PowerCable IQRF 901x Manual

This manual assumes basic familiarity with the IQRF technology. It is not intended as an IQRF tutorial. It provides an overview of the device's functions.

PowerCable IQRF 901x behaves as a standard **IQRF Interoperable** device. The product supports **SmartConnect**. It is subject to all guides and procedures issued by the IQRF Alliance. For useful documents, see:

- IQRF Alliance Tech Guide
- https://www.iqrfalliance.org/iqrf-interoperability/
  https://www.iqrfalliance.org/techDocs/
  - IQRF-StandardSensor-V014
    (https://www.iqrfalliance.org/techdoc_files/IQRF-StandardSensor_V014.pdf)
  - IQRF-StandardBinaryOutput-V004
    https://www.iqrfalliance.org/techdoc_files/IQRF-StandardBinaryOutput_V004.pdf
- IQRF Quick Start Guide
  (http://www.iqrf.org/weben/downloads.php?id=235)

IQRF Glossary

- **901x**
  The NETIO products company supplies the PowerCable IQRF in several versions with different types of electrical sockets and plugs. The type is specified by the last character at the place of the "x" in 901x. 901**E** = sockets for France, Czechia, Slovakia and Poland, 901**F** = German ("schuko") sockets used in most of Europe.
- **Node**
  In an IQRF network, a Node is a device that performs its function (e.g. measures electrical current – PowerCable IQRF 901E) and, at the same time, acts as a hub for other Nodes. A Node connects to a Coordinator (Gateway), either directly, or through other Nodes.
- **Coordinator**
  In the IQRF network, a Coordinator is a device (such as an IQRF Gateway) that controls network traffic and gathers data from individual Nodes. Connection of Nodes to the network is initiated at the Gateway. Nodes can be connected to the Coordinator either directly or through other Nodes.

Specifications

Power	**901E**, **901F**: 230V~; 50Hz; 16A
Switched output	**901E**, **901F**: 230V~; 50Hz; 16[8]A; max. 3600W
Internal consumption	Max. 1W
Output relay	Micro-disconnection (μ) (resistive load) 1E5 switching cycles, max. 1.5kV pulse voltage Switch heat and fire resistance class 1
Interface	IQRF DPA 4.00 and higher
Environment	IP30, protection rating = class 1 Operating temperature -10 .. 65°C (under load: 6A = max. 63°C, 10A = max. 50°C, 16A = max. 30°C) Device rated for pollution degree 2. Designed for continuous operation in altitudes up to 2000m. No additional cooling required.
Caution	The device is not designed to power appliances with a high inrush current. Do not connect several devices in series. The device is safe only when completely disconnected from the electrical network. The cable plug serves as the disconnection means and must be easily accessible. The electrical socket must be earthed and protected with a circuit breaker rated at 16A or less.

The manufacturer assumes no responsibility for any technical or printing errors and reserves the right to modify the product or this document without prior notice. Such changes are announced at the manufacturer's website, http://netio-products.com.

The manufacturer disclaims all warranties of any kind with respect to the contents of this document, as well as all implied warranties of merchantability or fitness for a particular purpose. In particular, the manufacturer disclaims all responsibility for any damages caused by incorrect use of the product, failure to comply with instructions and recommendations in the user manual, and/or unprofessional actions of third parties not authorized by the manufacturer to perform warranty service.

March 2019

Installation

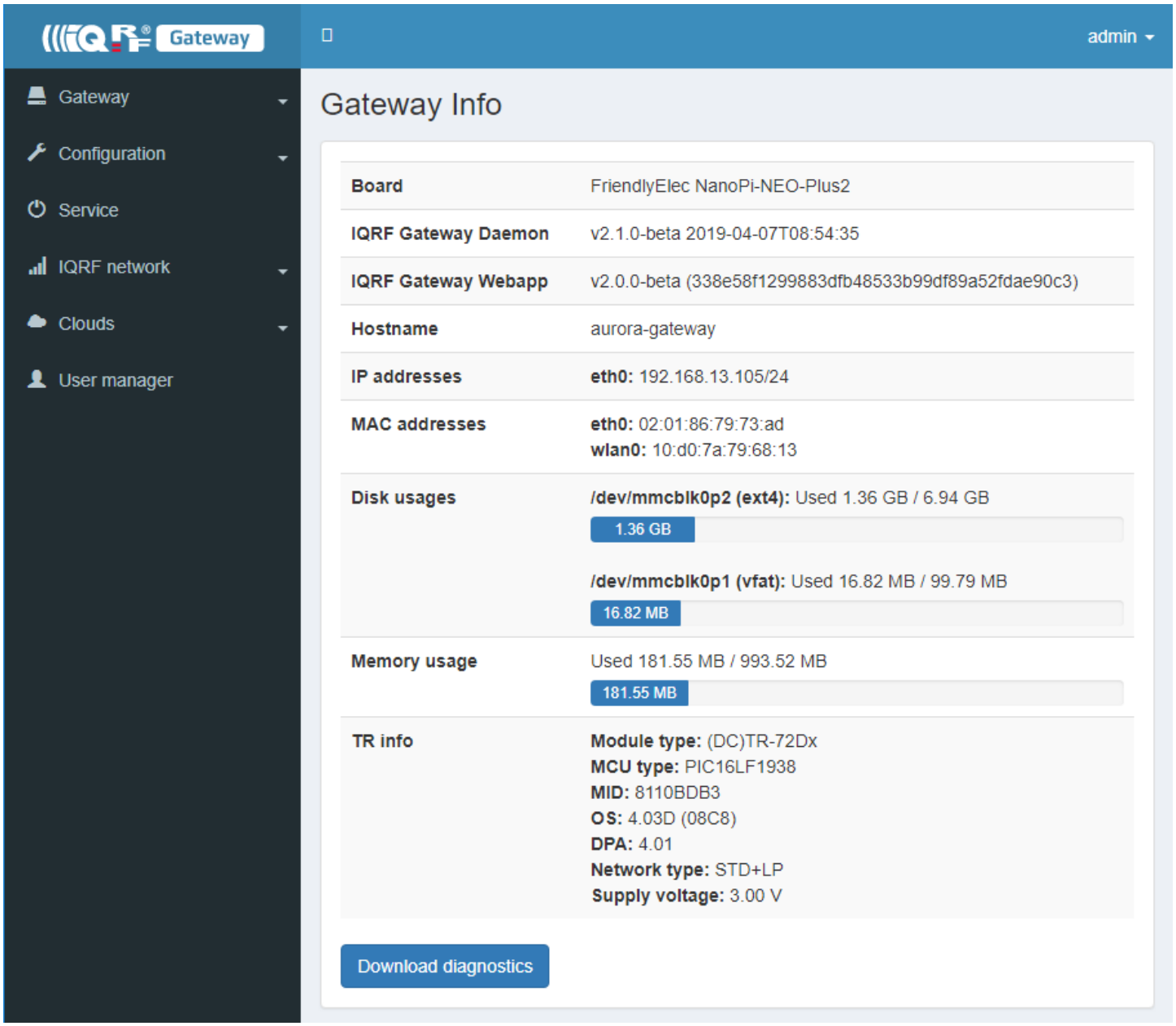
IQRF network and IQRF Gateway

An IQRF network is managed by an IQRF Coordinator. An IQRF Interoperable Gateway is created by connecting the IQRF Coordinator to a computer and installing the IQRF Daemon. The IQRF Interoperable Gateway in turn provides a JSON API interface that is used for all communication and configuration of the IQRF network over a LAN.

For available IQRF Interoperable Gateways, see:

https://iqrf.shop/product/gateways/

After setting up the IQRF Gateway according to its manufacturer's instructions, the following web applications can be used to set up the IQRF network and verify the basic functionality.



IQRF Network Manager

IQRF Network Manager is an Android mobile app for managing the IQRF network.

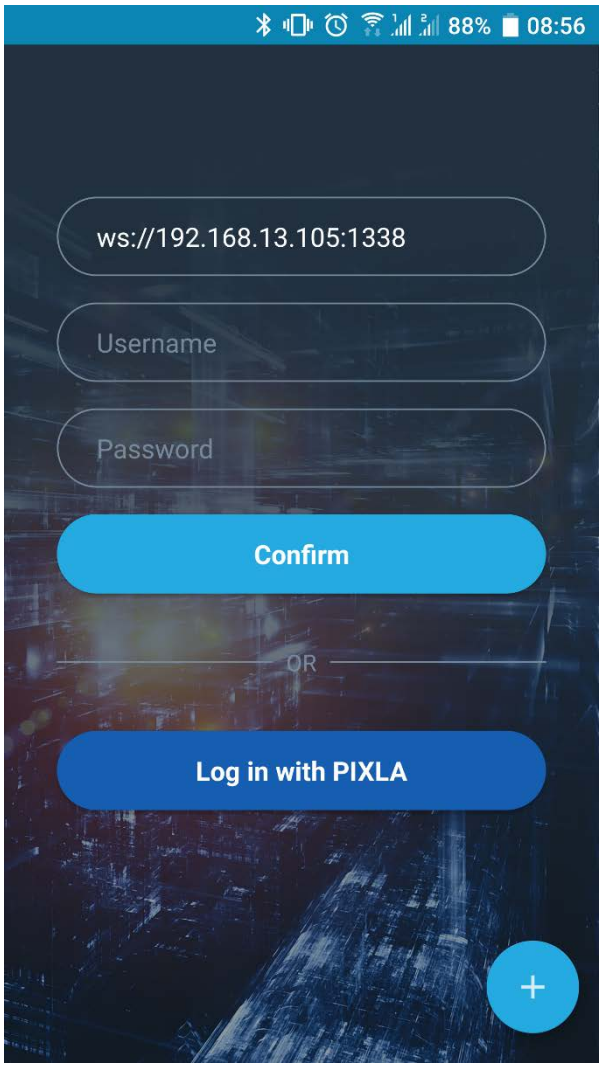
It is available free of charge in the Google Play store:

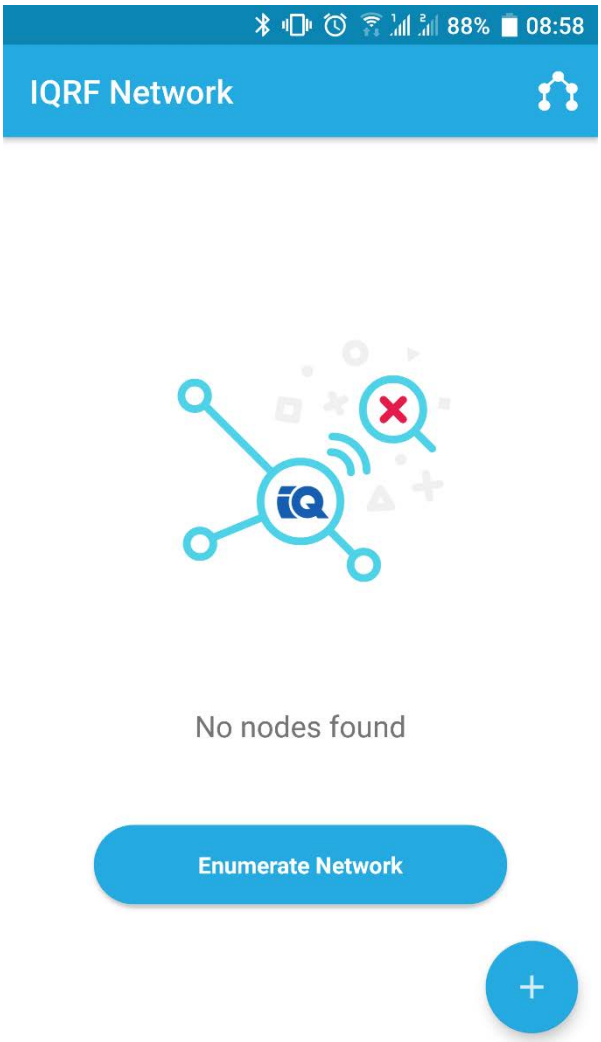
https://play.google.com/store/apps/details?id=org.iqrfalliance.demo

1. When the app is started, it needs the details to connect to the IQRF Interoperable Gateway.

   The Gateway must be accessible in the LAN. Websocket is used for the connection.

2. When the connection is successfully established, the current network status is loaded. At the beginning, the network is empty (“No nodes found”).





Connecting to the IQRF network (Bonding)

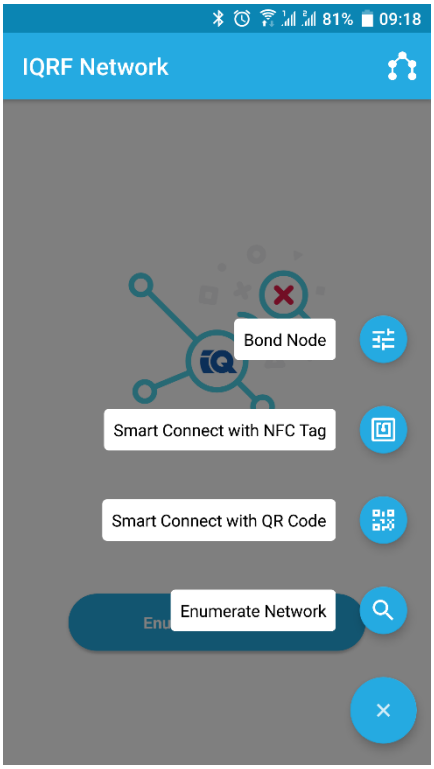
Bonding must be started at the device to which the PowerCable IQRF should connect. Most often, this is the IQRF Gateway. When testing, it could be the IQRF Coordinator controlled with the IQRF IDE.

A device can be bonded in three ways:

- SmartConnect – using the IQRF Smart Connect code (QR code) shown on the device.
- Local Bonding – using some physical interaction with the device (a button on the PowerCable IQRF).
- AutoNetwork – automatically connects all available devices with the same network key.

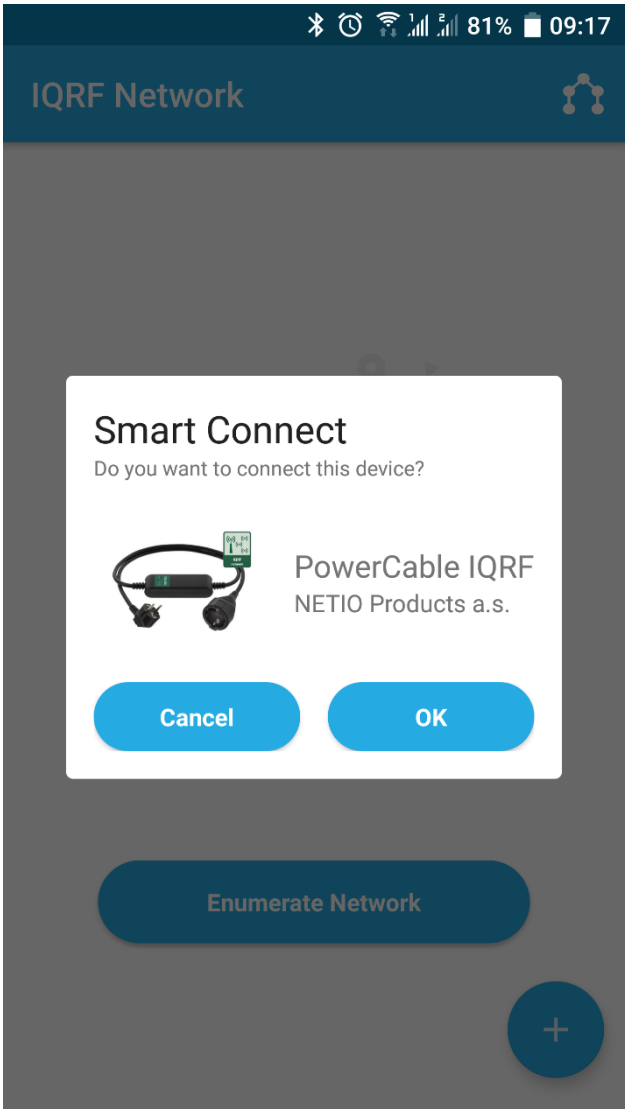
Example: Connecting with the mobile app – SmartConnect

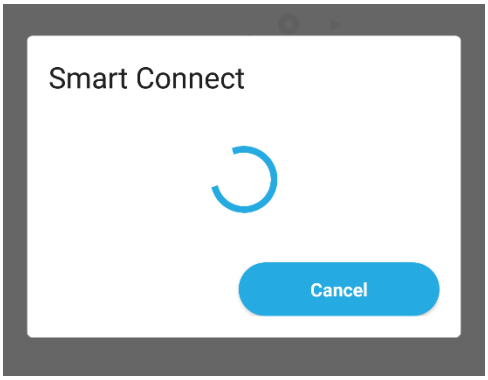
- Connect the app to the IQRF Interoperable Gateway.
- Click the blue circle with a plus symbol in the bottom right-hand corner to add a device into the network using any of the available methods. To add a device using the SmartConnect method, select “Smart Connect with QR Code”.
- Point the phone’s camera so that the QR code is in focus and within the indicated area.

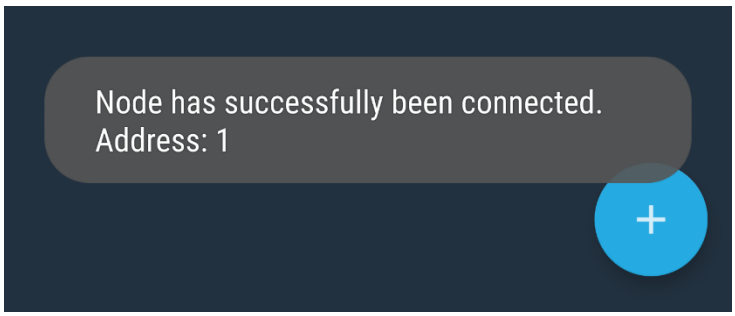


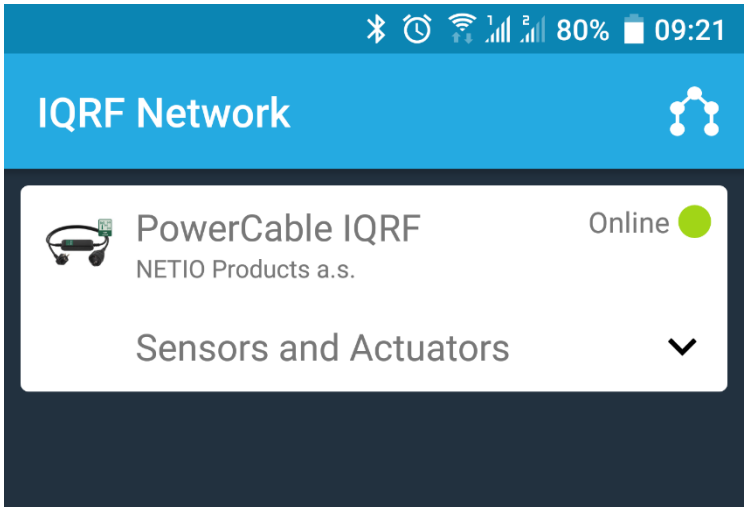
The code is scanned and device details are displayed. After confirming, the Smart Connect procedure starts. The app informs about the progress and the result.

The message about a successful connection also shows the address assigned to the device.





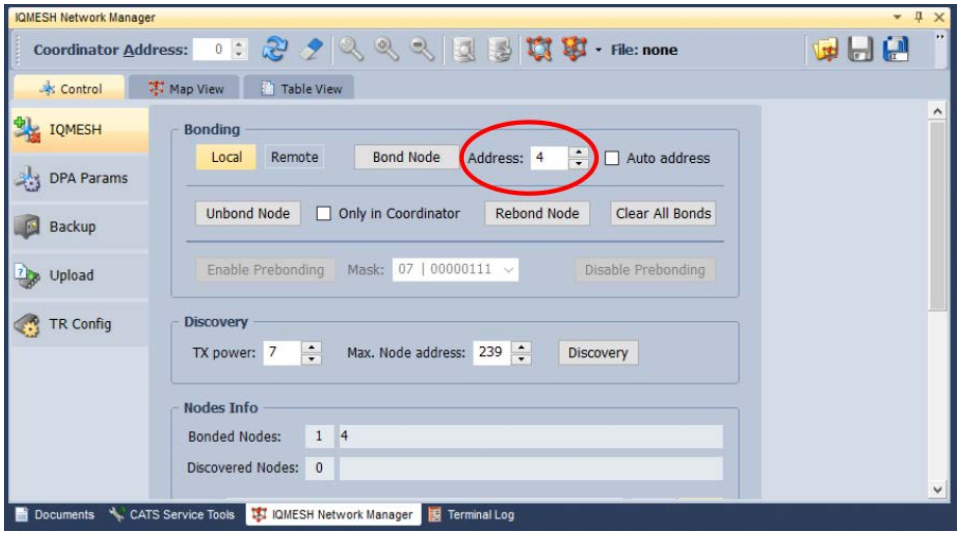




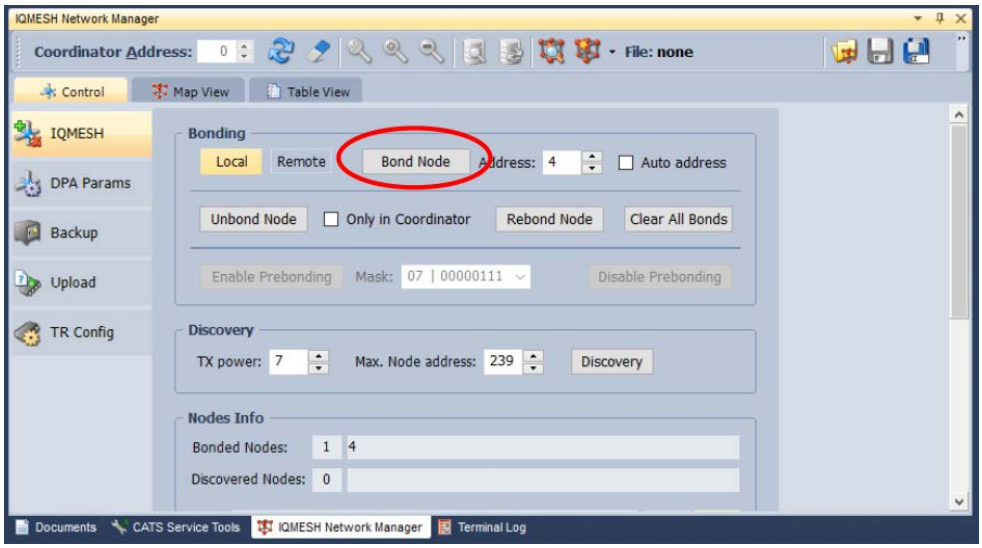
All interoperable devices connected to the network are then listed in the home panel.

Example: Connecting with the IQRF IDE – Local Bonding

1. Connect the module or the USB Gateway that acts as the Coordinator to the IQRF IDE.
2. In the IQRF IDE, open these windows: Packet Inspector, Terminal, IQMESH Network Manager

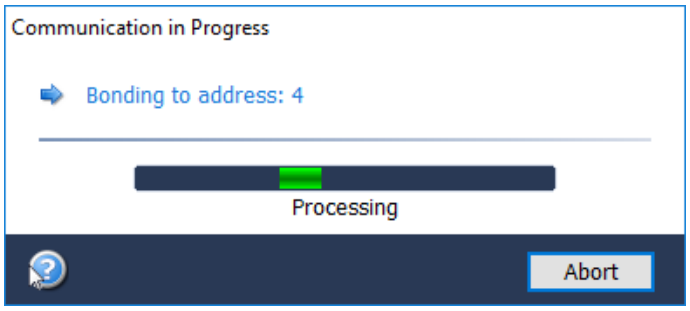


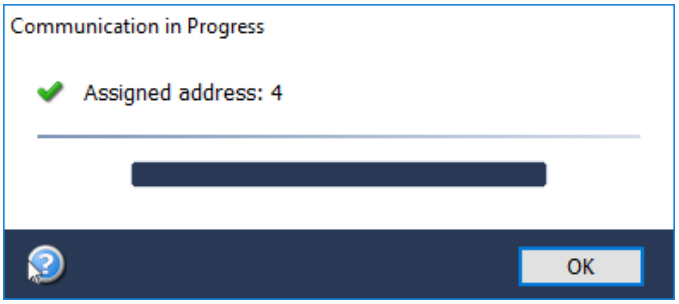
3. In the IQMESH Network Manager, go to the Control tab, and enter address 4 in the IQMESH menu.



4. Click **Bond Node**

5. While the search is in progress, press the button on the PowerCable IQRF





6. After a successful bonding, a message about the bonding result appears and the yellow LED lights up on the PowerCable IQRF.

Unbonding from the IQRF network

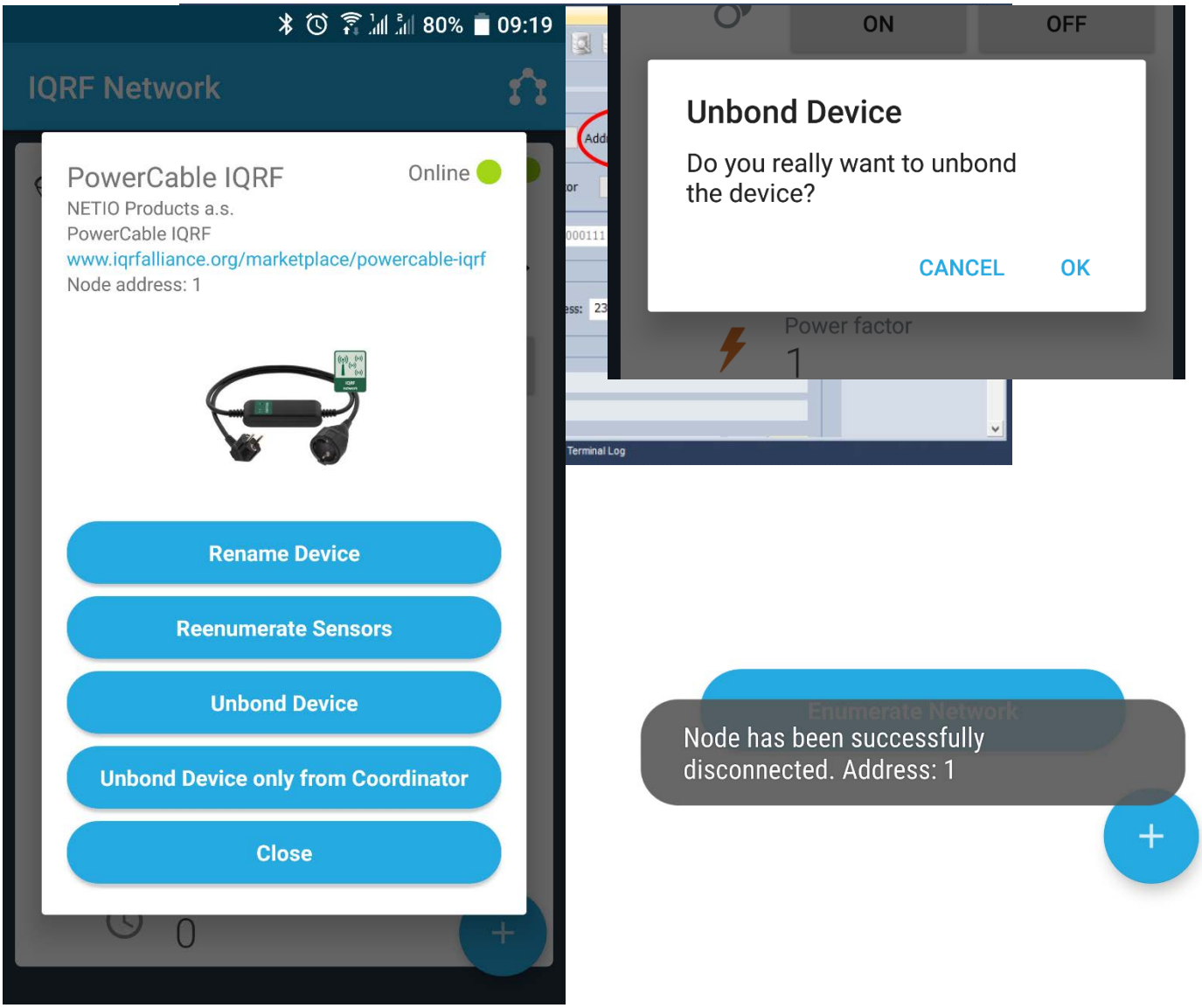
The device can be unbonded in two ways:

1. **By the Coordinator** – use the “Unbond Node” function with the selected PowerCable address, and confirm the unbonding at the remote device, too.
2. **By the PowerCable IQRF** – unplug the PowerCable IQRF. Press and hold the bonding button (Reset icon) and plug the device back in. Hold the button pressed until the green LED (Output icon) lights up, then release immediately. Successful unbonding is indicated by flashing yellow LED (WiFi icon) = Unbonded status.

Example: Unbonding from the IQRF network in the mobile app

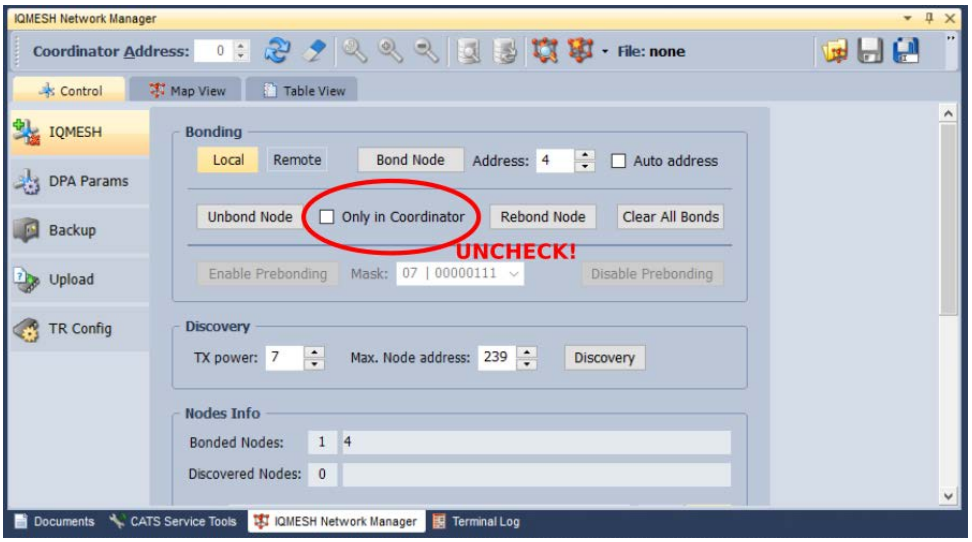
After clicking a particular device in the list, details can be shown or additional actions selected from a menu.
The “Unbond Device” item removes a device from the network **by the coordinator**
If the device is unbonded **by the PowerCable IQRF**, it will show up as Offline. Such a device can be removed with the “Unbond Device only from Coordinator” function.

Example: Unbonding from the IQRF network in the IQRF IDE

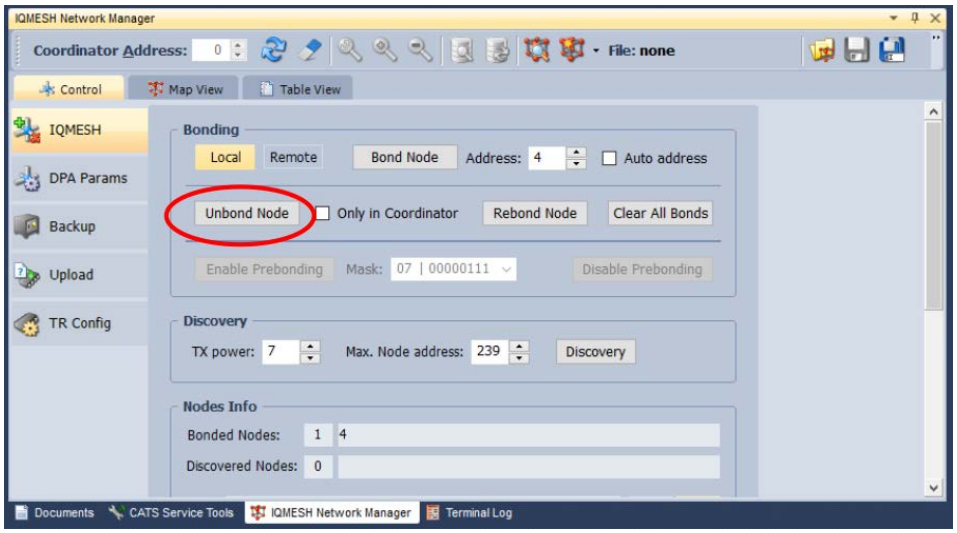


1. In the IQMESH Network Manager, go to the Control tab, and enter the address of the PowerCable IQRF to unbond in the IQMESH menu.
   For example **address 4**. Leave the PowerCable IQRF turned on and connected to the 230V grid!

2. **Check** “**Only In coordinator**”**.**



3. Click **Unbond Node** and confirm.



Controlling the output

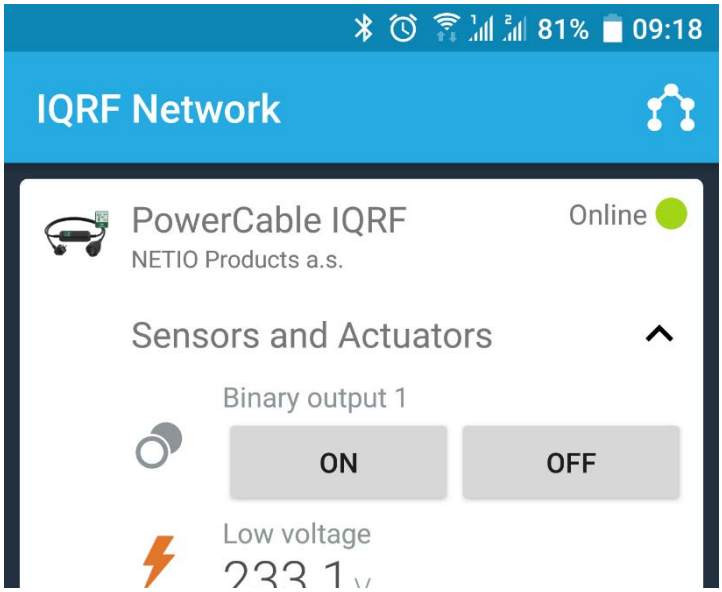
DPA Standard Binary Output

The output of the PowerCable IQRF can be controlled and monitored using the “Standard Binary Output” function of the DPA protocol. Commands and states conform to this standard.

Documentation according to DPA Interoperable: IQRF-StandardBinaryOutput-V004
https://www.iqrfalliance.org/techdoc_files/IQRF-StandardBinaryOutput_V004.pdf

Output address: 0x01

Example: Switching the PowerCable output on in the mobile app



Example: Switching the PowerCable output on in the IQRF IDE

In the IQRF IDE, open these windows: Packet Inspector, Terminal, Terminal Log.

Message header (HEX):
NADR: 0x0004

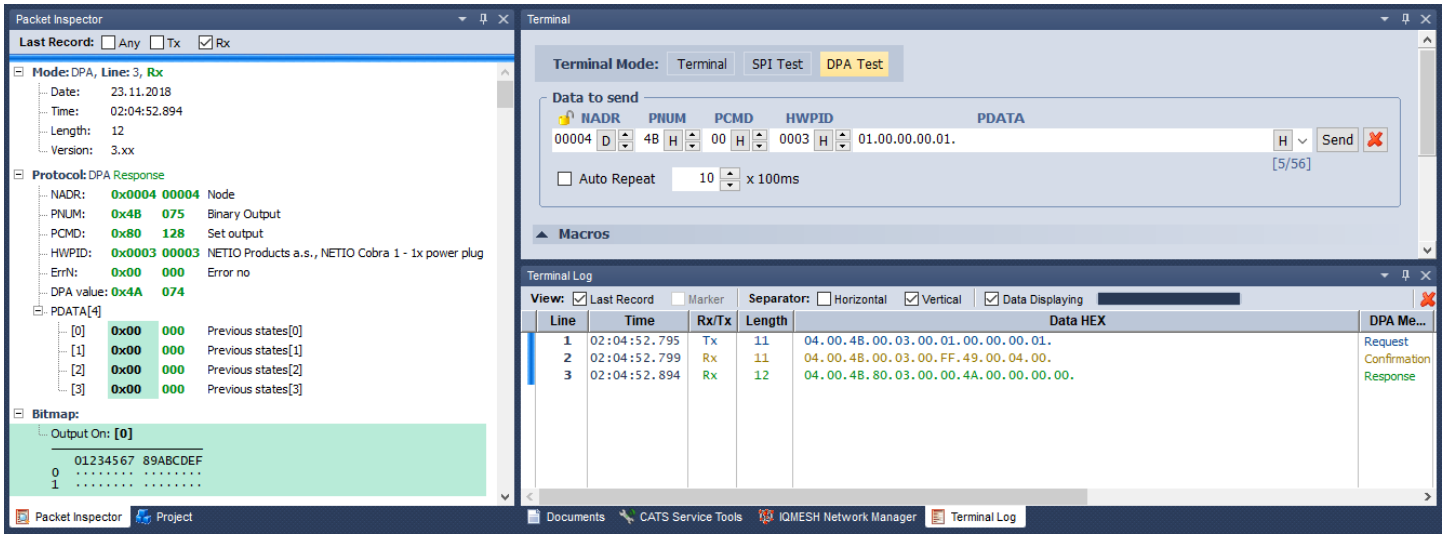
PNUM: 0x4B

PCMD: 0x00

HWPID: 0x0003

Message data (HEX):
PDATA: 01.00.00.00.01

Response PDATA if the command is correctly received: *04.00.4B.80.03.00.00.4A.00.00.00.00.*
(Previous output state: off)



Example: Switching the PowerCable output off in the IQRF IDE

In the IQRF IDE, open these windows: Packet Inspector, Terminal, Terminal Log.

Message header (HEX):
NADR: 0x0004

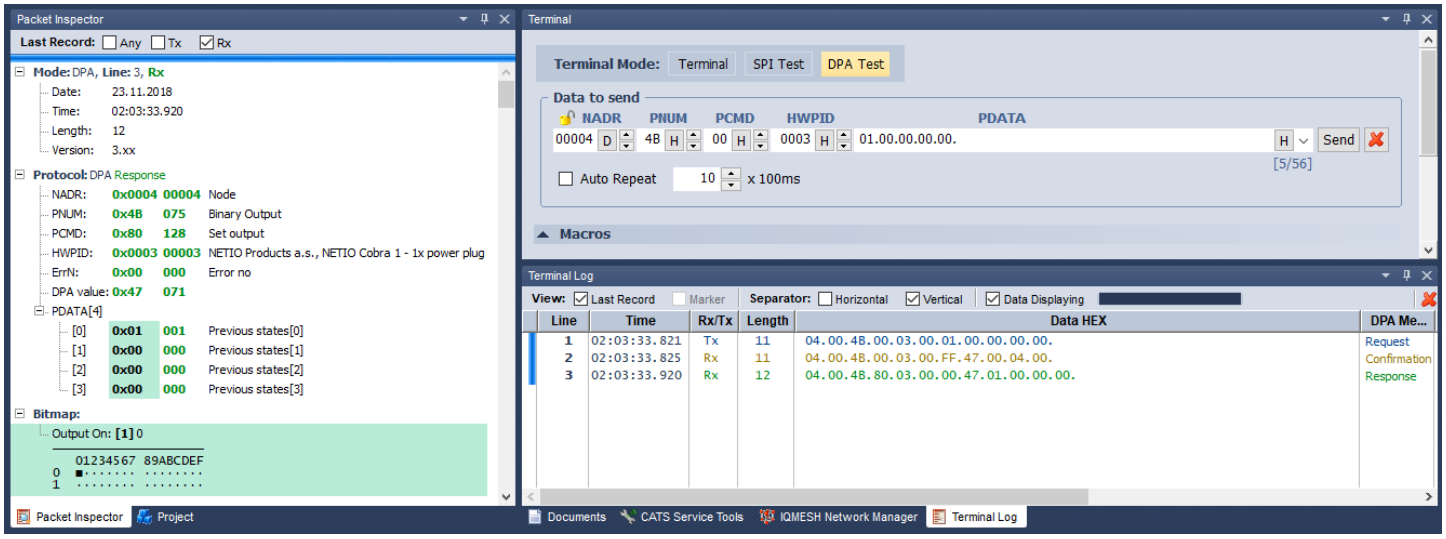
PNUM: 0x4B

PCMD: 0x00

HWPID: 0x0003

Message data (HEX):
PDATA: 01.00.00.00.00

Response PDATA if the command is correctly received: 04.00.4B.80.03.00.00.47.01.00.00.00.
(Previous output state: on)



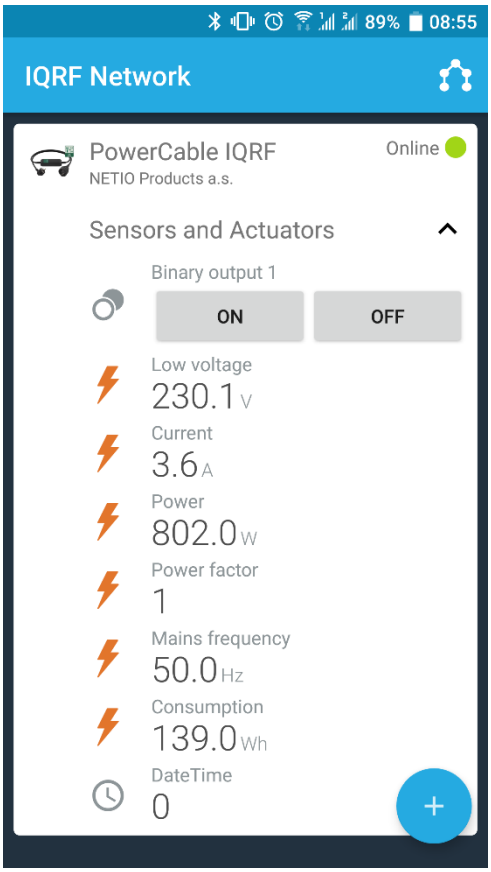
Reading the measurements

DPA Standard Sensor

PowerCable IQRF measurements can be controlled and read using the “Standard Sensor” function of the DPA protocol. Commands and values conform to this standard.

Documentation according to DPA Interoperable: IQRF-StandardSensor-V014 (https://www.iqrfalliance.org/techdoc_files/IQRF-StandardSensor_V014.pdf)

Example: Reading all PowerCable IQRF sensors in the mobile app



Addresses of individual sensors in PowerCable IQRF 901x

Voltage (Sensor 0)
Sensor Type: [0x06] Low Voltage
PDATA:

Current (Sensor 1)
Sensor Type: [0x07] Current
PDATA:

Power (Sensor 2)
Sensor Type: [0x08] Power
PDATA:

Power factor (Sensor 3)
Sensor Type: [0x82] Power Factor
PDATA:

Frequency (Sensor 4)
Sensor Type: [0x09] Mains Frequency
PDATA:

Consumption (Sensor 5)
Sensor Type: [0xA1] Consumption
PDATA:

Date and time when the consumption measurement started (Sensor 6)
Sensor Type: [0xA2] Datetime
PDATA:

Note: The consumption cannot be reset. In this regard, the PowerCable IQRF behaves as a regular power meter. The date and time refer to the factory reset.

Example: Reading all PowerCable IQRF sensors in IQRF IDE

In the IQRF IDE, open these windows: Packet Inspector, Terminal, Terminal Log.

Message header (HEX):
NADR: 0x0004

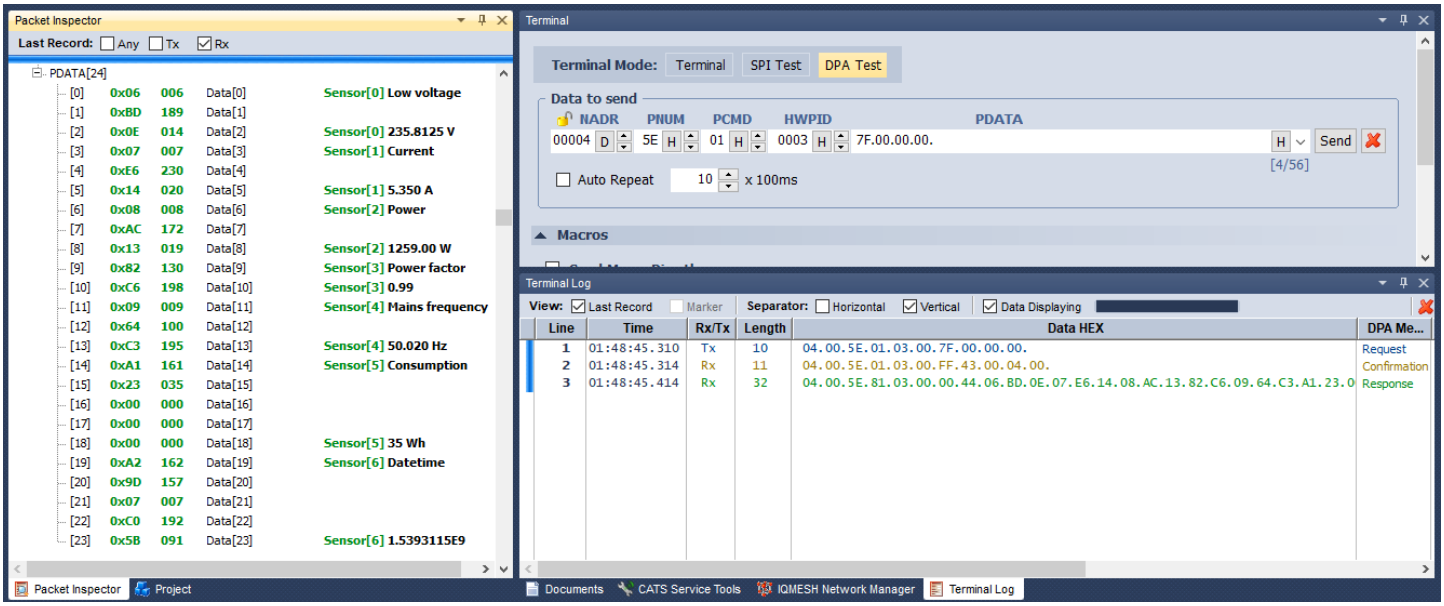
PNUM: 0x5E

PCMD: 0x01

HWPID: 0x0003

Message data (HEX):
PDATA: 7F.00.00.00

Response PDATA if the command is correctly received (example):
04.00.5E.81.03.00.00.44.06.BD.0E.07.E6.14.08.AC.13.82.C6.09.64.C3.A1.23.00.00.00.A2.9D.07.C0.5B.



Example: Reading the electrical current from PowerCable IQRF in the IQRF IDE

In the IQRF IDE, open these windows: Packet Inspector, Terminal, Terminal Log.

Message header (HEX):
NADR: 0x0004

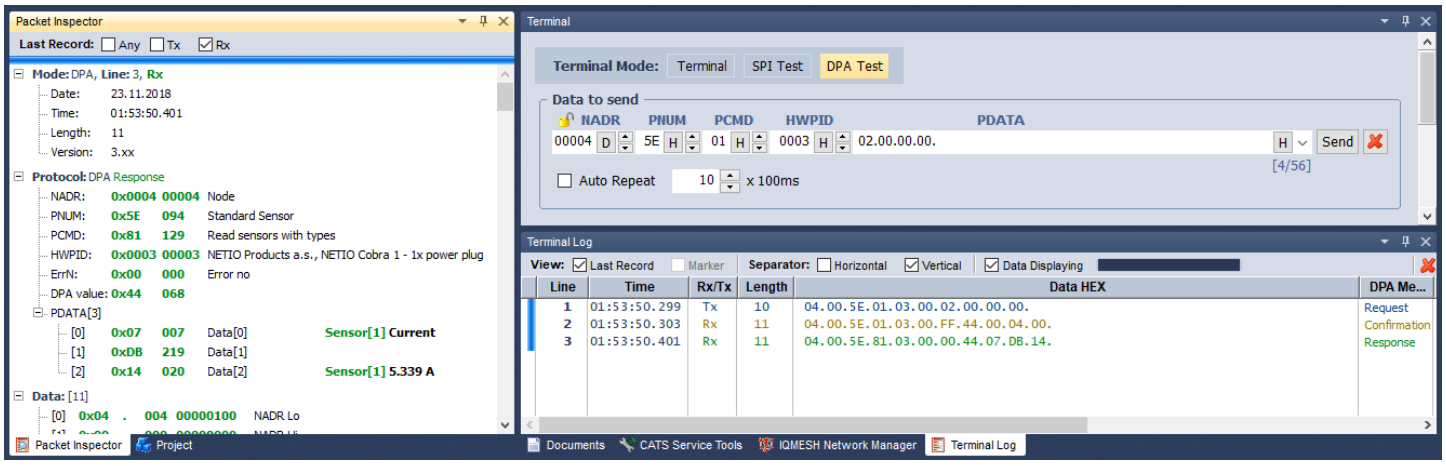
PNUM: 0x5E

PCMD: 0x01

HWPID: 0x0003

Message data (HEX):
PDATA: 02.00.00.00

Response PDATA if the command is correctly received (example):
04.00.5E.81.03.00.00.44.07.DB.14.



Configuring the default power-on state

The Power Cable IQRF supports user-configurable power-on output state. The following options are available:

- **OFF** – when the power is restored, the output is always off and can only be switched on with a command over the IQRF network
- **ON** – when the power is restored, the output is always switched on (within 2 seconds after powering up the device), and can be only switched off with a command over the IQRF network
- **LAST** – when power is disconnected or interrupted, PowerCable IQRF remembers the output state and restores it within 2 seconds after the power is restored

These states are set over a special service channel using the following commands:

Setting the power-on state to OFF (address 0x0004)

Message header (HEX):
NADR: 0x0004

PNUM: 0x5E

PCMD: 0x40

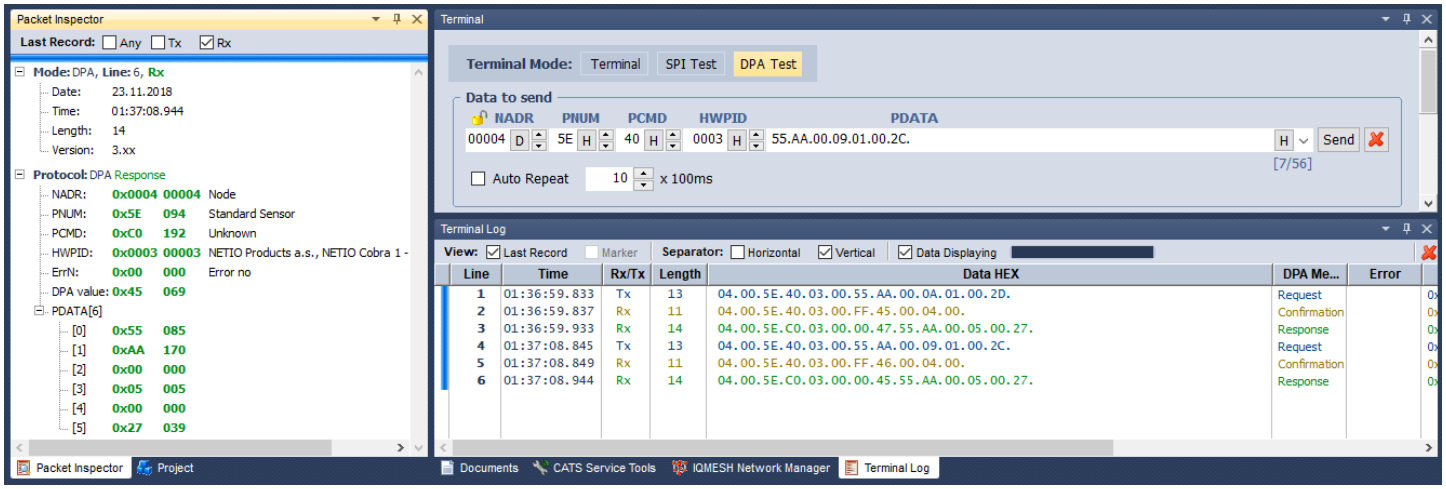
HWPID: 0x0003

1st message data (HEX):
PDATA: 55.AA.00.0A.01.00.2D

Response PDATA if the command is correctly received: 55 AA 00 05 00 27

2nd message data (HEX):
PDATA: 55.AA.00.09.01.00.2C

Response PDATA if the command is correctly received: 55 AA 00 05 00 27



Setting the power-on state to ON (address 0x0004)

Message header (HEX):
NADR: 0x0004

PNUM: 0x5E

PCMD: 0x40

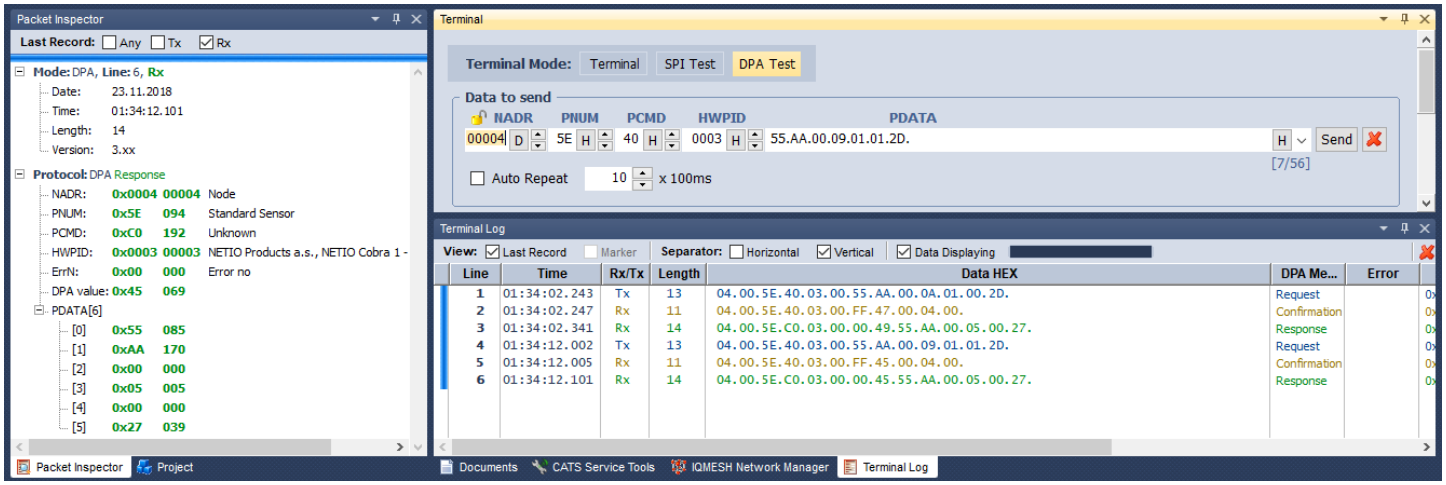
HWPID: 0x0003

1st message data (HEX):
PDATA: 55.AA.00.0A.01.00.2D

Response PDATA if the command is correctly received: 55 AA 00 05 00 27

2nd message data (HEX):
PDATA: 55.AA.00.09.01.01.2D

Response PDATA if the command is correctly received: 55 AA 00 05 00 27



Setting the power-on state to LAST (address 0x0004)

Message header (HEX):
NADR: 0x0004

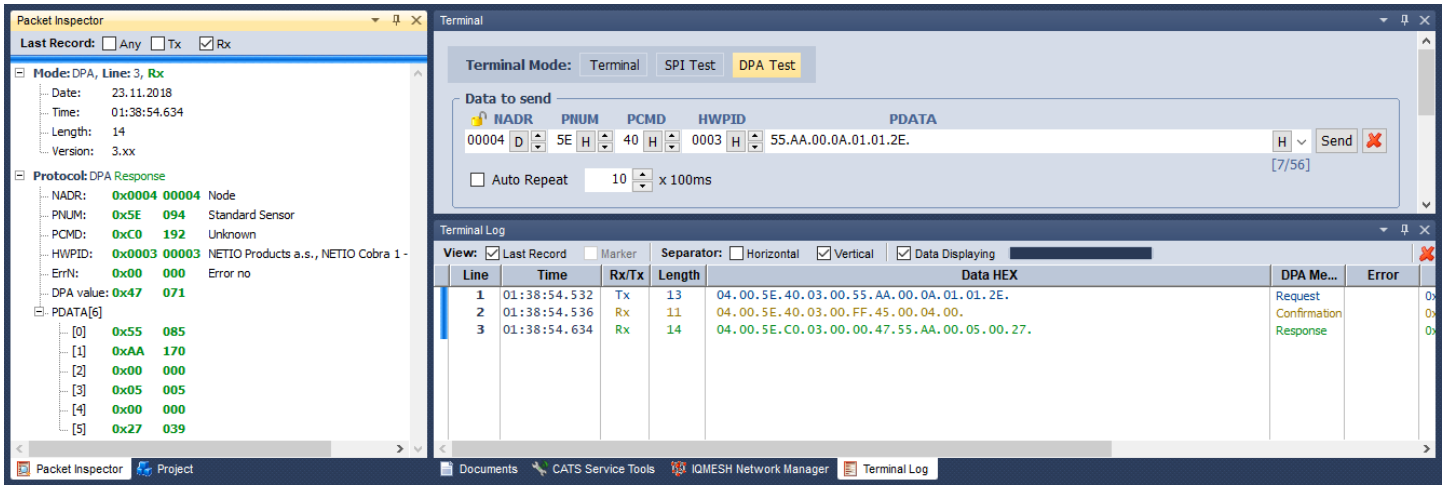
PNUM: 0x5E

PCMD: 0x40

HWPID: 0x0003

Message data (HEX):
PDATA: 55.AA.00.0A.01.01.2E

Response PDATA if the command is correctly received: 55 AA 00 05 00 27



EU DECLARATION OF CONFORMITY

Manufacturer: NETIO products a.s
Address: U Pily 3/103
143 00 Praha 4, Czech Republic
Product / type: **901*x*** - where "*x*" stands for the socket/plug type code:
E FR
F DE

This EU Declaration of Conformity is issued under the sole responsibility of the manufacturer.
Object of this Declaration: "NETIO PowerCable IQRF 901x extension cord controlled and monitored over the IQRF network".

The above-mentioned object of this Declaration complies with applicable harmonizing legislation of the European Union:

- 2014/53/EU (CZ no. 426/2016) including addendums

References to applicable harmonized standards or other technical specifications, with which conformity is hereby declared

- Article 3(1)(a) Protection of health and safety
- Article 3(1)(b) Electromagnetic compatibility
- Article 3(2) Effective and efficient use of radio spectrum

Additional information:

- Test protocol No.: EZÚ 700026-01/06 dated 31st January 2018
- Test protocol No.: EZÚ 700026-01/09 dated 31st January 2018

RoHS:
We hereby declare that the above-mentioned product(s) comply with essential requirements of the Government Regulation No. 481/2012 Sb. (Directive 2011/65/EU) on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The following standards were used in the conformity assessment: EN 50581:2012

Czech Republic, Praha, 18th March 2019 Jan Řehák, Chair of the Board