WIFIGUI SOFTWARE

User Guide

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Version 1.6

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VERSION HISTORY

Version	Comment
1.0	First version
1.1	Endpoint view documentation added
1.2	Added example how to close TCP connection
1.3	Improved WIFIGUI instructions
1.4	Updated the guide to match the latest WIFIGUI version
1.5	Updates to match v.1.2 software
1.6	AP mode instructions added

TABLE OF CONTENTS

1 Introduction

WIFIGUI is a simple terminal like user interface application that allows a developer to quickly test and evaluate Bluegiga's WF121 Wi-Fi module. The main purpose of WIFIGUI is to hide the complexity of the Bluegiga BGAPI^{TM} binary protocol used by the host to control the Wi-Fi Software running on the WF121. It offers a more user friendly approach to the usage of the BGAPI protocol. WIFIGUI can however be a very good tool for quick prototyping and debugging of Wi-Fi applications. This user guide walks you through the basic usage of WIFIGUI.
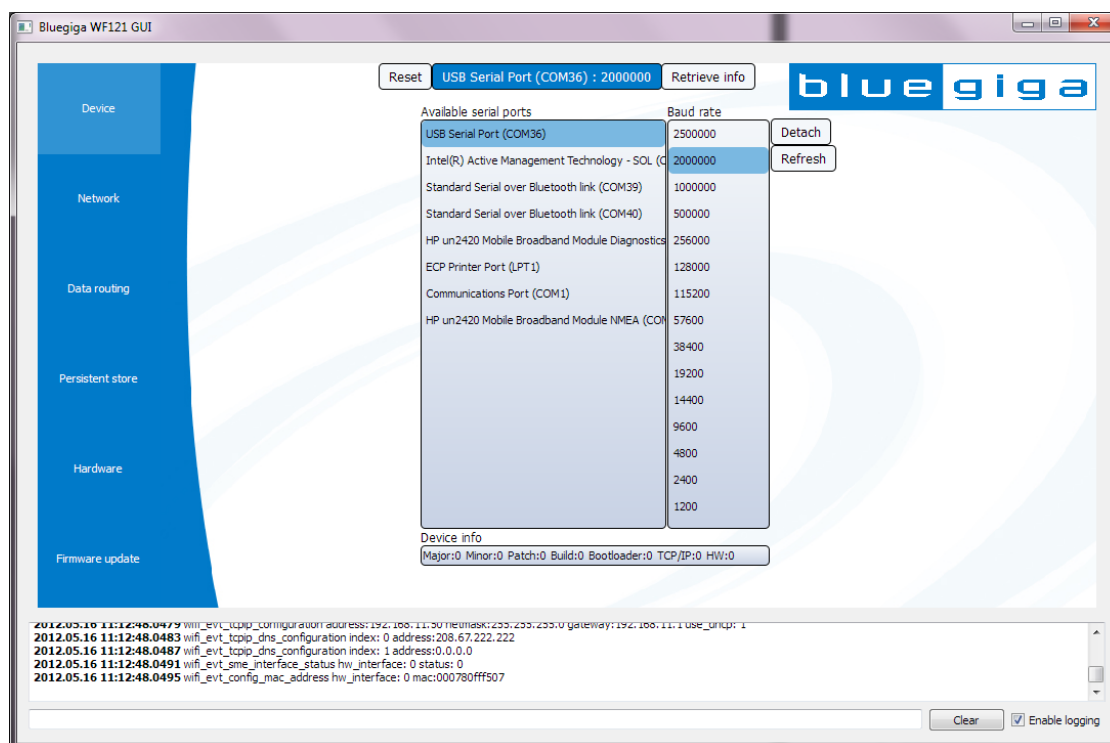

**Figure 1: Wi-Fi GUI application**

1.1 Compatible products

WIFIGUI can currently be used with Bluegiga WF121 Wi-Fi module.

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2 Preparations

If you have not used WIFIGUI before, you first need to do some preparations:

2.1 Preparing the WF121 development kit

1. Make sure **3V3 and CURR MEAS** jumpers are connected.
2. Check sure **Board power** switch is turned **ON**
3. Make sure **UART1** and **UART2** switches are turned **ON**
4. Connect micro USB cable to the **UART to USB** converter
5. Check that the green power led turns on

Figure 2: DKWF121

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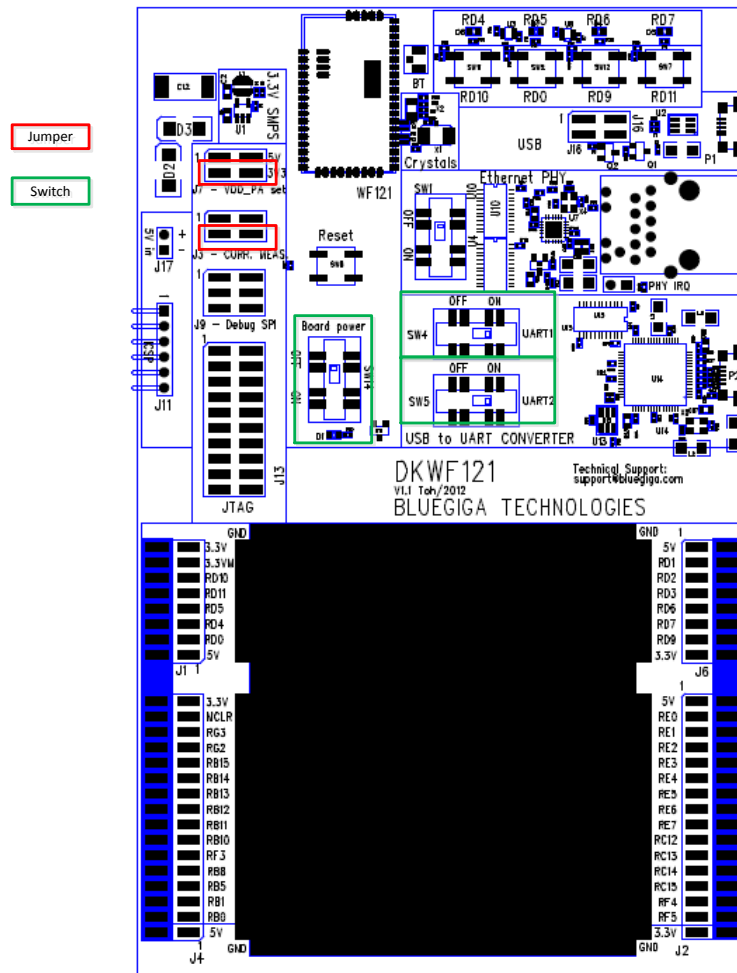
2.2 Installing the driver

1 Download the latest Wi-Fi software from Bluegiga's web site: www.bluegiga.com

2 Install the Wi-Fi software to your PC according to the on-screen instructions

3 Connect the WF121 development kit to your PC using USB.

  3.1 Connect the USB cable to USB port labeled "**USB to UART converter".**

4 Windows should automatically recognize the FTDI USB to UART converter and install the drivers.

5 Once the driver is installed two (2) virtual COM ports should be visible in the Windows Device Manager.

6 If two new virtual COM ports are visible the installation is complete.
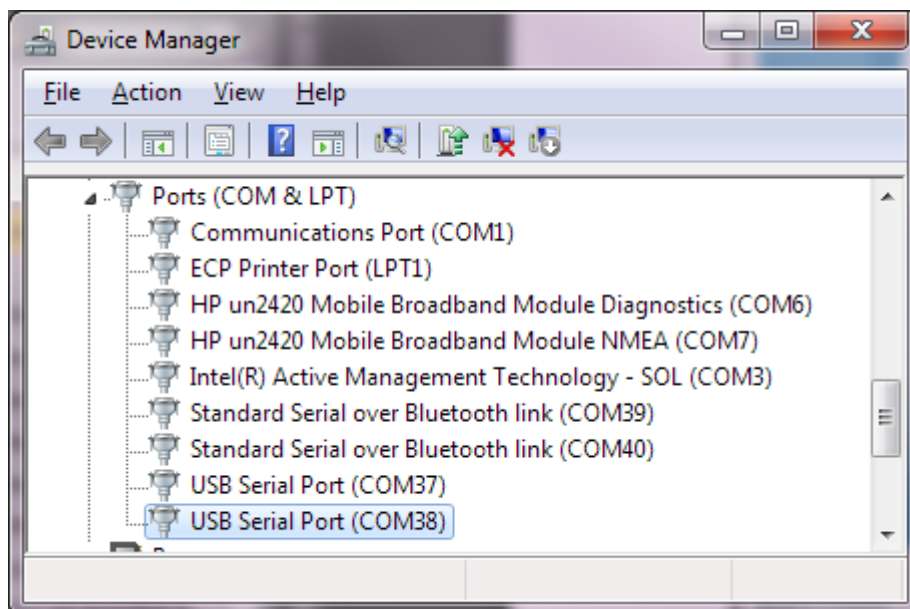
7 Finally Start the WIFIGUI software.

Figure 3: Windows Device manager

Note:

On Linux and MAC computer no drivers are needed, however WIFIGUI software does not work on these platforms at the moment.

If the factory default configuration the WF121 development kit has a pre-programmed firmware that will expose the BGAPI via UART. The WF121 development kit should be automatically recognized by Windows (or Linux) as a virtual COM port device and two COM ports should be enumerated.

In case the USB to UART converted driver is not automatically installed, it can be downloaded from: In case a driver is not installed the FTDI FT232-HL driver can be downloaded from FTDI web site: http://ftdichip.com/FTDrivers.htm.

3 Using WIFIGUI software

This chapter contains brief step-by-step instructions how to use the WIFIGUI software.

3.1 Device view

The device view simply shows you the available COM ports on the PC and allows you to open the COM port where the WF121 Wi-Fi module is connected to.

It will also show you the devices' firmware and hardware information.
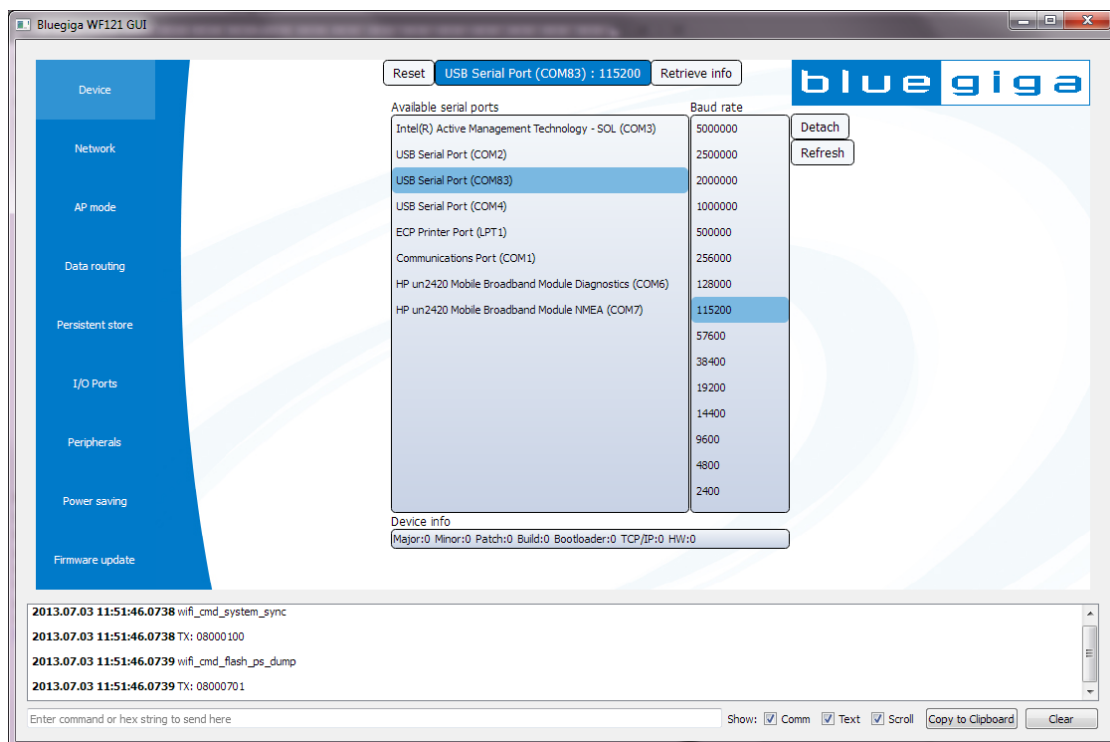

Figure 4: Main view

Controls	
Attach / detach	Opens or closes the selected COM port
Refresh	Refreshes the COM port list
Reset	Sends a reset command to WF121 also refreshes the **Device info** field
Retrieve Info	Reads the current status information from the WF121 and also syncs the status with the WIFIGUI software

Controls	
Log view	The log view shoes the user readable BGAPI^{TM} commands the **WIFIGUI** sends to the WF121 hardware as well the BGAPI responses and events the WF121 sends back to the **WIFIGUI.**
Command input	Can be used to send commands manually to WF121. Either in ASCII format: "wifi_cmd_sme_start_scan 0 0103" (scans channels 1 and 3) or HEX format: "0804030300020103"
Comm	Shows raw BGAPI protocol (binary) communications
Text	Shows user friendly (text) BGAPI communications
Copy to Clipboard	Copies the BGAPI log to clipboard
Clear	Clears the BGAPI log

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3.2 Network view

Network view gives the basic control to WF121 network controls like turning on or off the Wi-Fi radio in WF121, scanning and connecting to Access Points and configuring the IP address.
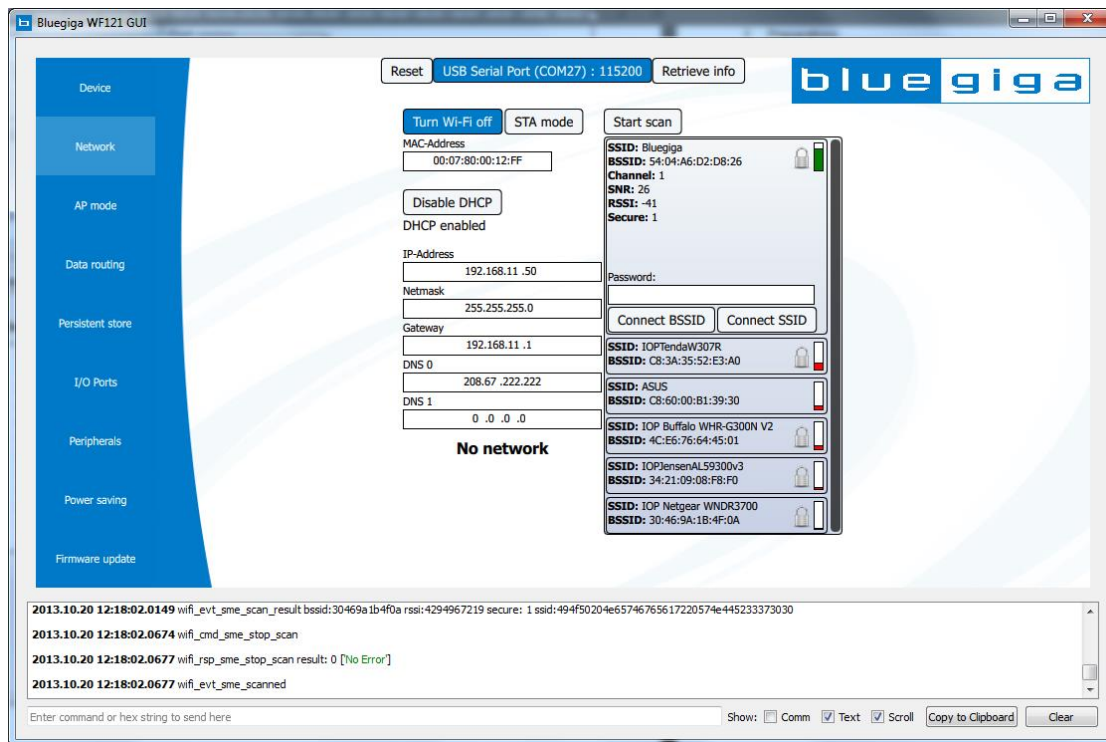

Figure 5: Network view

Controls	
Turn Wi-Fi on/off	Enables or disables the Wi-Fi radio on WF121 module.
AP mode	Enables or disables Wi-Fi Access Point mode
Start scan	In client mode starts the Access Point scan procedure. If scanning is in progress pressing the button again, will stop the scan.
Disable DHCP	Disables the DHCP client and allows manual IP address configuration.

Fields	
MAC-address	Shows the WF121's IEEE address. Can also be used to restore a lost MAC address.
IP-address	Shows the current IP address
Netmask	Shows the current IP netmask
Gateway	Shows the current IP gateway
DNS 0	Shows the primary DNS gateway address
DNS 1	Shows the secondary DNS gateway address
Access Point	Shows the list of discovered Wi-Fi access point sorted based on RSSI

3.2.1 Turning Wi-Fi radio ON or OFF

Turing Wi-Fi radio ON:

1. Press **Turn Wi-Fi on** button
2. Wait until button turns permanently blue
3. Wi-Fi is ready to be used

Turing Wi-Fi radio OFF:

1. Press **Turn Wi-Fi on** button
2. Wait until button turn grey
3. Wi-Fi is OFF

3.2.2 Scanning for Access Points

1. Turn Wi-Fi radio on

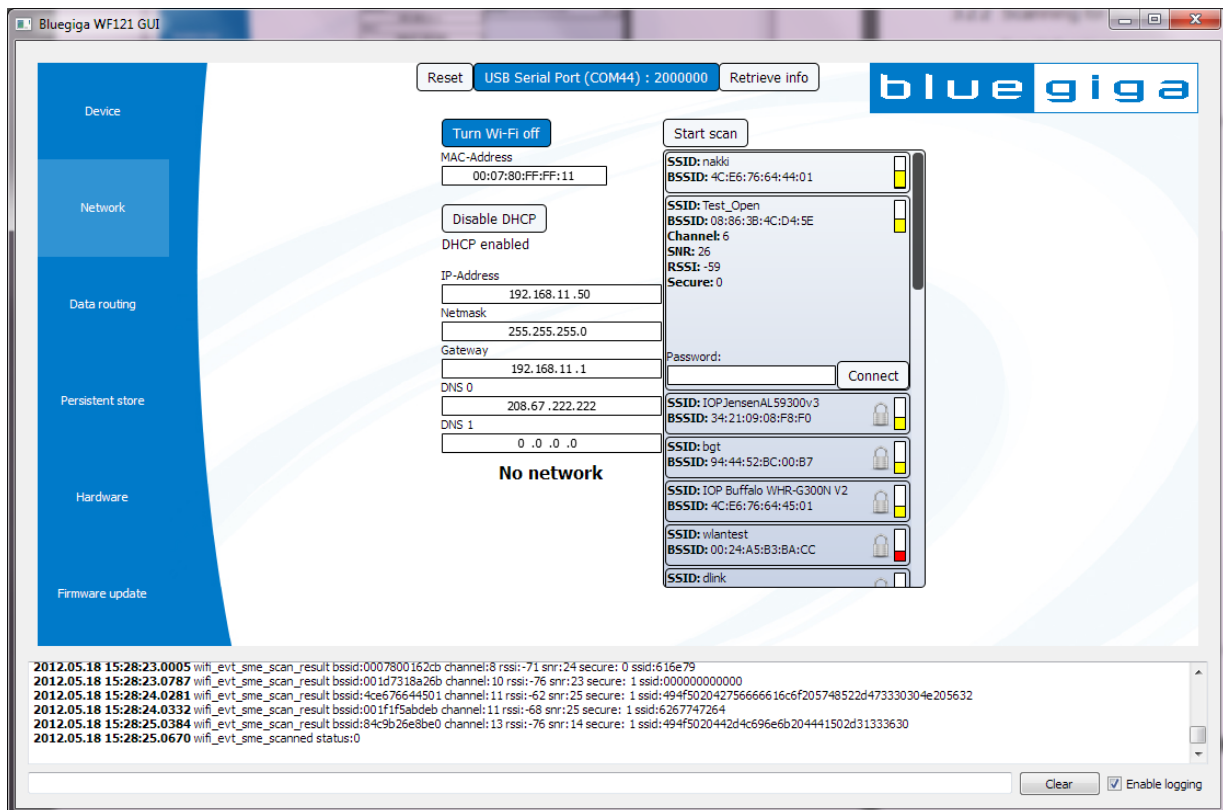2. Press Start **Scan** button

3. Wait until the scan is finished

Figure 6: Scanning for Access Points

Note:

To stop the scanning while it's in progress press **Stop scanning** button.

The discovered access points are show in the in the Network view and the results are sorted based on the signal strength. When you click a discovered Access Point more information will be displayed about the selected AP.

Access Point details	
SSID	SSID (name) of the discovered AP
BSSID	BSSID (IEEE address) of the discovered AP
Channel	802.11 channel the AP uses
SNR	Signal-to-Noise ratio
RSSI	Received Signal Strength Indication
Secure	Tells if the AP is secure or insecure. **0: no security used** **1: security used**
SSID	SSID (name) of the discovered AP
Connect SSID	Starts the SSID connection procedure
Connect BSSID	Starts the BSSID connection procedure

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3.2.3 Connecting to an Access Point

To connect an Access Point:

1. Select the AP you want to connect to
2. Type the security key to the **password** field
3. Press **Connect** button
4. Wait until the Access Point field turns blue and **Connect** button will change to **Disconnect**

    a. If the connection is not successful the WF121 will try to reconnect the AP for eight (8) times
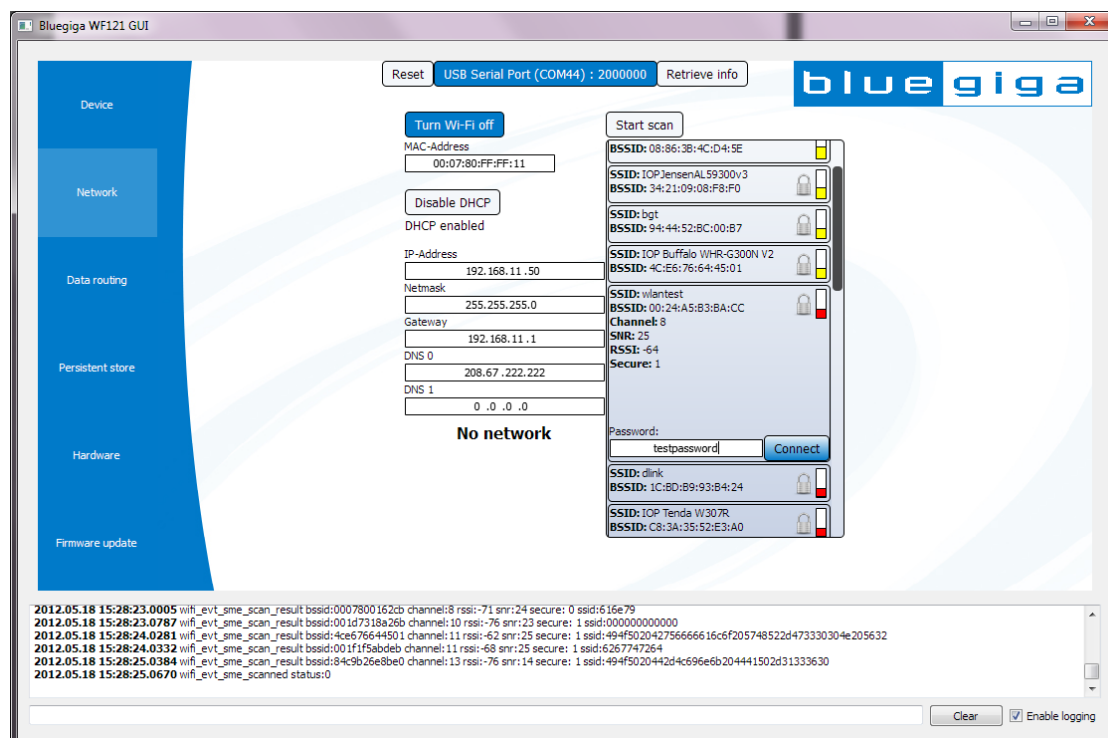
Figure 7: Connecting to an AP

Note:

When connected to an Access Point scanning cannot be made.

In case DHCP is enabled after the Wi-Fi connection has been established the IP-address and other fields are updated assuming DHCP negotiation is successful. Once this is competed **No Network** text is changed to **Network ready.**

3.2.4 Disconnecting an Access Point

To disconnect an Access Point:

1. Select the AP you are currently connected to (shown in blue)

2. Press **Disconnect** button

3. Wait until the Access Point field turns grey and **Disconnect** button will change to **Connect. Also Network ready** field will change to **No network**

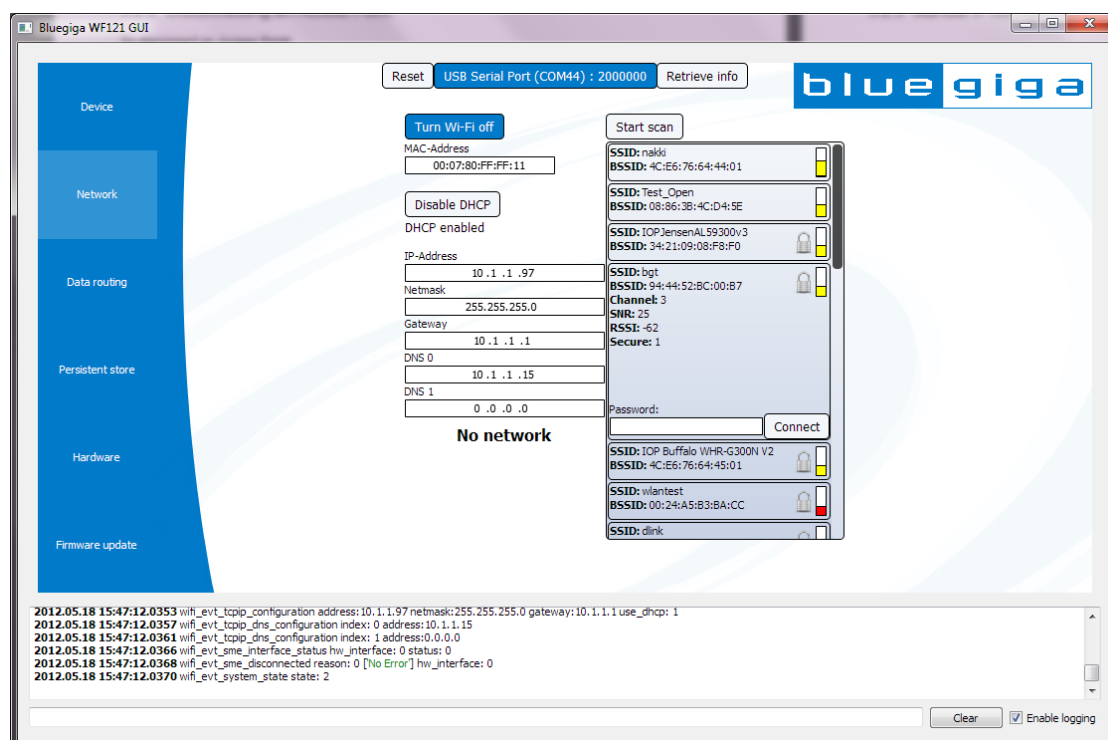**Figure 8: Disconnecting an Access Point**

3.2.5 Manual IP-address configuration

In case DHCP is not available or manual IP-address configuration is preferred the following steps need to be made:

First make sure you are **not connected** to a network

1. Configure the IP address manually:

    1.1   Type the preferred IP-address to **IP-address** field

    1.2   Type the preferred netmask to **Netmask** field

    1.3   Type the preferred gateway address **Gateway** field

    1.4   Type the primary DNS address to **DNS 0** field

    1.5   Type the secondary DNS address to **DNS 1** field

1.6   Then press **Disable DHCP** button to activate the settings

2. Finally **Connect** to an Access Point

3.3 AP Mode View

In this view you can either enable or disable the Wi-Fi Access Point mode view and change the various AP mode related settings like DHCP IP address.
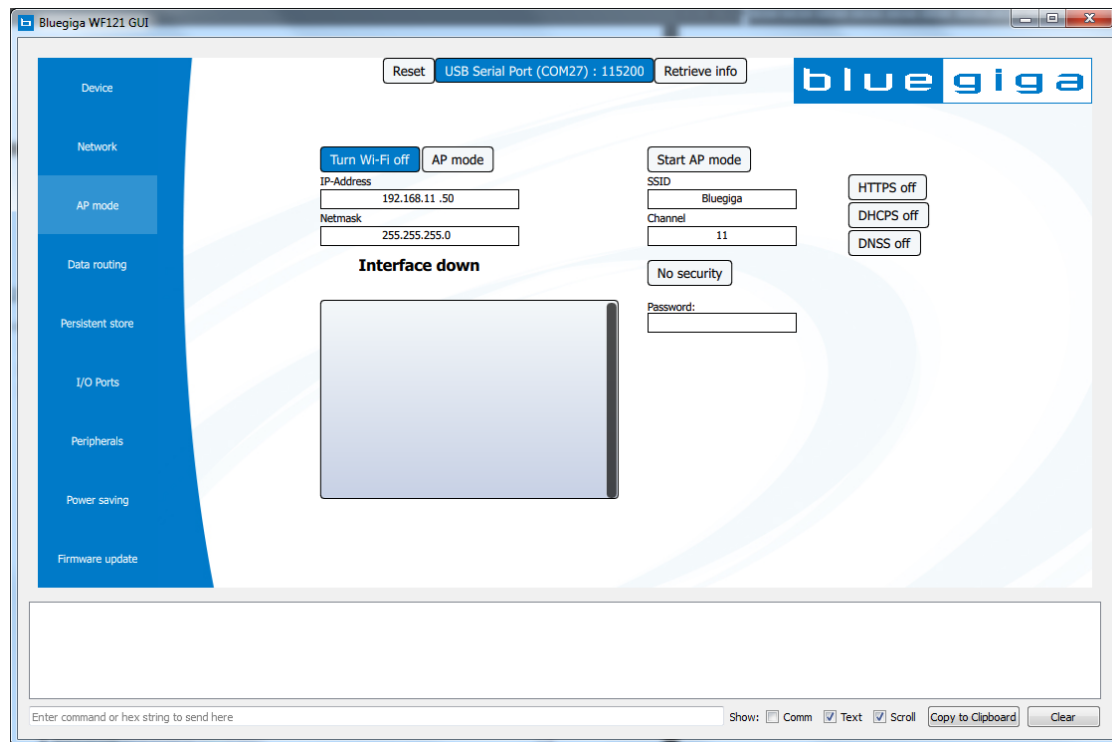

Figure 9: Wi-Fi Access Point mode view

Access Point mode controls	
Turn Wi-Fi on/off	Enables or disables the Wi-Fi radio on WF121 module.
AP mode	Enables or disables Wi-Fi Access Point mode. The label on the button tells which mode is currently enabled.
IP-address	Shows the local devices IP address
Netmask	Shows the local devices netmask
Start AP mode	Starts the Wi-Fi AP mode
SSID	Local devices SSID
Channel	Local devices RF channel

Access Point mode controls	
No security **WPA2** **WPA** **WEP**	Changes the security mode and tells which security mode is currently in use.
Password	Password for the Wi-Fi AP
HTTPS	Enables or disables the built-in HTTP server
DHCPS	Enables or disables the built-in DHCP server
DNSS	Enables or disables the built-in DNS server

3.3.1 Starting the Wi-Fi Access Point Mode

In order to start the Wi-Fi Access Point mode, please do the following steps:

- Go to **AP Mode** page
- Press **STA mode** button once, to initialize the AP mode configuration
- Enter the desired **SSID**, **Password** and **Channel** into the corresponding fields
- Next press the **Start AP Mode** button, to start the Wi-Fi Access Point mode
    - o Wait for the commands to be executed
- Finally enable the DHCP server by pressing the **DHCPS** button

You should not be able to discover and connect the WF121 running the AP mode for example with your PC.

In Windows:

- Discover the available wireless networks
- Select the Access Point that runs on the WF121 Wi-Fi Module
- Connect it and use the security settings you have configured
- Once the connection is successful you should see a new MAC address to appear in the WIFIGUI telling the connection is up.
    - o You can also disconnect the clients (STAs), by selecting a client and pressing disconnect. Notice however that some clients (like Windows 7) immediately reconnect the AP

Figure 10: Discovering Wi-Fi networks in Windows 7
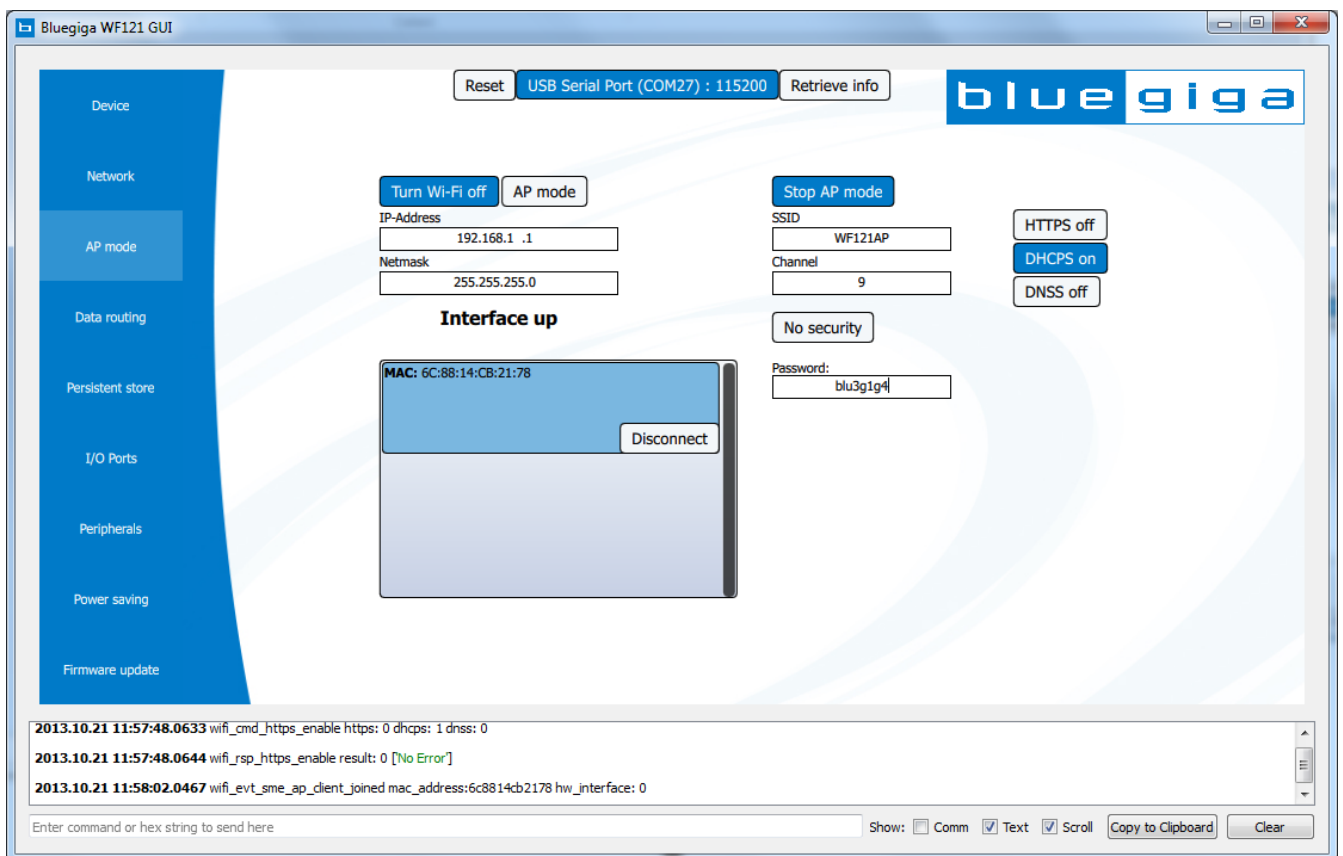
Figure 11: WIFIGUI showing one active client connection

3.4 Data Routing View

Data routing view exposes the IP stack controls and allows you to create TCP/UDP clients or servers. The view also exposes the controls to the endpoint configuration and displays the sent and received data.
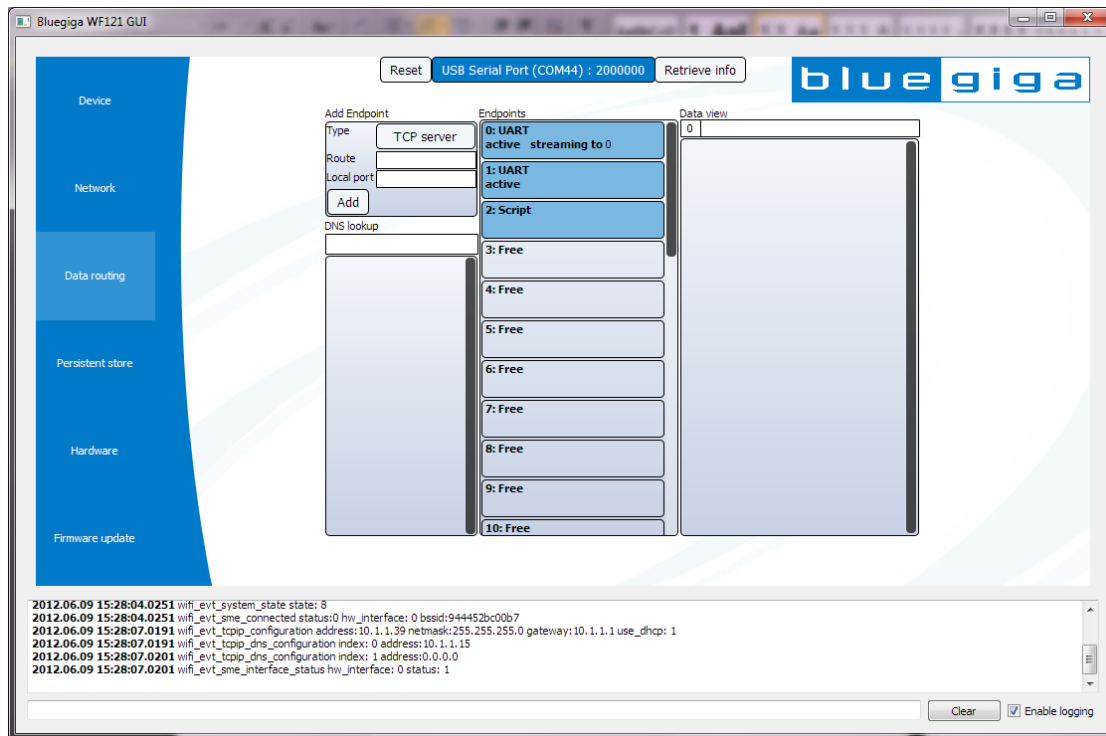

Figure 12: Data routing view

3.4.1 Add endpoints

This section allows you to create TCP and UDP clients and servers.

End point details	
Route:	The target destination for data. Can be any of the available endpoint IDs
Remote IP	Remote IP address
Local port	Local TCP or UDP port
Remote port	Remote TCP or UDP port
Add Endpoint button	Creates the endpoint and adds it to the list of available endpoint

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3.4.2 DNS lookup

This tool allows you to perform DNS look-up requests.

DNS lookup tool	
DNS lookup field	Type an URL (like www.bluegiga.com) into the DNS lookup field. Press **Enter** to perform the lookup.

3.4.3 Endpoints

This section shows you active endpoints, their IDs, types and their status. You can also close the active endpoints using this tool or change the data routes.

3.4.3.1 Closing an endpoint

1. Select the desired endpoint to be closed.
2. Press **Close** to close the endpoint.

3.4.3.2 Changing data routing

1. To change the data routing configuration, first select the desired endpoint.
2. Type the new **endpoint ID** to the available **field**
3. Press **Enter** to activate the change
4. You can also press **Retrieve info** to update the endpoint status

3.4.4 Data view

Data view allows you to send data to an endpoint and also shows data received from the BGAPI endpoint.

To send data to an endpoint:

- Type the endpoint ID you want to send the data to
- Type the data into the following field
- Press **Enter** so send the data

Received data is shown in the field below.

3.5 Persistent store view

Persistent store view can be used to access the local PS key store. At the moment it only allows you to view the local PS keys and their values.
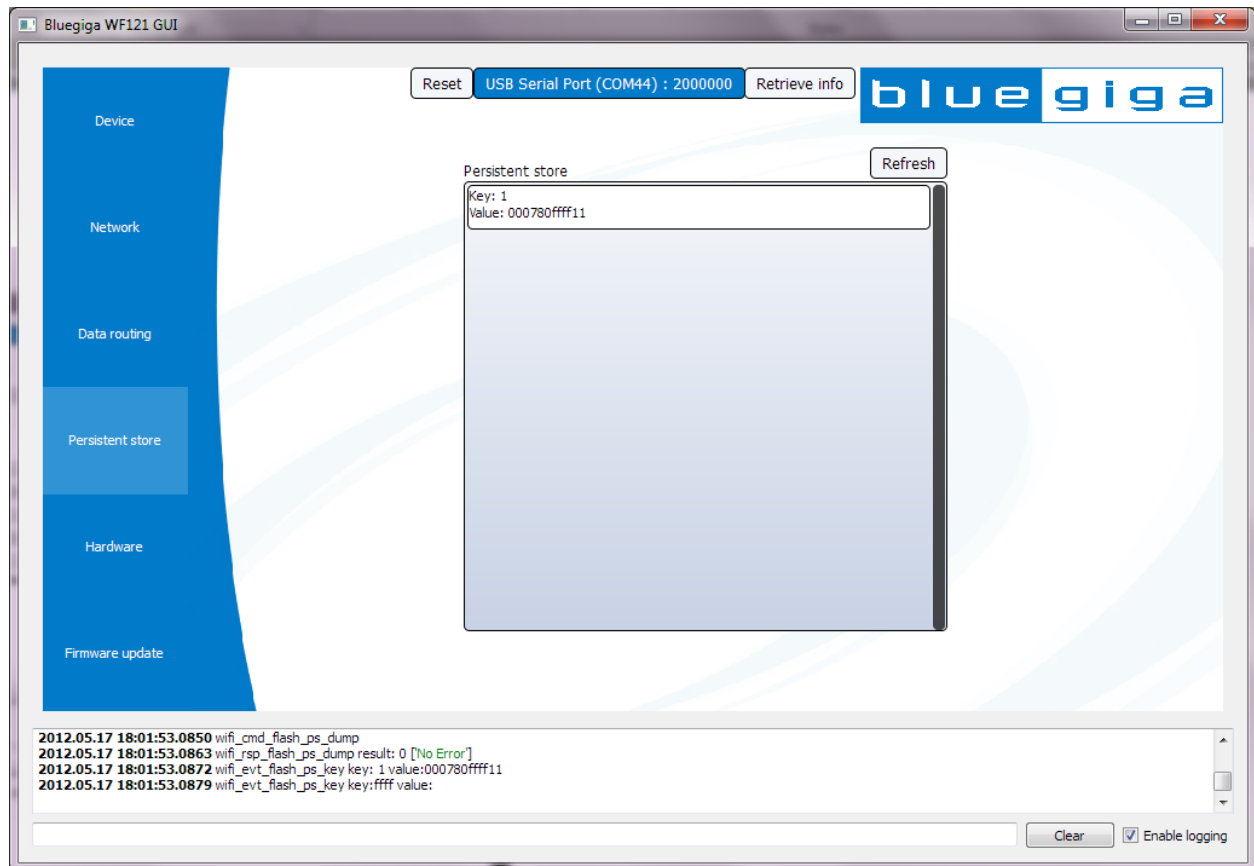
Figure 13: PS store view

3.6 I/O Ports View

This view allows you to view and configure the IO ports of your WF121 Wi-Fi Module. You can configure whether the ports and input or outputs and change the state of outputs and also enabled and configure the interrupts.
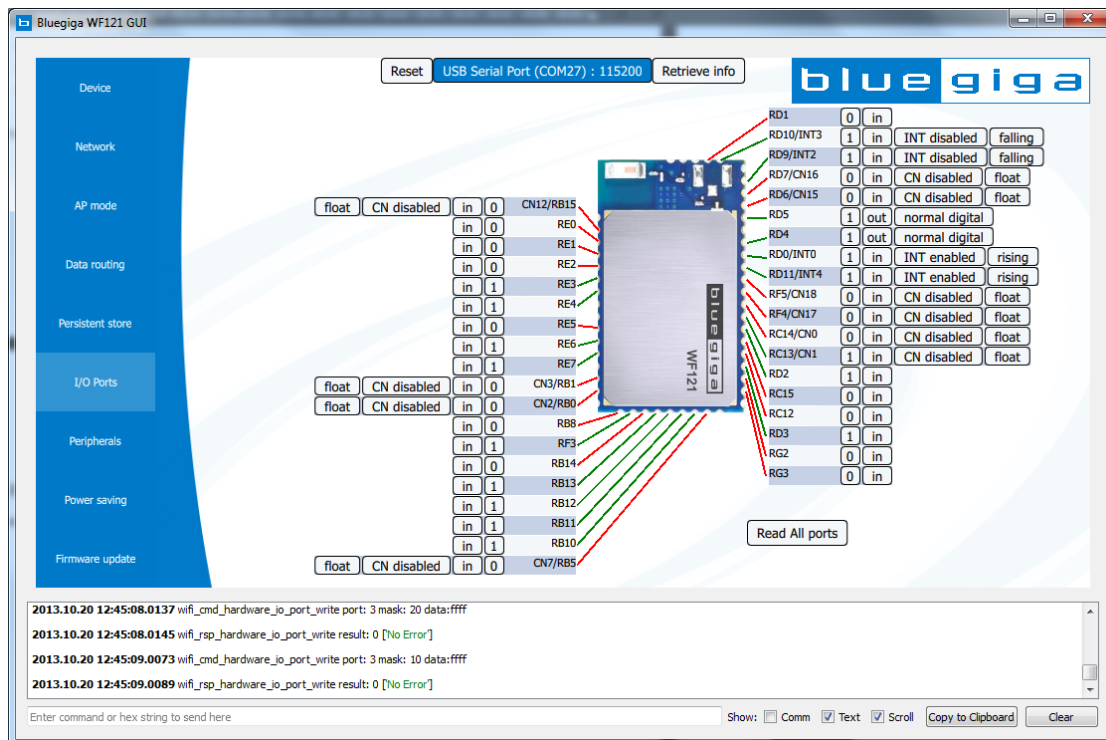
Figure 14: IO Ports view

IO Ports view	
0 / 1	Tells if the IO is enabled or disabled and can be used to change the status of an output.
in / out	Tells if the IO is an input or an output and can be used to change the state.
normal digital / open drain	Configures if an output is normal digital or open drain and also shows the current state.
INT enabled / INT disabled	Enabled or disables the interrupts on a port and also tells the current state.
falling / rising	Configures on which edge the interrupt occurs and also tells the current configuration.
float / pullup	Can be used to configure if the IO is floating or has a pull-up. Also shows the current configuration.

IO Ports view	
CN enabled / **CN disabled**	Can be used to enabled or disable change notification and also shows the current configuration.
Read All Ports	Reads all port statuses and configuration and updates the view

3.6.1 Turning on the Leds on DFKWF121

1. Configure RD4, RD5, RD6 and RD7 as outputs
2. Make sure they are configured as normal digital IOs
3. Change the all statuses from 0 to 1
4. All leds on DKWF121 should turn on

3.6.2 Capturing Button Presses on DKWF121

1. Configure ports RD0, RD9, RD10 and RD11 as inputs
2. Enable interrupts on RD0, RD9, RD10 and RD11
3. Choose the edge when you want the interrupt to be generated
4. Press a button on DKWF121 and monitor the API events in the log view

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3.7 Peripherals View

This view allows you to configure the output compare pins and read the ADC values.
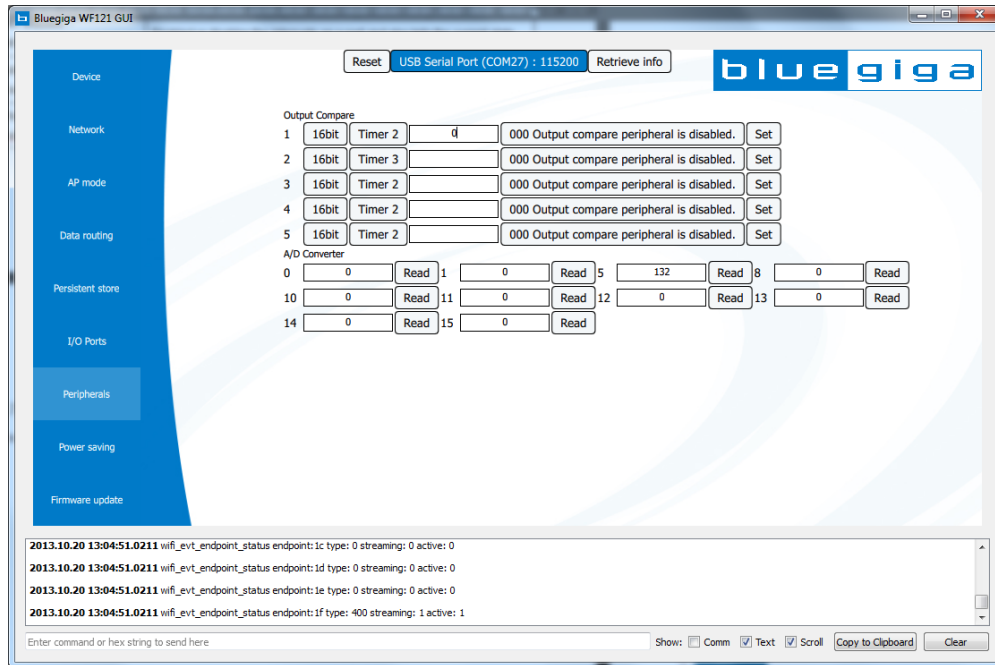
Figure 15: Peripherals View

3.8 Power Saving View

This view allows you to select to which power saving states the local hardware can go to.
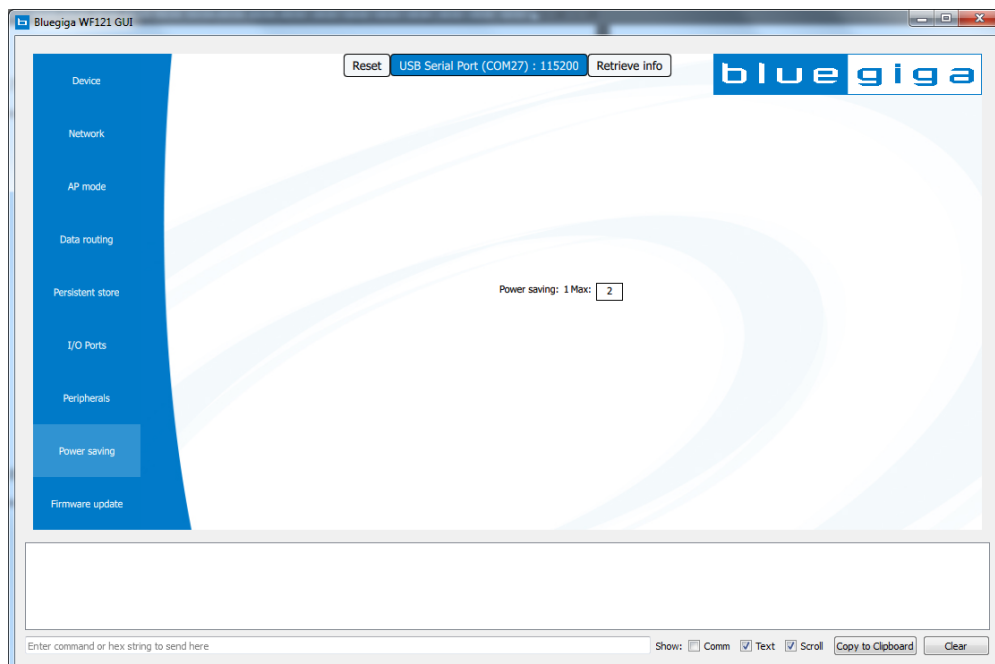
Figure 16: Peripherals View

3.9 Firmware Update View

Firmware update view can be used to perform a DFU update of your local device.

To perform the update

1. **Boot** the device into DFU mode
2. Select a .DFU file you want to upload to the device
3. Press **Upload**
4. Wait for update to finish
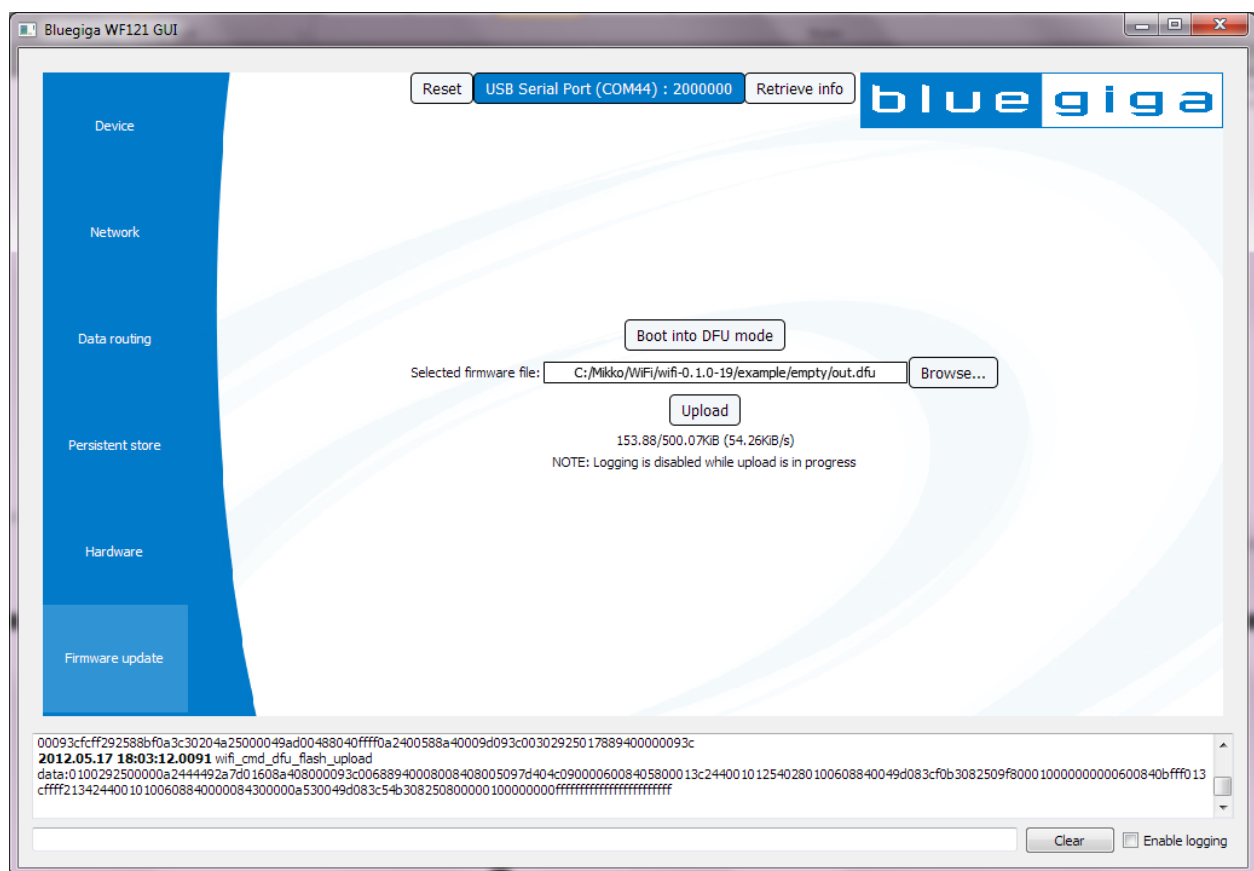
Figure 17: DFU firmware update

4 TCP Server example

4.1 Creating a TCP server

1. To create a **TCP server** select the TCP server from the **Add endpoint** tool
2. Type in a local **TCP port** number
3. Select streaming destination to **endpoint ID 1** (UART1)
4. Press **Add** to create the endpoint
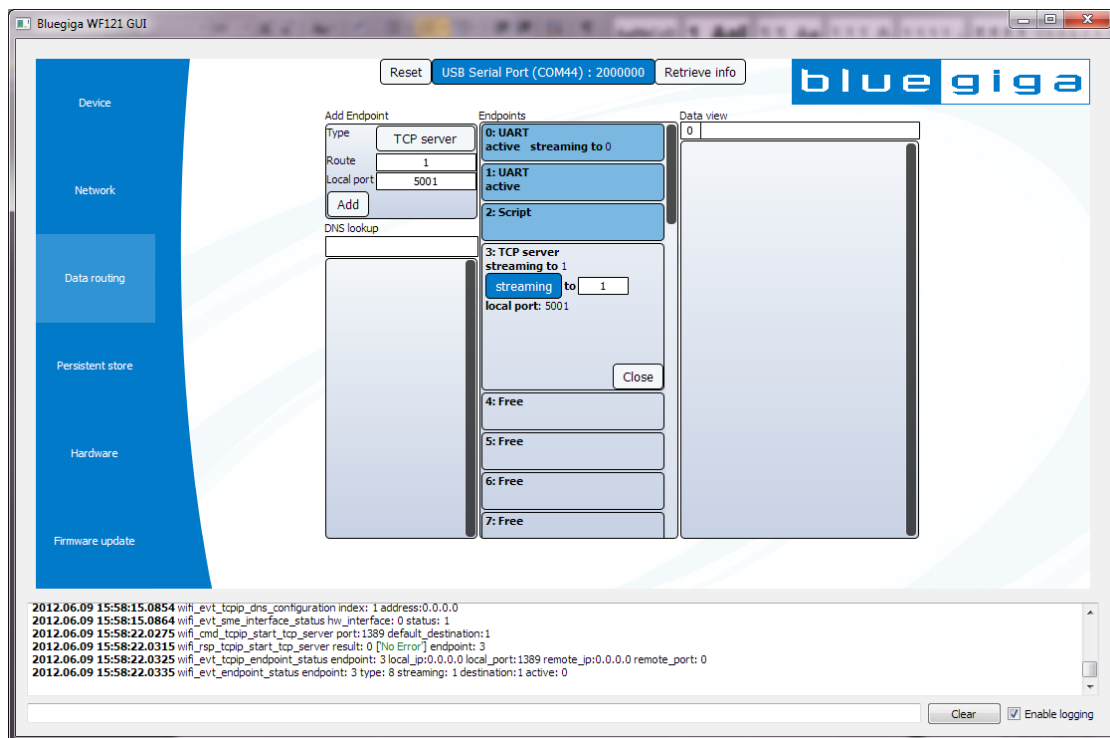
Figure 18: TCP Server creation

4.2 Creating a TCP client connection

To create a TCP client connection you need TCP client software like Putty or Tera Term.

1. Open a TCP client software
2. Create a TCP client connection to the IP address your WF121 Wi-Fi module and the TCP port you've created.

   (Example uses : 10.1.1.39 and port 5001)
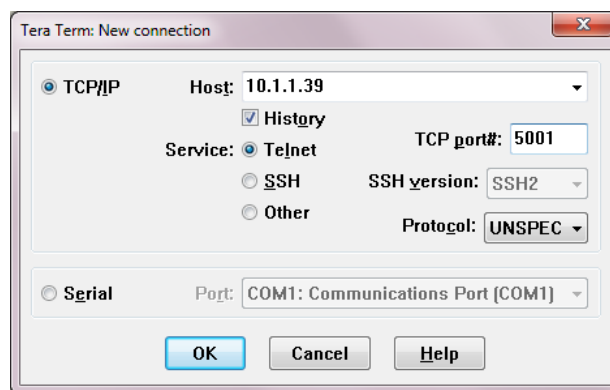
Figure 19: TCP client connection

4.3 Checking TCP connection status

Once the TCP connection has been established the endpoint views shows new endpoint for each TCP client connection.

In the example below the TCP client connection get a new endpoint ID 4.
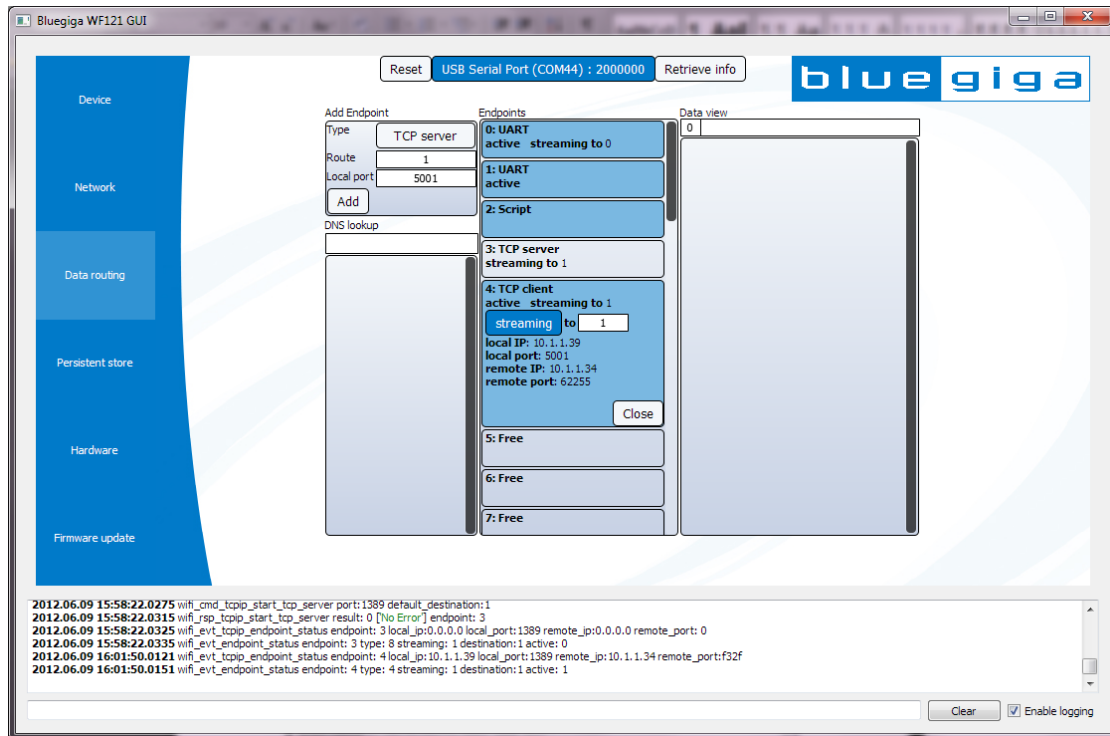
Figure 20: TCP client endpoint

4.4 Transmitting data

In order to send data to the TCP client:

1. Change the endpoint ID in the data view to **4**.

2. Type in the data you want to send into the following field.

3. Press **Enter** to send the data.

4. Finally check that you've received the data at the TCP client.
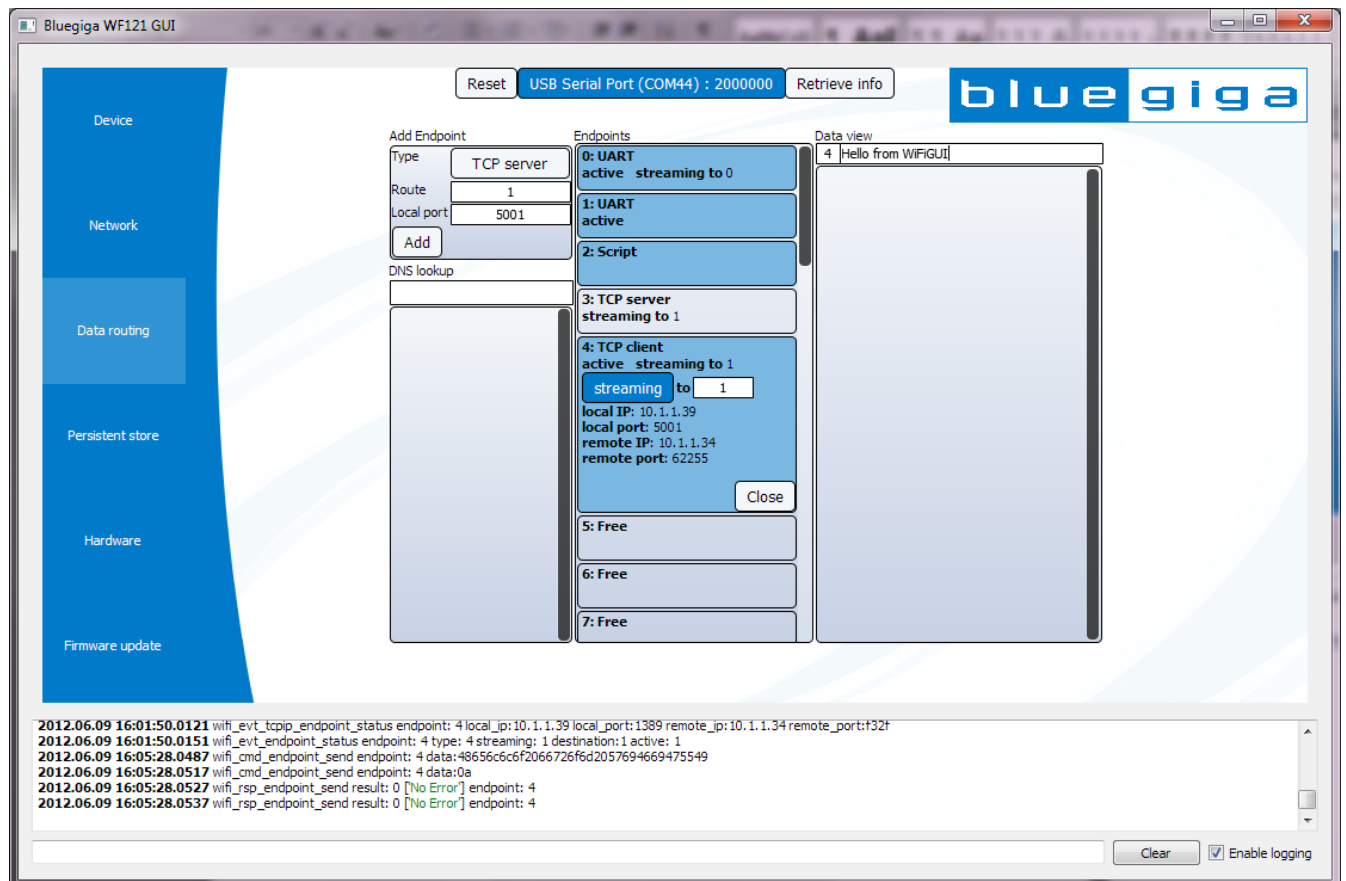
Figure 21: Sending data from the TCP server to the TCP client
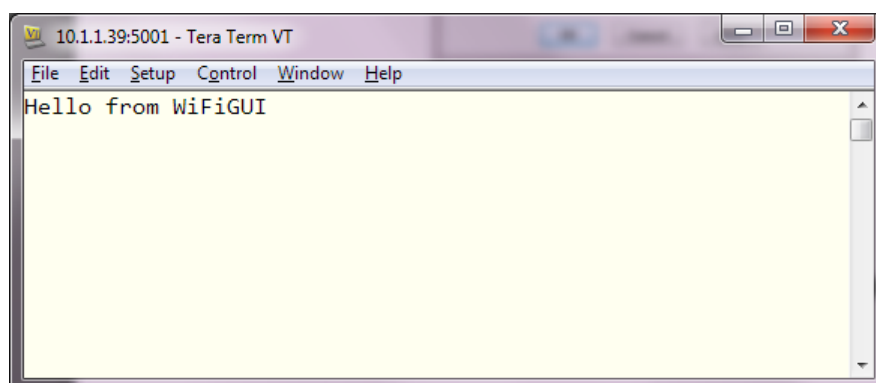
Figure 22: Verifying data reception

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In order to send data to the TCP server:

1. Use the TCP client software to send data

2. Finally check that you've received the data at the WIFIGUI software's data view
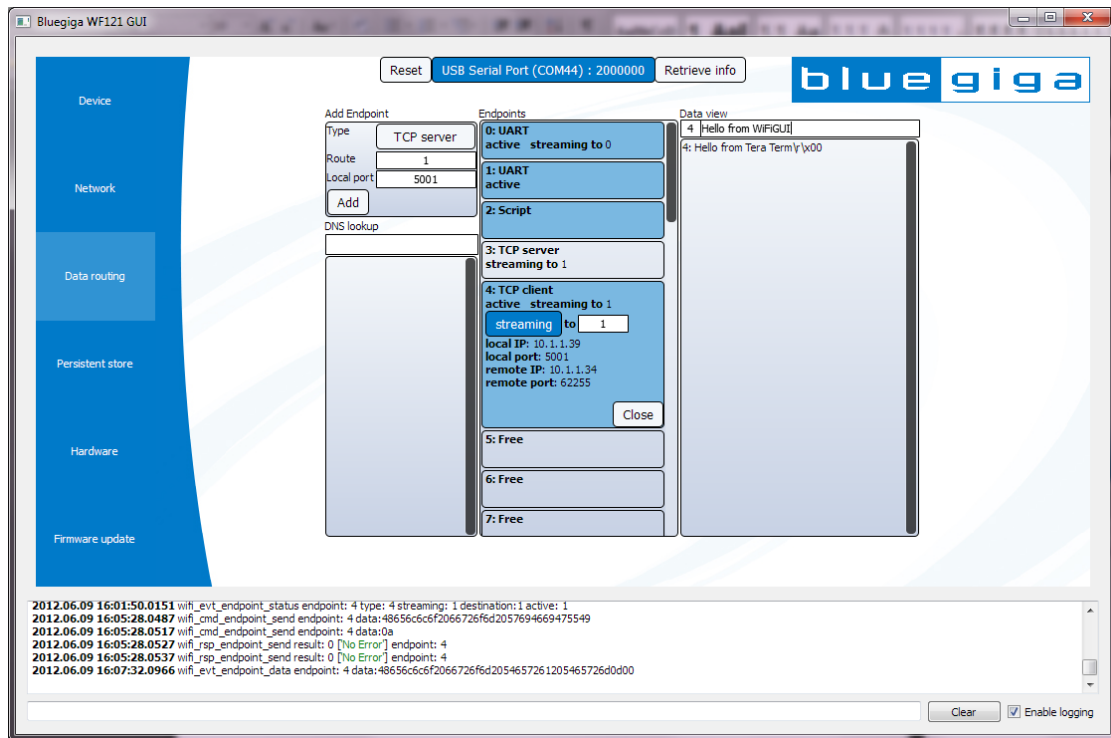
Figure 23: Receiving data at the TCP server

4.5 Closing the TCP connection

- Select the TCP client endpoint from the WIFIGUI
- Press **Close**

Note:

Alternatively the connection can also be closed from the TCP client. The endpoint will however remain open in the Wi-Fi software until the endpoint is closed also from the WIFIGUI.
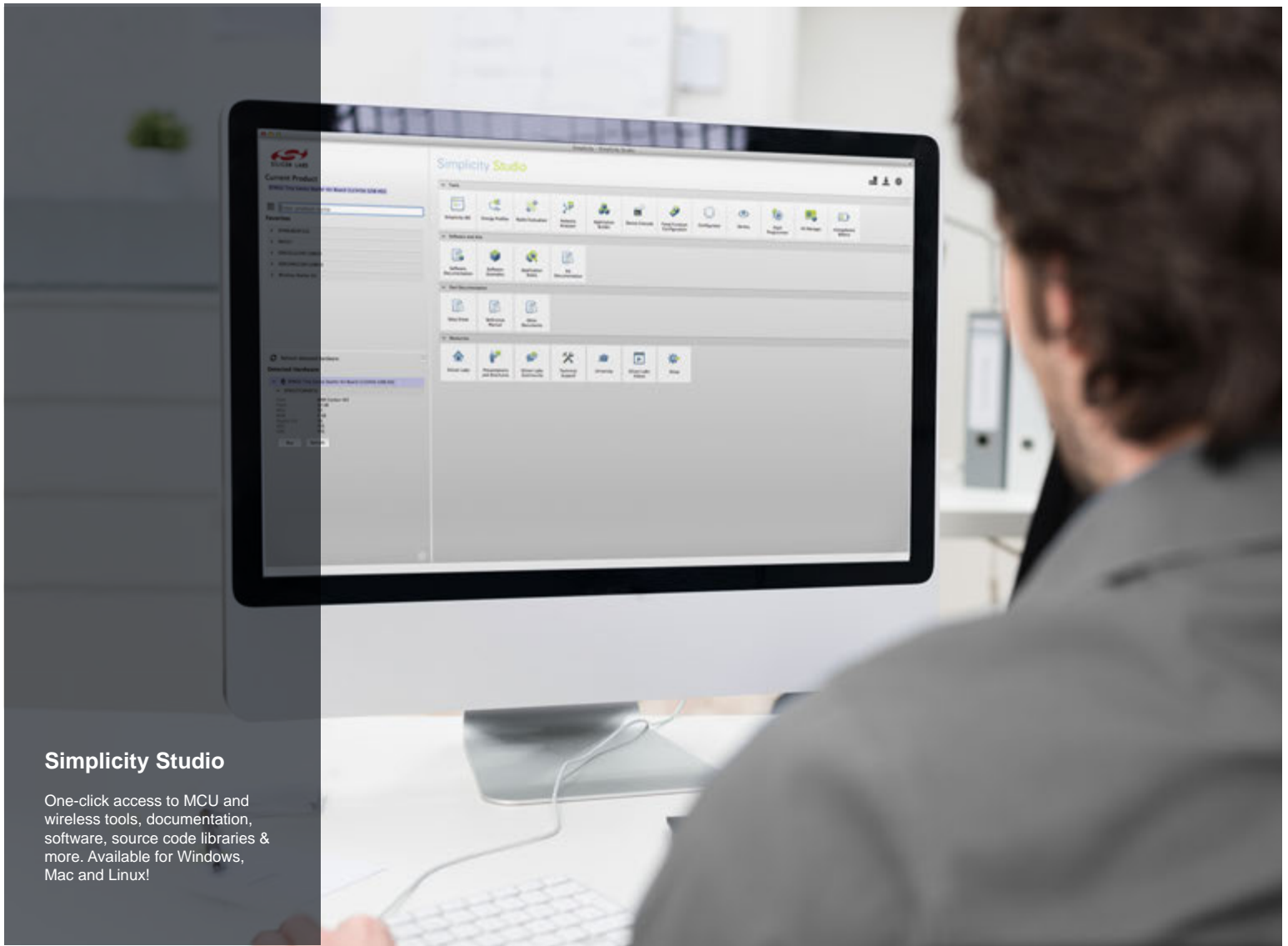
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