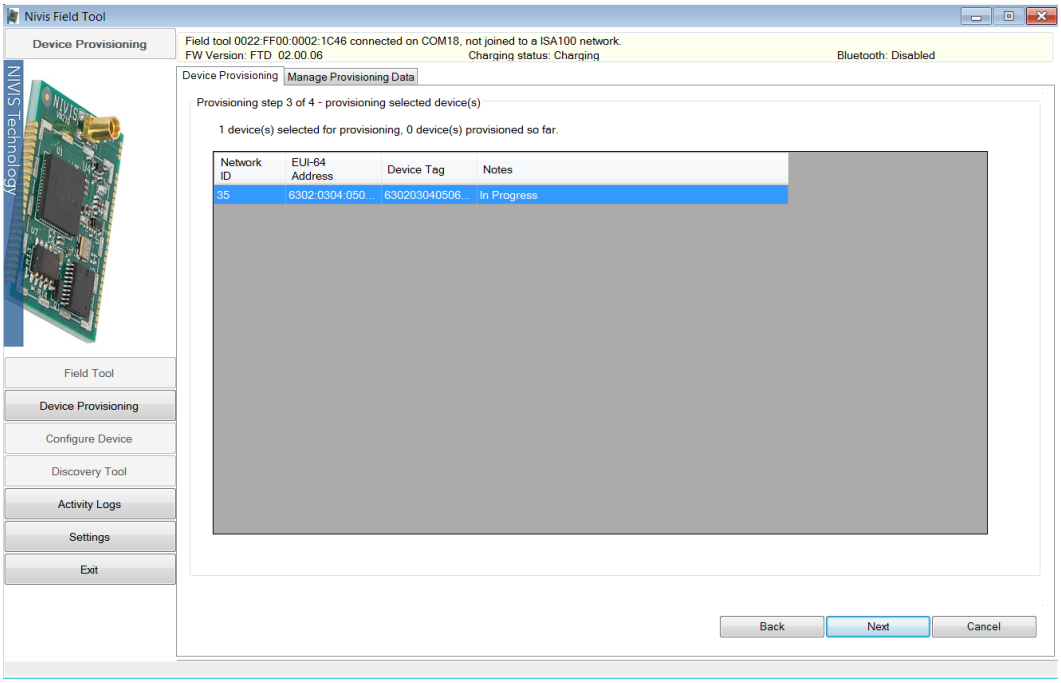
- Waiting for connection – the Field Tool is waiting for the device to be provisioned to join the

provisioning network.

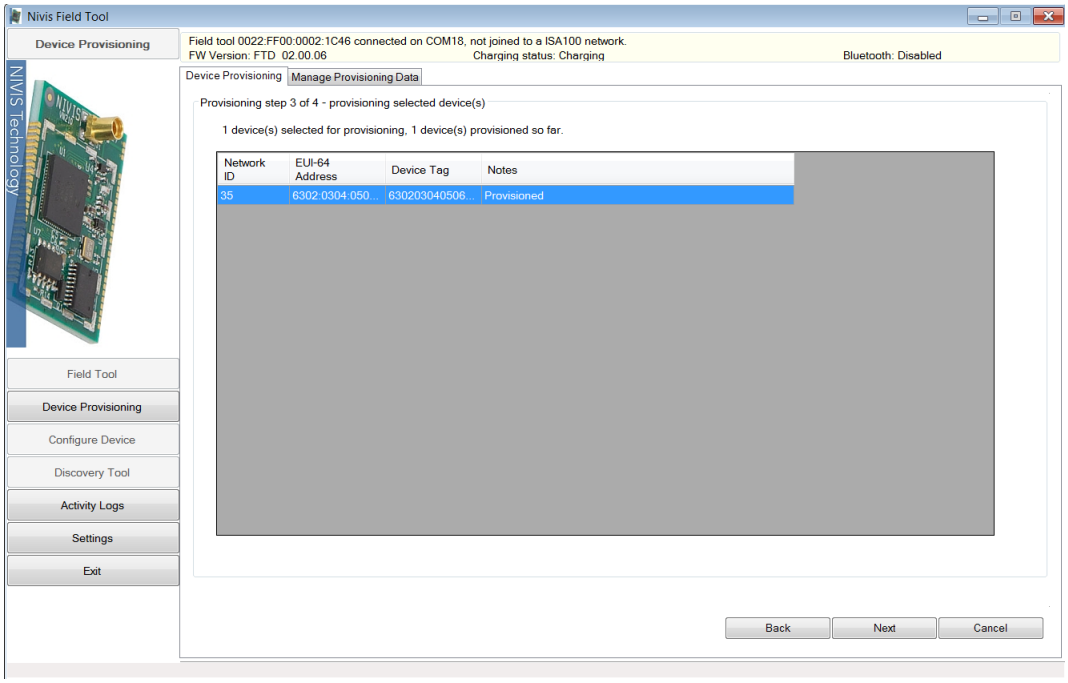
Note: This step may take several minutes in some cases. If the status doesn't change in 10 minutes, power cycle the device.



- In progress – the device to be provisioned has joined the provisioning network and the provisioning settings are sent to the device.

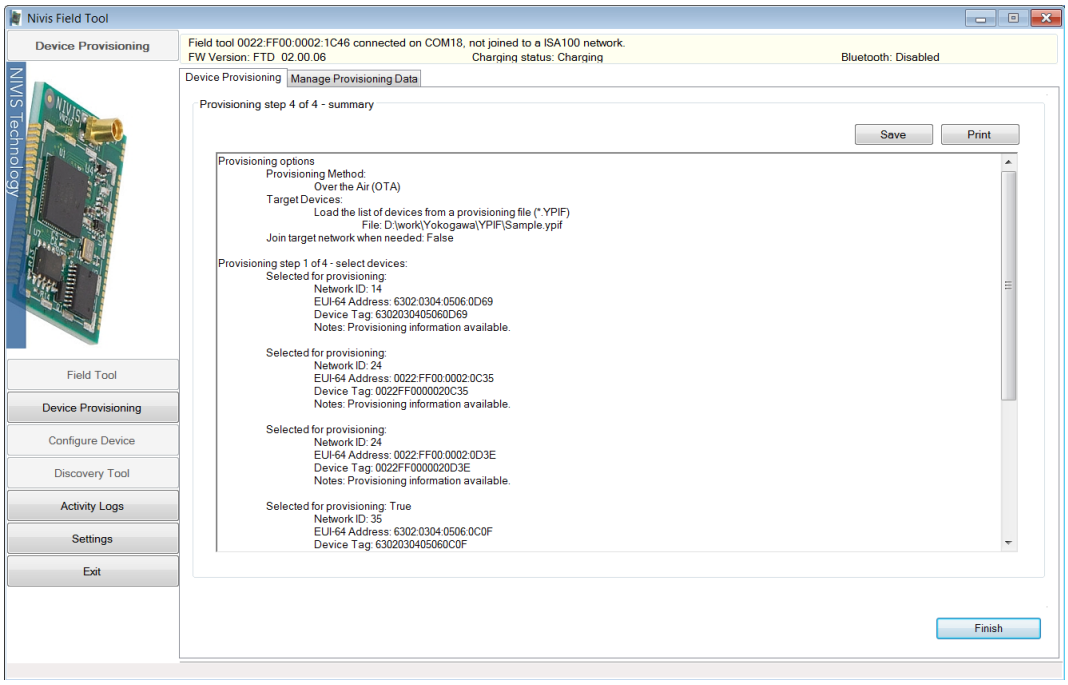


- Provisioned – the provisioning process for the selected device has ended successfully



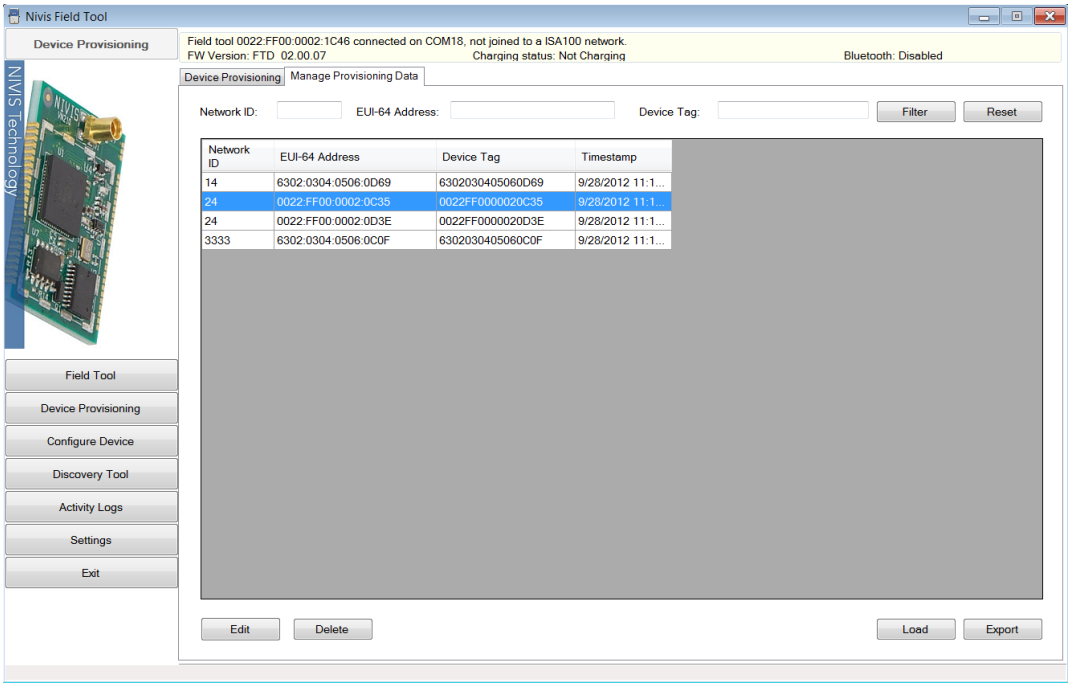
Clicking on *Next* button will lead to the final step, which presents a summary of the device that were provisioned and the result of each provisioning operation.

3.2.4 Step 4 – Summary



3.2.5 Manage Provisioning Data

This option allows you to manage the provisioning information store in the local database of the Field Tool application. You can edit or delete the provisioning entries, load or export the entries from/to files. It also allows you to filter the entries for easy finding of a certain device provisioning entry.



3.3 Configure Device

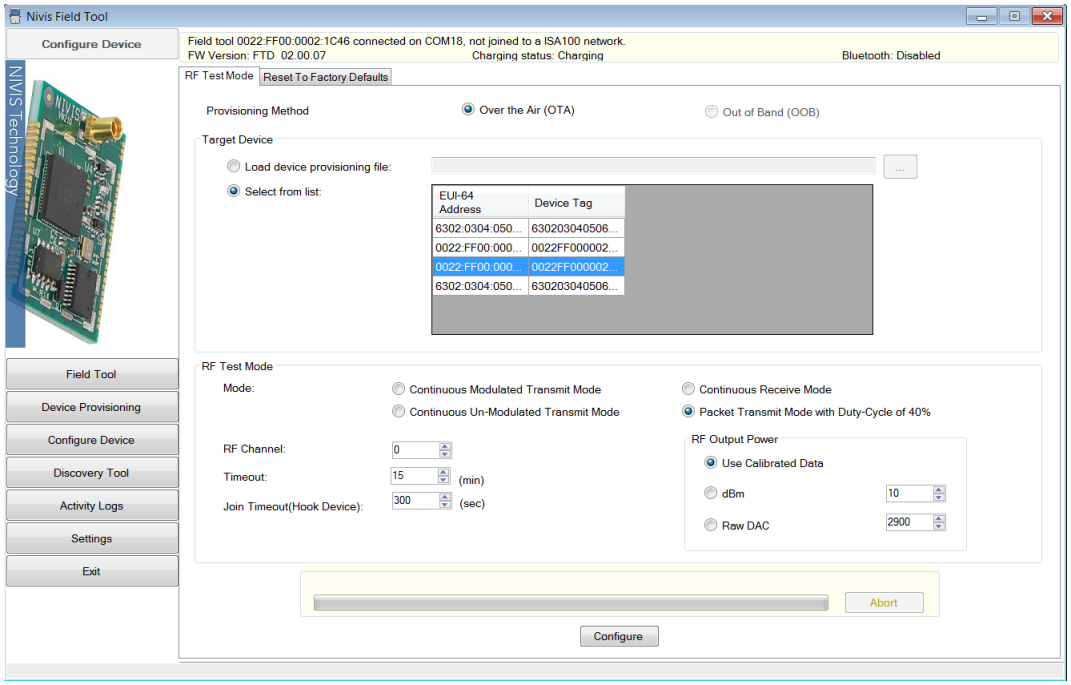
3.3.1 RF Test Mode

Note: For Yokogawa field devices, the RF test mode activation from the Field Tool is requiring firmware version v4.2.25 or newer.

The RF Test Mode can be used to set the device into several transmission or reception modes used for RF testing or certification: continuous modulated or unmodulated transmit mode, or continuous receive mode.

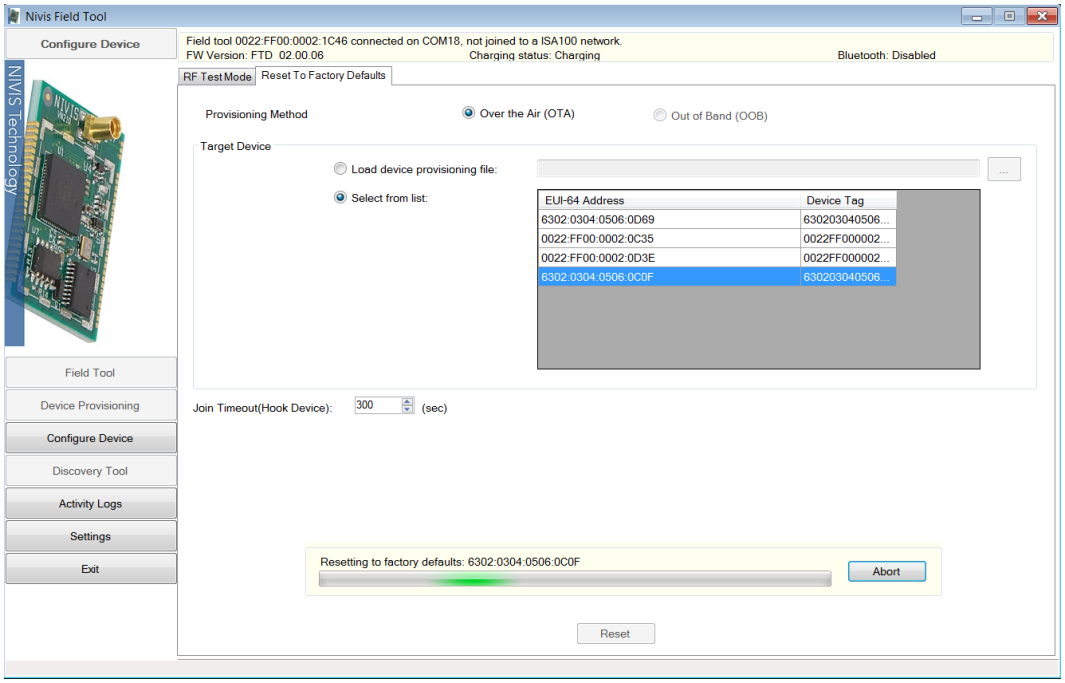
It also allows the user to set the output power of the radio. For setting the output power, there are several options to set the value:

- Use Calibrated Data. This is the default mode, the result being as the one from calling the API_ENERGY_MODE with RFPowerLevel parameter with 0xFF value;
- Specify a value in dBm, in the range of 0..30 dBm. For VN210, this will result in setting the DLMO.RadioTransmitPower to one of the values {0, 5 or 10}, depending on the value of the RF Output Power option: 0 if less than 5 dBm, 5 if between 5 and 10 dBm, and 10 otherwise.
- Specify a Raw DAC Value, in the range of 0x0000 .. 0x0FFF. The result is as the one from calling API_ENERGY_MODE for RFPowerLevel with RF Output Power's LSB value;



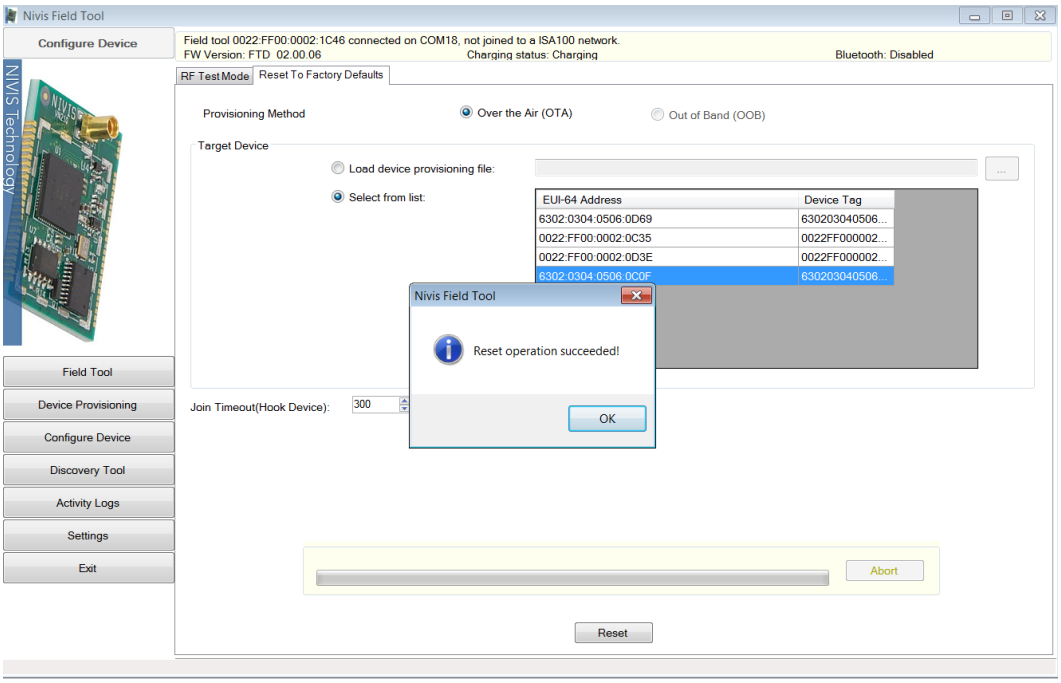
3.3.2 Reset to Factory Defaults

Resetting a device to factory defaults is possible if the Field Tool has the original provisioning file that provisioned the device, and the field device is in network discovery state. This operation can be performed by pressing the Reset button after selecting the device.



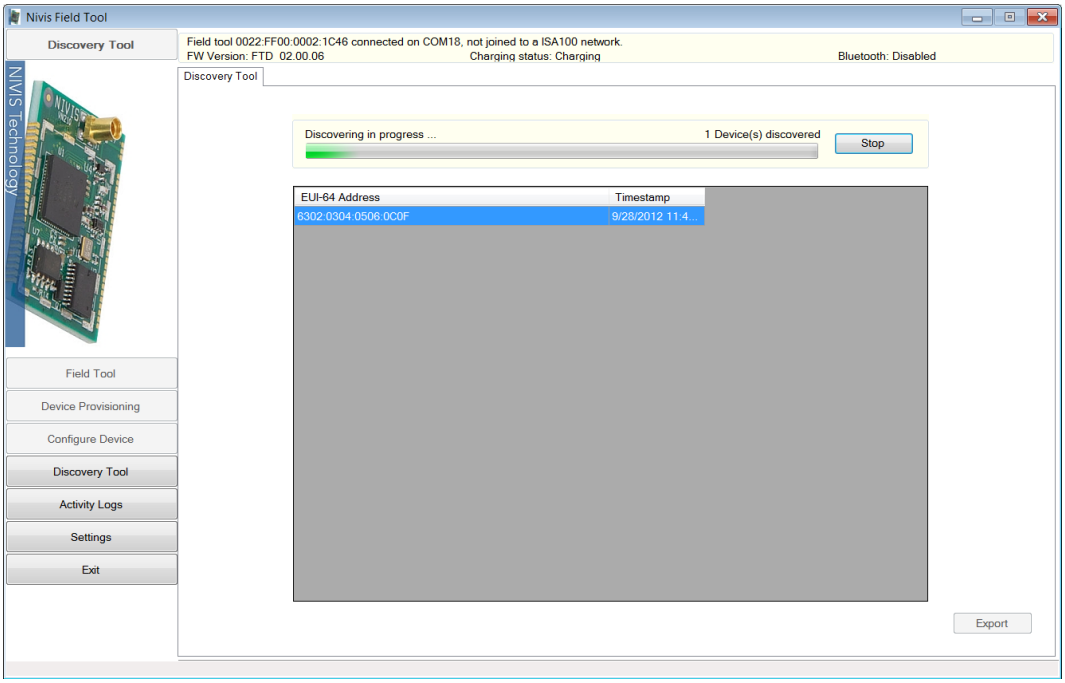
Field Tool begins the special operation of resetting the selected field device to factory default. A virtual ISA100.11a network with id matching the subnet id of the DBR, is created, and Field Tool begins transmitting advertisements with this subnet id. The DBR being in discovery state will attempt to join this virtual network. The join process is secured with DBR's JOIN key from the provisioning file (.ypif). Once captured by Field Tool, a command is sent to the DBR via RF to force a reset to factory default.

The user can configure a timeout for this special join, called hook. The user will receive a confirmation of the operation result.



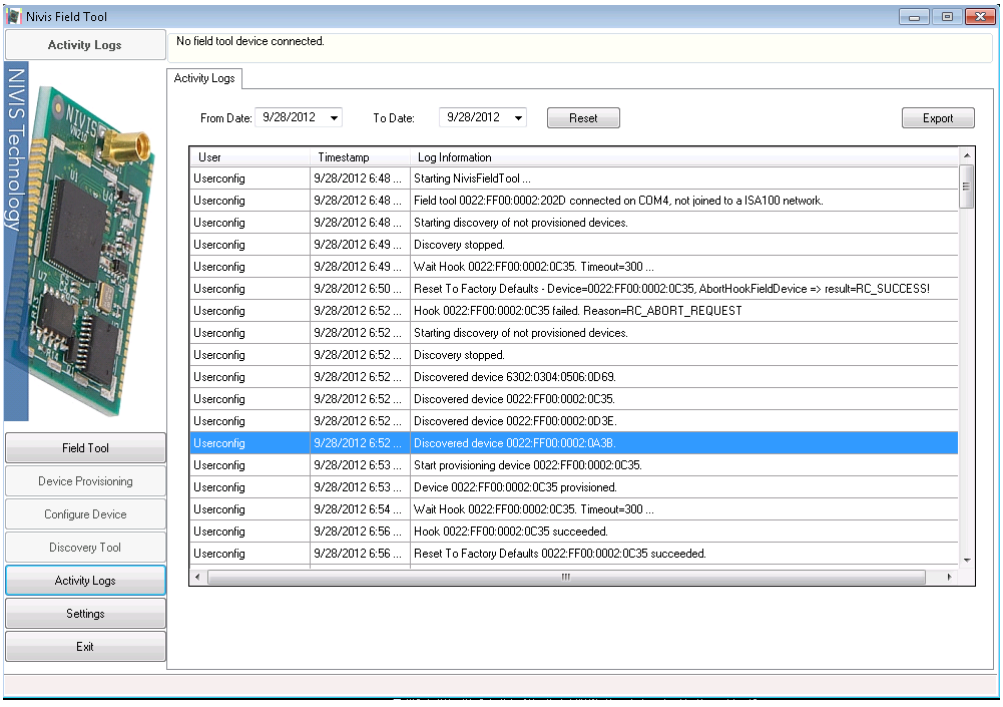
3.4 Discovery Tool

Use the Discovery Tool to detect the devices to be provisioned. The tool will send advertisements on the provisioning network and will collect all the devices in factory defaults state within the RF range. The RF range depends on the Field Tool output power settings. For Japan usage, the output power will be -60 dBm, resulting in 1-2 meters range.



3.5 Activity Logs

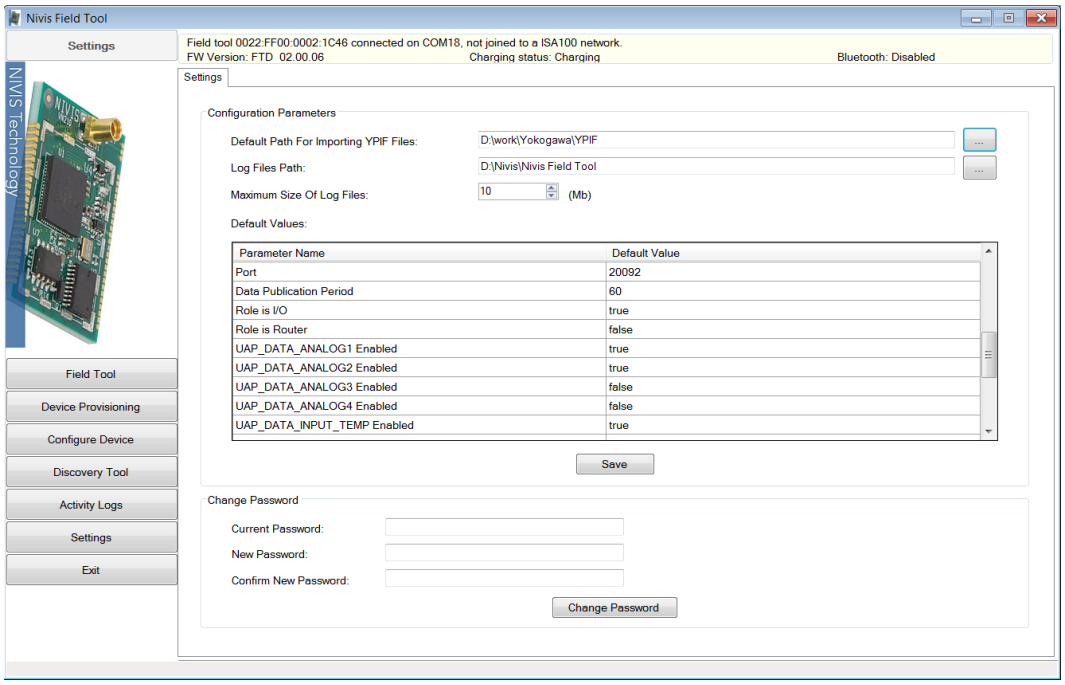
The activity logs shows the actions done by the user of the Field Tool application. This is not a persistent log and will be deleted when the application is closed. However, you have the options to filter and to export your current activity.



3.6 Settings

The Settings option allows you to configure several parameters for either application behavior, like the location for the log files and their maximum size, the path to the *.YPIF files or the password to access the application.

Note: The default password for the application access is ***admin.***



The Settings window also allows you to change the default provisioning parameters like System Manager EUI-64, Network ID, DL configuration, parameters that are common to the devices being provisioned for a certain network.