METRICI

LED RGB ARR DISPLAY

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1. Introduction

LED RGB ARR Display is the newest product from Metrici - an outdoor hardware device coupled with a dual-core controller that has more than enough computing power at its disposal to drive the LEDs. It is meant to manage parking lots more easily. In its smallest presentation - 34x18 cm it has 2048 independent Multi-Color LEDs that offers it a color capability of 16M and a contrast ratio of 4000:1. This automatically connects to Metrici Parking Place Detector database to extract live data from the interface – as free places, busy places and other.
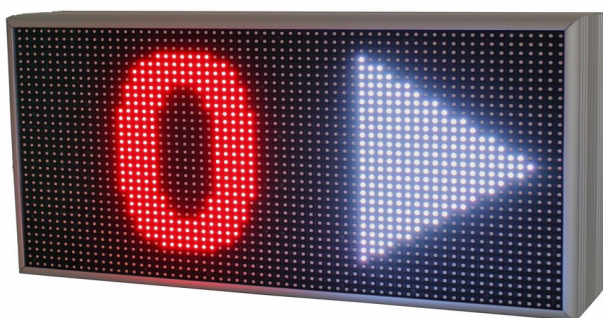
The panel is capable of brightness levels bigger than 5000 nits, offering it ample viewing angles: horizontal viewing angle up to 150° and vertical viewing angle up to 90°. Coupling it with a frame rate of 60 Hz, you can expect sharp and crisp images.

The LED Display is perfect for both outdoor and indoor usage because of its IP67 protection grade. The smallest dimensions 340x180x60 mm makes the panel easy to install and operate. It only needs a power source of 5V DC and it averages a power consumption of 0.073 kW.

2.Technical Data

No of Pixels	2048
Resolution	64x32 (pixel)
Pixel Pitch	5 (mm)
Brightness Proportion Ratio	R: G: B = 30%:60%:10%(adjustable)
Color Temperature	3,500° — 9,500° K(adjustable)
Lifetime	100 000 (hours)
Operating Temperature	-15°+55° (Celsius)
Screen Operation Mode	1/8 (scan/static)
LED Screen Protection Grade	IP65 Certificate
Case Protection Grade	IP67 Certificate

3.How does it work

The display was built as a tool for managing the parking lot and easing drivers' job in finding a free parking space. It is meant to be placed at the eginning of a parking row to show current free places for that specific row or section of a parking lot and the direction in which the free places can be found.

It can be used in any location that uses Metrici Parking Place Detector:

- a small or big open parking lot;

- a single level or multilevel parking

- an underground parking lot

The display will output the number of free parking places as they are monitored and counted by the Metrici PPD engines and interface.

4.Installation

The display features a custom-made firmware with wireless access and easy-to-use web-pages. You can set it up using any device capable of wireless communication such as a smartphone, a tablet or a laptop/PC, running on any OS.

4.1 AP Mode vs Station Mode

The display comes with two operating modes: AP Mode and Station Mode. Both modes feature their own web-pages used to make different settings. These web-pages are detailed throughout the manual.

The AP Mode's main purpose is to offer the user a reliable and secure way of making the first-time network settings, for example: assigning the Display a static IP for it to be later accessible in Station Mode.

The Station Mode is the mode in which the display will be able to output the status of free parking spaces. Beside this main functionality, it also serves multiple purposes, such as: to make the device accessible at any given time at that respective static IP and to give access to main-functionality settings of the display, like changing the brightness of the display.

You will have to go through AP Mode in order to reach Station Mode. The first part of the configuration will be made in AP Mode and the second part will take place in Station Mode.

On the first boot the display will always be in AP Mode. This mode will always be accessible only at http://109.108.112.114 . The network settings that will be made will apply only for Station Mode.

In AP Mode we can:

- create a user with a username and set a password. If set, this will be later used for authentication in Station Mode. This step is optional;

- configure the network settings. Here you can opt for a DHCP IP or a Static IP. This IP will be used as a link-local address at which you will find the Station Mode's main configuration page. Please note that the network settings will always be made to reach the Station Mode and apply only to it. This step is necessary, unless you can provide configuration files, in which case read the next feature;

- import configuration files. This gives the user the possibility of uploading configuration files, but also to download or delete them. We will detail the configuration files in the guide.

After the AP mode settings were made and the Display was given an IP Address in the local network, it will restart and go into Station Mode. This mode will be accessible with the given IP: http://GIVEN_IP .

In this mode we can:

- add or change the URL that provides the functionality of the display. This URL will make the display output the free spaces available in the parking lot. Without this URL the Display won't function as intended;

- change the interval of time at which the display checks for available free parking spaces. The display comes with a predefined value of 3 seconds;

- change the brightness of the display. The display comes with a default value of 5%;

- configure the network settings. This is identical to the AP Mode's setting and it was added to not force the user to put the display into AP Mode to change the network settings;

- import and export configuration files. Identical to the AP Mode.

4.2 Connecting to Access Point (AP)

The first step that you have to take in order to set up the panel is to connect it to a power power socket. The display was designed with a plug-and-play functionality in mind. It comes with a power regulator from 220V/230V AC to 5V DC, so you can plug it in any available power socket. When powered on the display should show like in this image

The display will show the name of the wireless network that you should connect to.

Please note that the name of the wireless network will be different on each first-boot and on every device. It will always be composed of Metrici followed by three random numbers. In this case the network name is Metrici593 .

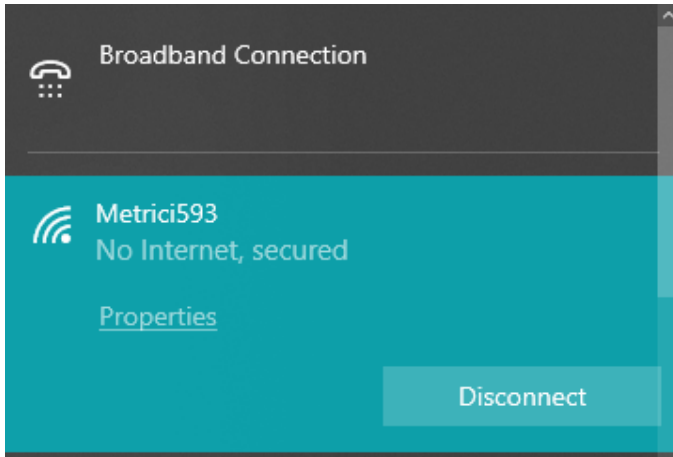 Proceed to connect to the display using a Desktop PC or a mobile device
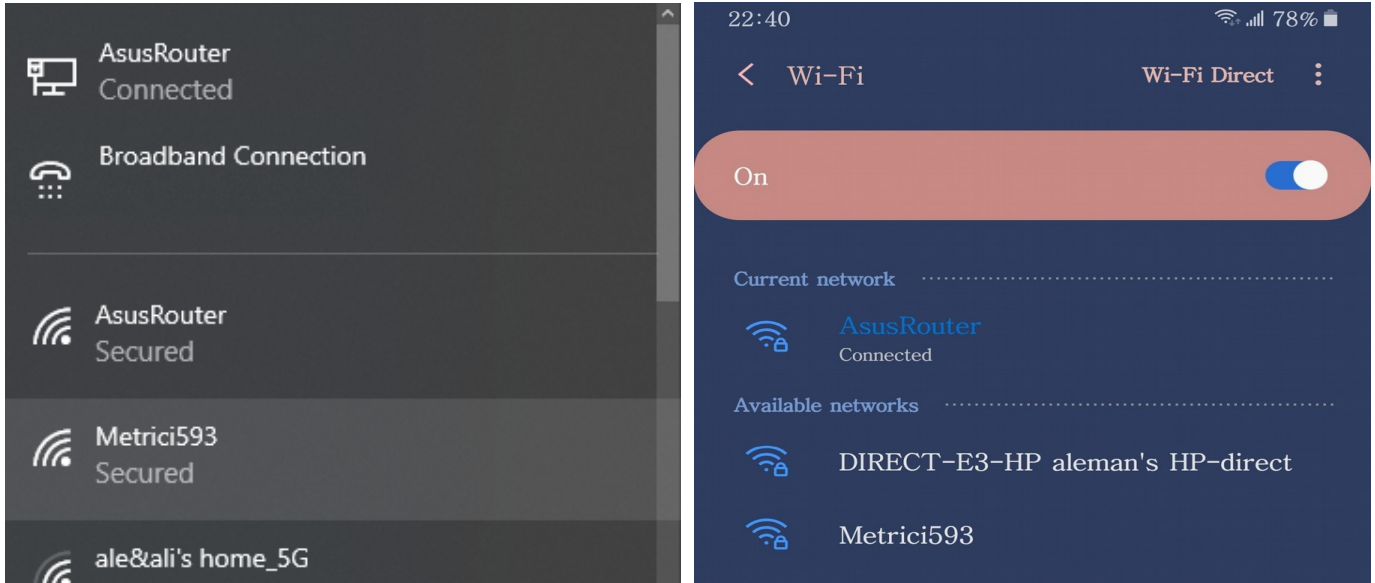
After selecting the proper network you will be prompted to type in a password. The password will always be:
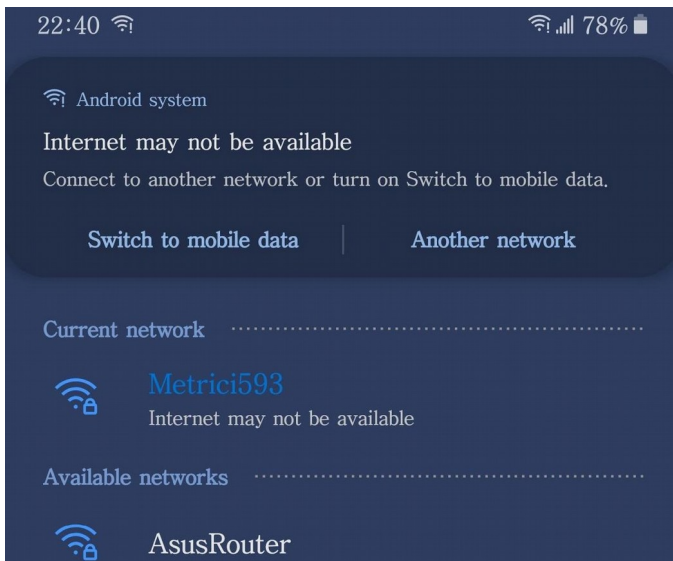
metrici@admin
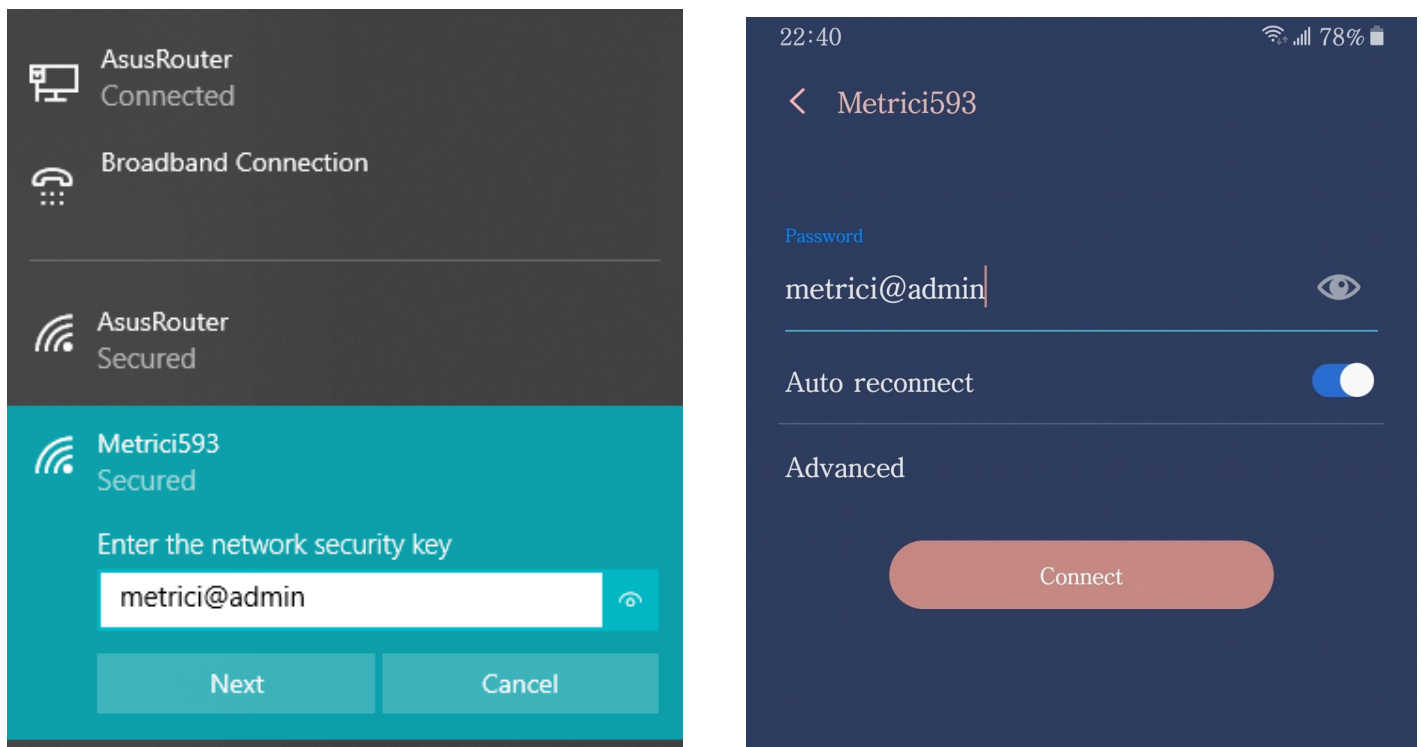
If you have entered the password correctly you will get a warning message saying that internet is not available or that there is no internet

This is perfectly normal because, technically, you aren't in fact connected to the internet. You have actually linked to the Metrici Controller that's part of the display.

Also on connection, the display will output a message like this one for 10 seconds.

NOTE! Please wait until the message disappears, as the web-page page found at http://109.108.112.114 is NOT accessible until than. Trying to access it will either return HTTP 404 Page Not Found or it will make the page load indefinitely. This is easily fixed by refreshing the web-page / browser window after the Congratulation message disappears and the Config Page message appears. As in this image.

After the 10 seconds have passed, the panel will show the IP Address which you will access and on which you will make the network configuration for the display.

4.3 Configuration

Open a browser on your device and type this IP Address- **109.108.112.114** in the address bar, hit Enter and you will be redirected to the **Configuration Page**.

As explained before, to access the AP Mode and its configuration pages you will have to go to http://109.108.112.114. This is the only address that a PPD Display will be accessible at when in AP Mode. Station Mode is accessible at the IP that the user sets up.

You need to make this configuration step so that you can connect the display to the Access Point/Router/Modem of your network and then access the URL Link that updates the status of parking places.

Upon accessing the above address you will encounter the next web-page. You can define here a **user name** and a **password** to use when accessing the Display in STATION Mode. This step is optional and can be skipped by pressing the Skip button.

The IP address set in AP Mode for Station Mode is link-local. This means that the Station Mode will work only in local network. If no user is created, the display's Station Mode can be accessed without any form of authentication. But, in order to access it, apart from knowing the IP, you will also have to be connected to the same network as the respective display. In consequence, the Station Mode is as secure as the network it is in. As a supplementary measure of protection you are offered the possibility of adding and creating a username with a password.
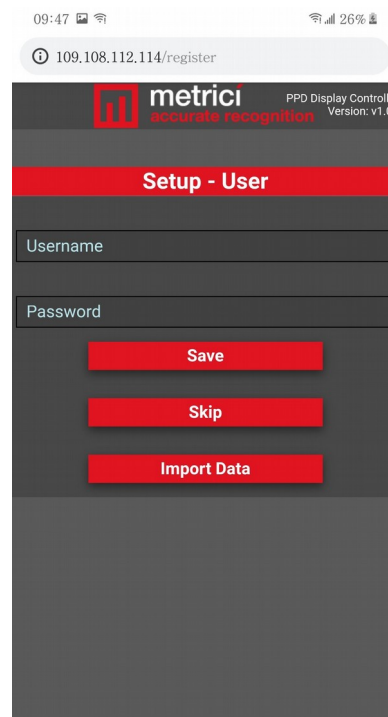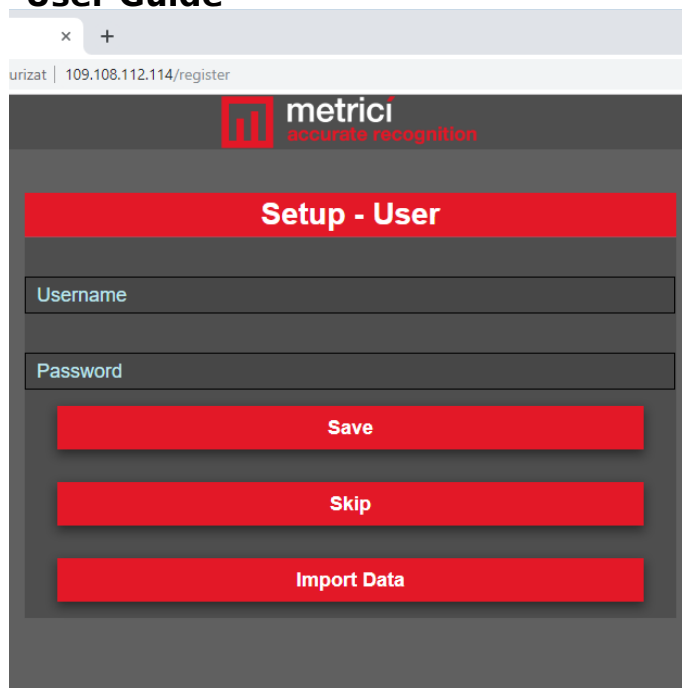
You also have the option to Import Data to configure the display. By pressing this button, you can Upload, Download and Delete Configuration Files only in .txt format.

This feature will make the process of setting up multiple displays several times faster. The feature is very useful when a parking lot has to set-up dozens of such displays because it offers you the possibility of skipping the manual configuration by uploading already-made configuration files while you are in AP Mode without having to touch Station Mode configurations.
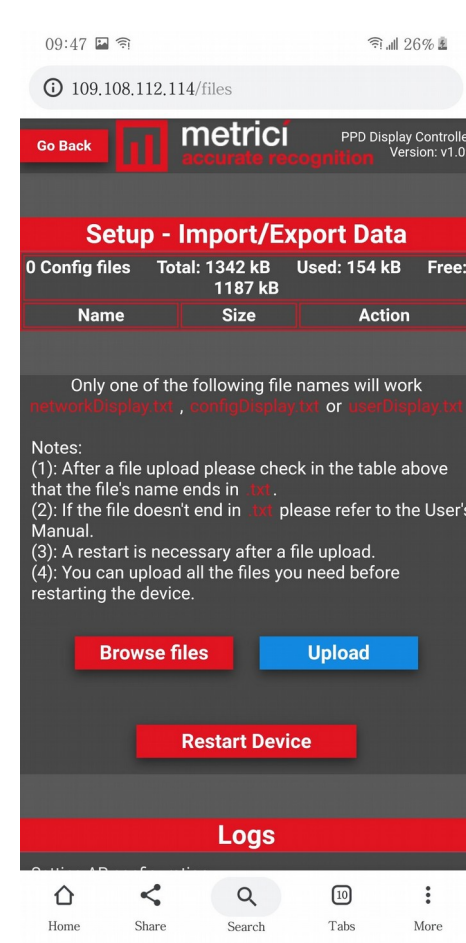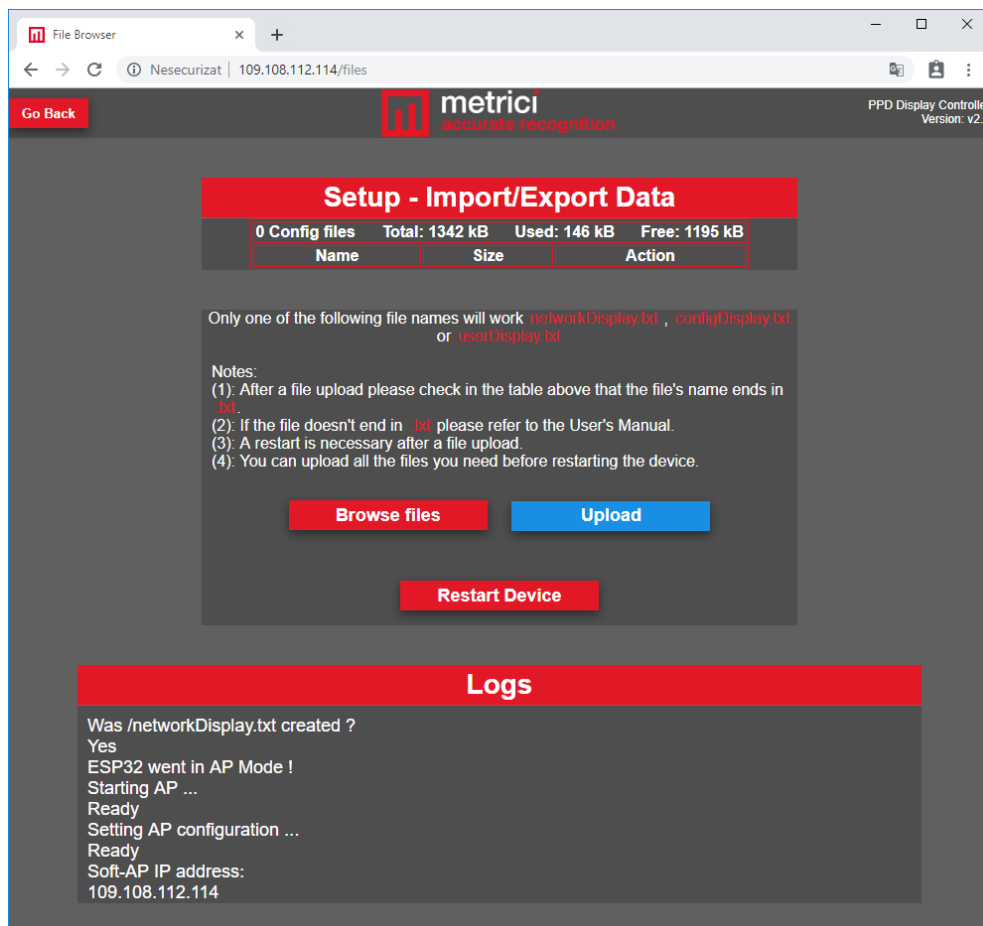
If you are setting up your first Metrici LED RGB display, then we strongly advise that you skip Importing for now and concentrate on doing a "manual" set-up as explained in this guide.

NOTE!

As the configuration page informs you, the configuration files you upload must have one of the three names: **networkDisplay.txt, configDisplay.txt, userDisplay.txt**

Desktop view   Mobile view

If the uploaded file name or extension doesn't meet the above requirements, please delete it and change its name or extension accordingly.

4.4 Upload files format

To properly create a configuration file you should first know how to fill in the data. The next images details you how the configuration files should look like. Please note that the networkDisplay refer to the local networl. UserDisplay refer to the access credentials for the display and the configDisplay refer to the settings of the display.

4.5 networkDisplay.txt format use

The networkDisplay.txt file can contain settings made for either DHCP or Static IP.

If you want a DHCP IP, meaning that the IP will be automatically chosen by the DHCP Server, you only need to complete the SSID and password for the wireless network.

Example:

> **Router**
> **password1234**

If you want a Static IP, meaning that the IP will be specified by you, then you will have to input the SSID, Password, IP, Gateway, Subnet Mask and DNS of the desired Access Point.

Example:

> **Router**
> **password1234**
> **192.168.1.100**
> **192.168.1.1**
> **255.255.255.0**
> **8.8.8.8**

Note:

Please note that the entered values must be placed each on their own row. Do not let any any free spaces in the entered values and also, do not separate the values by entering more spaces between them. As a rule, after you have entered the SSID, for example "Router", you just have to hit ENTER on your keyboard and that will send you to the next row. Here you can start typing the Password of that respective wireless network, for example "password1234", then you can stop if you want a DHCP IP or, if you want Static IP, continue in the same way with IP, then, Gateway, then Subnet, then DNS. After you have entered the desired values you have to save, close and upload the networkDisplay.txt using the above Import web-page. If your Access Point doesn't have any password, only complete the SSID and don't hit ENTER.
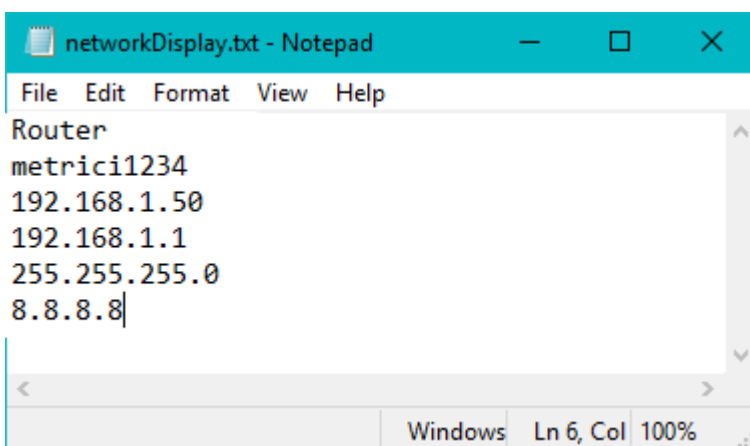
1st line: **SSID**
2nd line(*): **Password**
3rd line(*): **IP Address**
4th line(*): **Gateway**
5th line(*): **Subnet Mask**
6th line(*): **Primary DNS**

(*) are optional lines, only to be set when creating a Static IP.

As in this example

Attention! If you are trying to set up Static IP on more displays, please be careful for each display to have its own UNIQUE IP Address. No two displays can have the same

IP Address. If by mistake you set two displays with the same IP, none of those displays will be accessible and you will have to RESET one of them.

4.6 userDisplay.txt format use

The userDisplay.txt will have to include the Username and Password for that display to be accessible. As we have mentioned above, creating a user is an optional feature. The entered values must be placed each on their own row.
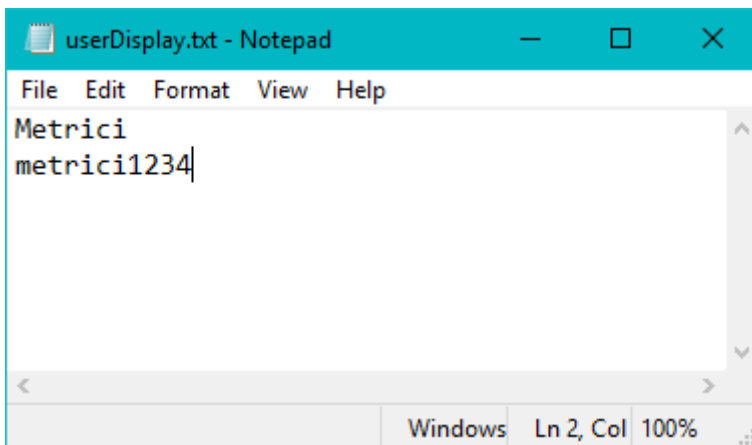
1st line: **Username**
2nd line: **Password**

As in the adjacent example

4.7 configDisplay.txt format use

The configDisplay.txt will have to contain the URL, the URL refresh rate (the interval of time at which the display checks for available free parking spaces) and the brightness of the screen. The entered values must be placed each on their own row.
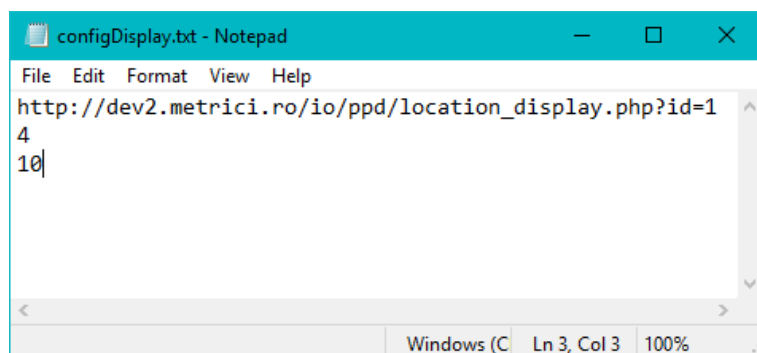
Example:

> **http://dev2.metrici.ro/io/ppd/location_display.php?id**
> **4**
> **10**

Attention! This URL – taken from Metrici Interface will usually provide information regarding just one row of parking spaces. This means that each display will have its own unique URL. So for that you will have to configure groups for the rows.

1st line: **URL**
2nd line(*): **URL Refresh Rate** in seconds
(default: 3)
3rd line(*): **Brightness in percentage**
(default: 5)
(*) are optional lines, because these fields have default values

For the changes to apply, after uploading a file or multiple files, you have to restart the display by pressing on **Restart the Device** button.

If you choose to use the import feature only for the networkDisplay.txt then you will have to press on the **Restart the Device** button. By doing this, you can skip ahead to reading Station Mode chapter.

If you choose to upload more configuration files such as networkDisplay.txt and configDisplay.txt and the entered values are correct, then you can skip ahead to the end of the guide, because the Display should work without fault.

4.8 Display IP Address

If you are setting up the first display or you chose not to load files, keep consulting this guide.

Whether you press Save or Skip you will be redirected to the next page that gives you the choice of the IP Address that the display will have. This IP Address will be used to access the STATION Mode just like we are accessing the AP Mode, through web pages.
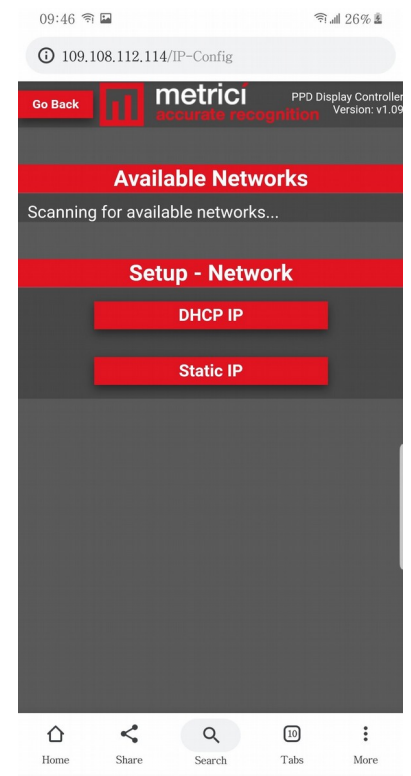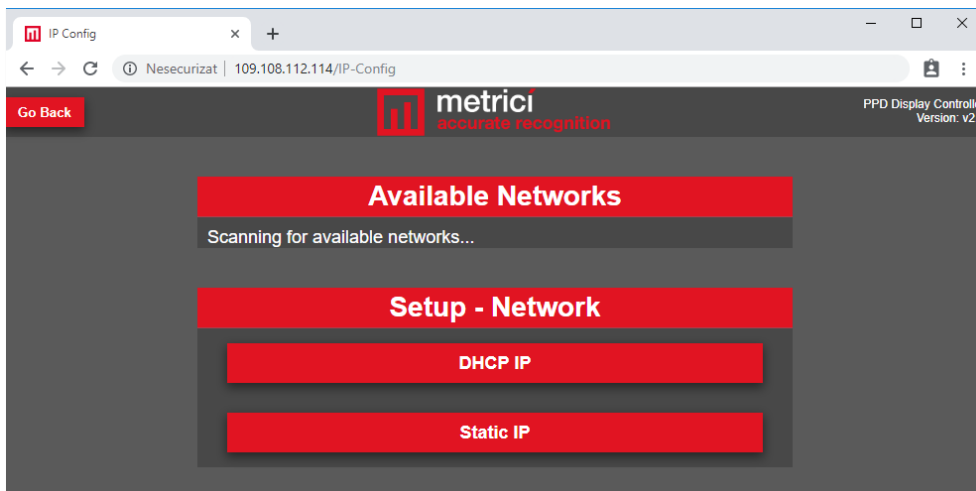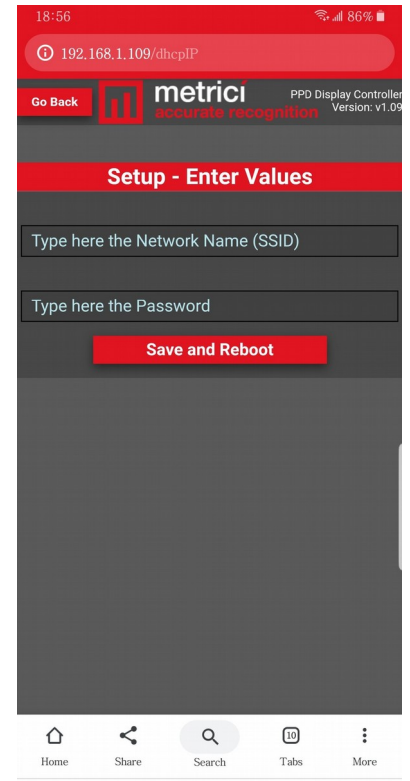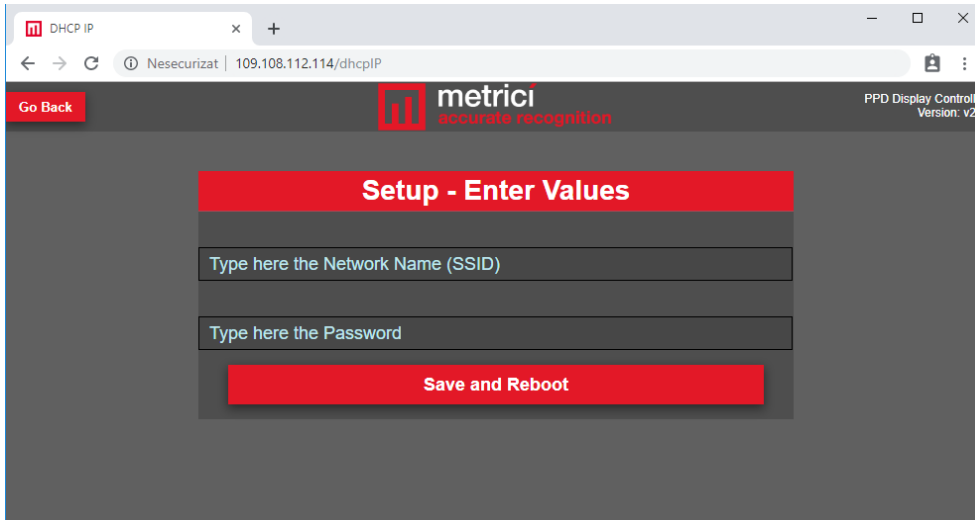

4.9 DHCP MODE

The DHCP IP option is straightforward: you will have to enter the SSID and Password of the Access Point/Router/Modem of your local network to which the display will connect to.
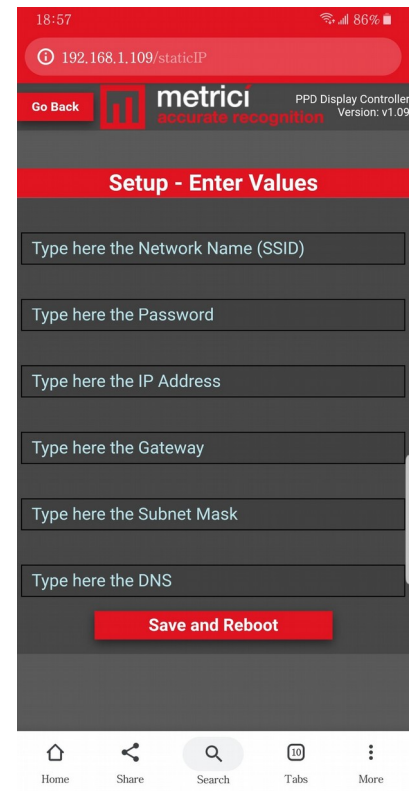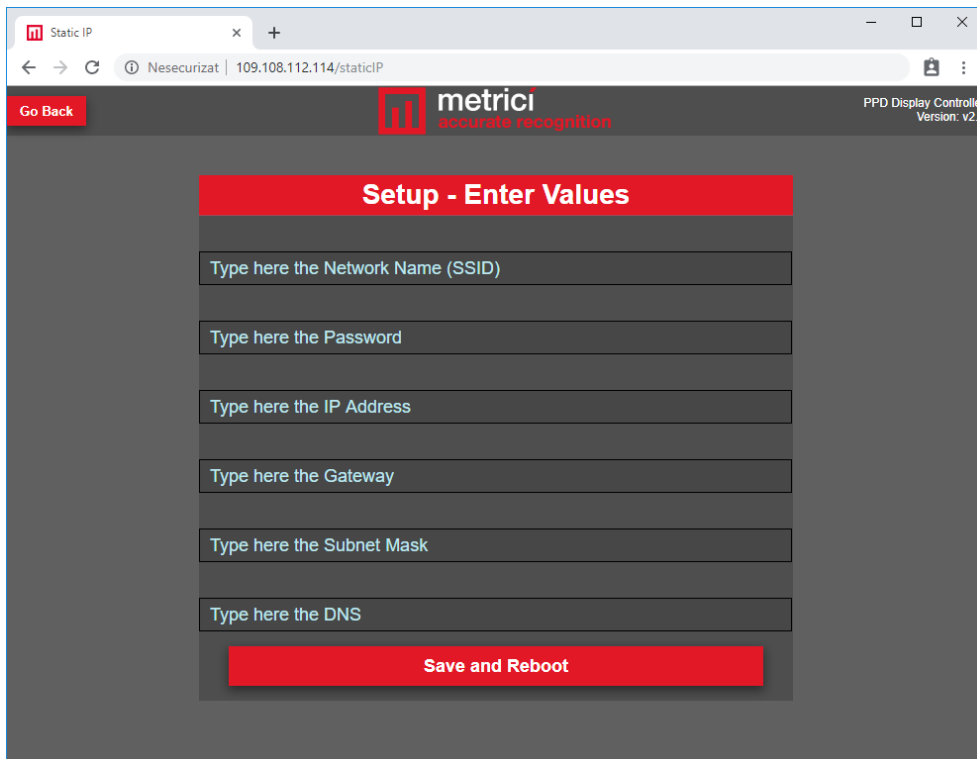
4.10 Static IP

On the STATIC IP configuration page you will have to complete the 6 network configuration fields

You are almost finished with the AP Configuration. You just need one more step. To **save and reboot** the device.

When pressing Save and Reboot on either DHCP or STATIC IP configuration pages the Display will save the authentication info that you've typed in and will begin its 5 seconds restart sequence.

NOTE! Upon restarting the LED Display will flash but it is supposed to and do not worry about it.

You have now finished configuring the AP Mode and are prepared to enter the STATION Mode of the display where we continue setting up the display.

5. Connecting to STATION MODE

After the restart, the display will boot in **Station Mode** and it will greet you with a message as in the next image

NOTE!

If a power outage occurs after you have completed the settings correctly and the display starts functioning, showing free parking spaces and their direction, this Home Page message will not be shown when the displays powers up again.

The display will use the stored info of the settings and will try to connect to its Access Point/Router/Modem. Upon 20 failures (made in 20 seconds) it will restart and try again and again until the Access Point is working and a connection is done.

If the previously entered values were incorrect and the Display did not manage to connect to the specified Access Point the Display will output 2 errors:

(1) Could not access Wireless Network ! WiFi Router/AP is down !

(2) SSID or Password Incorrect ! Press the RESET button and enter AP Mode to reconfigure !

These errors will appear only if any of the network settings was wrong and the display could not connect to the desired Access Point. This can happen in one of the following cases:

- if input values were wrongly introduced/written when using the web-pages

- if the uploaded networkDisplay.txt was badly constructed or any of the written values were incorrect or typo were made

Both error messages will be shown:

NOTE! Just like with the Home Page message, these errors will be displayed only if URL was not set. Else you will only be able to see just the first (1) message in Logs.

5.1 Communication with the Metrici interface

The display needs a URL to actually work as it was intended to, so before accessing the configuration page you will need to get that URL from Metrici Interface.

Or you can go to IP_OF_YOUR_SERVER, navigate the left-side menu of Metrici Interface and select Parking Place Detector -> Settings -> Locations & Cameras.

For each group you create in the location, Metrici will autogenerate an URL which you will copy in the display asssigned to show information for that particular group/row/section of the parking.

Press the Edit button for that group and a new page opens where you write the Display Text (explained below). This text tells the display what info to show. The color codes explained in Metrici Inerface will **NOT** be used for this type of display as they won't work. You will only use the codes from this chapter.
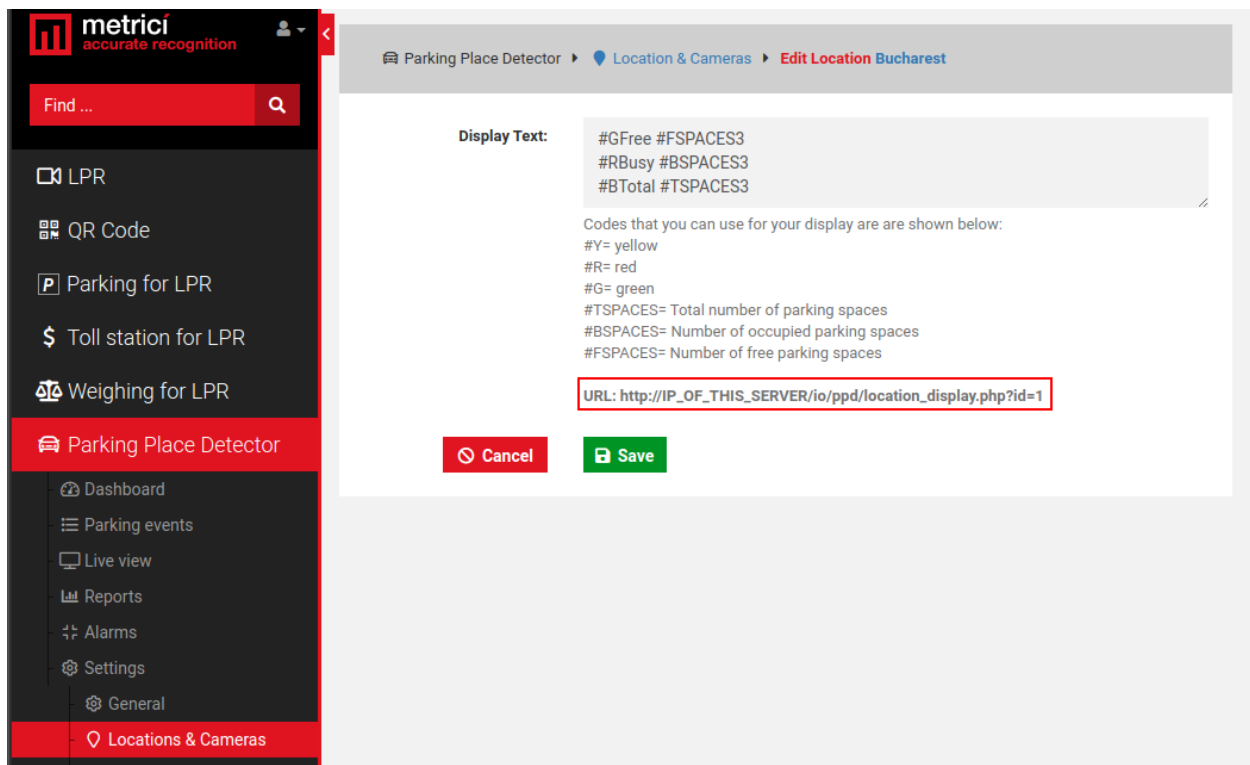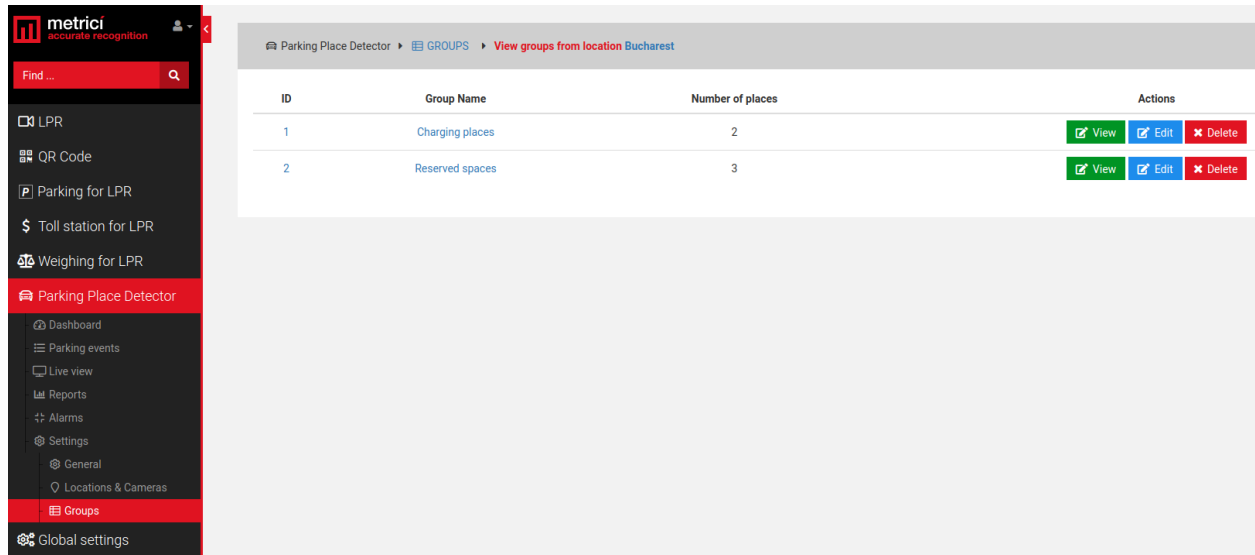
For the group you setup press Edit button you will get a page in which you can enter the Display Text. As the name suggests, this is the place the displays accesses to get the information about free places and direction of those free places

The Display Text is composed by the script provided by Metrici PPD (ex. #FSPACES2) and the combination of a hashtag sign (#) with an arrow sign.

The last character-a numeral indicates how many characters are to be used to display the information. For example #FSPACES2 will display number of free places up to 99 and #FSPACES3 will display number of free places up to 999.

In this version of the software only number of free spaces will be delivered and displayed.

Available arrows:

- The right arrow: >

- The left arrow: <

- The up / ahead arrow: ^

- The down / behind arrow: v / V

All possible combinations of the arrow signs and the hashtag:

#>, #< , #^ , #v , #V

There is no difference between the small v and the big V. They both output the same design, namely the down arrow.

The elements inside the Display Text can only be positioned in two ways. Depending on where you position the code, the arrow will be placed and displayed accordingly on the LED Display.

1. If first comes the script provided by Metrici PPD (ex. #FSPACES2) and then the hashtag and the arrow:

#FSPACES2#>
then the display will output the number on its left-side and the arrow on its right-side, as in

35>
2. If first comes the hashtag and the arrow and then the script provided by Metrici PPD as in

#<#FSPACES2
the arrow will be placed on the left-side and the number on the right side, as in

<35

Please note that the hashtag sign MUST always precede the arrow sign no matter where the arrow is positioned. Not following this rule will result in the display not outputting the desired text.

In another example, #FSPACES3#^ will show on the display a text such as 341^, where 341 in our example represents the number of free places for that group in that moment – information retrieved live from Metrici database for the group the display is assigned to .

Each screen will display the number of available parking spaces for only one row/group and in only one direction. You won't be able to cycle between rows/groups or directions.

Copy the URL from Metrici Iterface as in this example
http://IP_OF_THIS_SERVER/io/ppd/group_display.php?id=2 and hit Save. The display in which this URL is copied will display the free places for the group with the ID 2 in our example.

Each group you create in Metrici Interface will have its own ID. For more details of how to create groups please refer to Metrici PPD user guide. So for a display to show free spaces for a row, you will have to first create a group for the parking places in that specific row.

5.2 Display Home Page

Now, back to the setting up the Display: if the network authentication info is correct and the Display is connected to the desired Access Point, you can now access whatever IP Address you have on the Display, be it a STATIC IP or obtained via DHCP.

If you have created a Username and Password when in AP Mode, upon accessing the address you will be prompted to type them in:
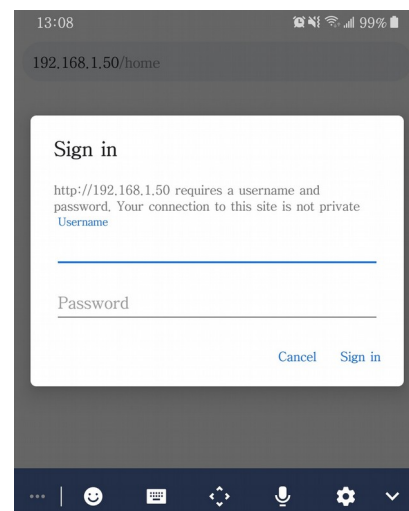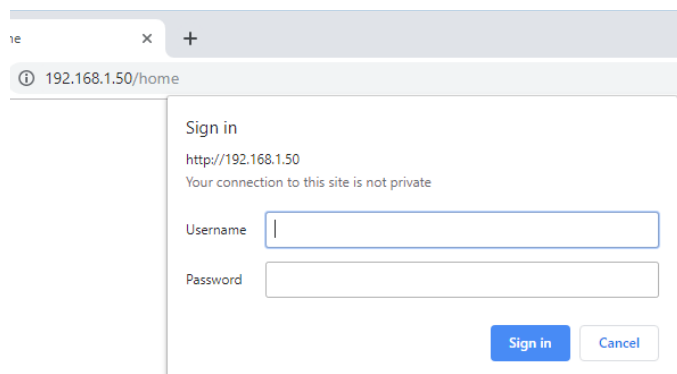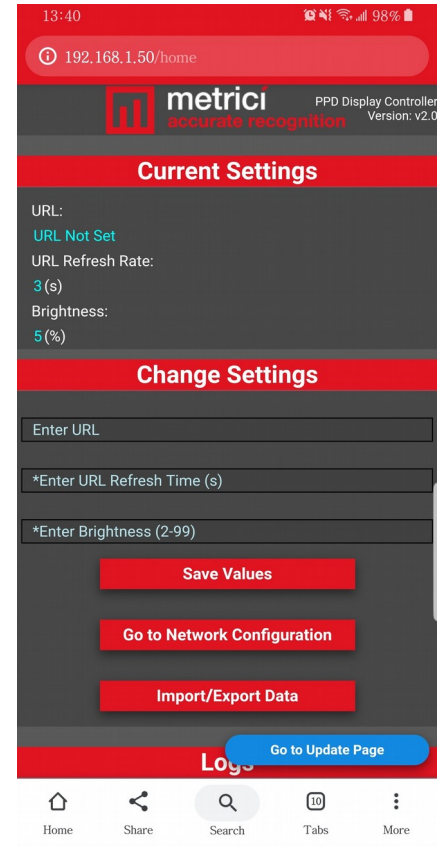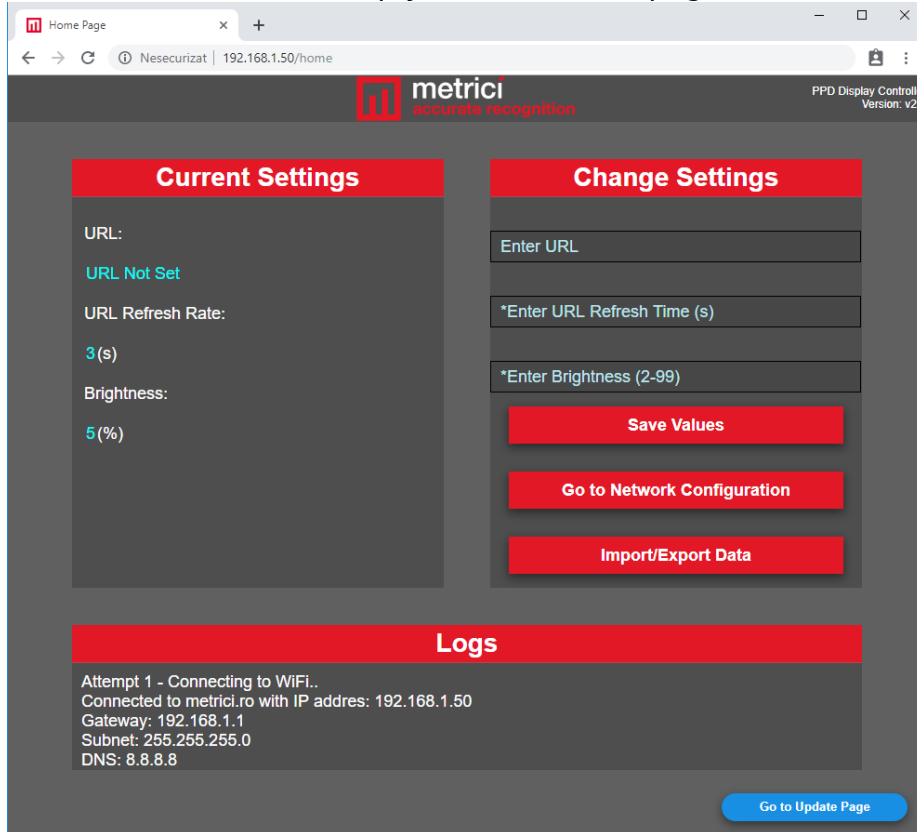
If you introduce them correctly or if you've chosen not to create a Username and Password you will be redirected to the **Metrici PPD Display Home Page**.

In this next step you will find the page that will allow you to set up the

display. It will let you change the URL, customize the URL Refresh Rate and the Brightness. It also has real-time Logs.

By default the URL Refresh Rate is set at 3 seconds and the Brightness is set at 5%.

The Logs present you with a possibility of viewing significant events. They are not stored and will be overlapped by newer events.
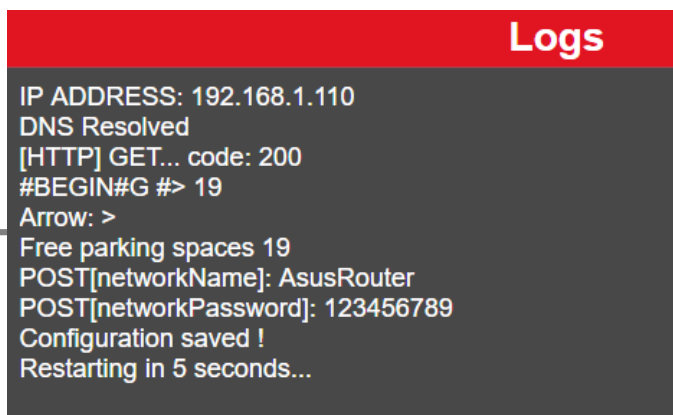
Example logs

5.3 Import/Export Setting files

Metrici lets you import or export configuration files and also to Update the device's firmware.

Import and export work in the same way as presented on first pages. You will be able to Download, Upload and Delete settings files.

You can also download settings files in order to use them for further installs or other LED displays or to create a back-up before an update.

Please note that you can't use the same configDisplay.txt on two displays. Each display must have its own unique URL from Metrici and a unique IP. You can however keep the template (that includes URL, Refresh Time and Brightness) and edit the URL for each of the display that you want to set up.

Also, you can use networkDisplay.txt for more than one display only if you want those displays to use IP Addresses allocated by the DHCP Server and only if they will connect to the same Access Point. If you plan on using Static IP, we suggest to create another networkDisplay.txt or use the appropriate web-pages to configure the network settings.

If you choose to change the settings by Uploading one or more settings files please note that the settings will take effect after you restart the device. You can do that by pressing on the **Restart Device** button.

Uploading a file with the same name and extension like the ones that are already present on display will replace the existing ones and changing the settings with the new ones. This will also need a restart

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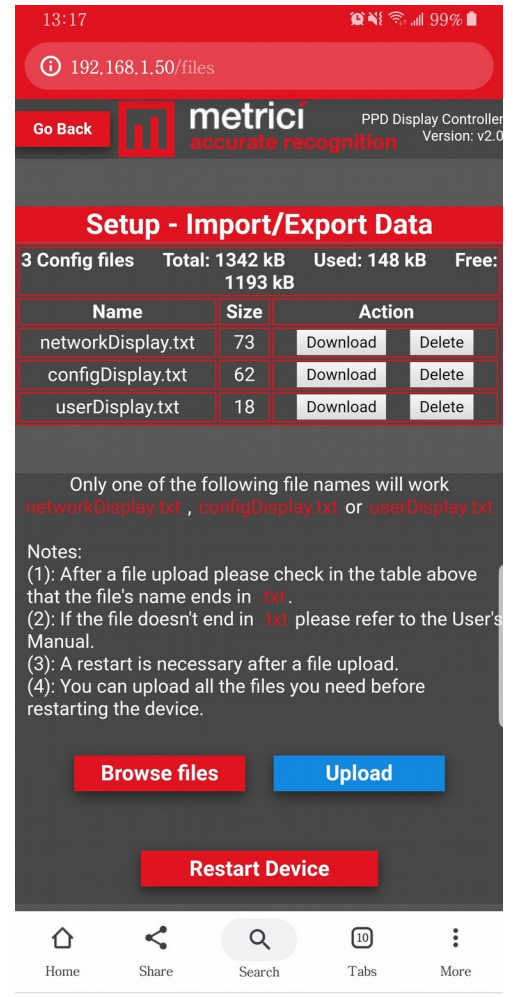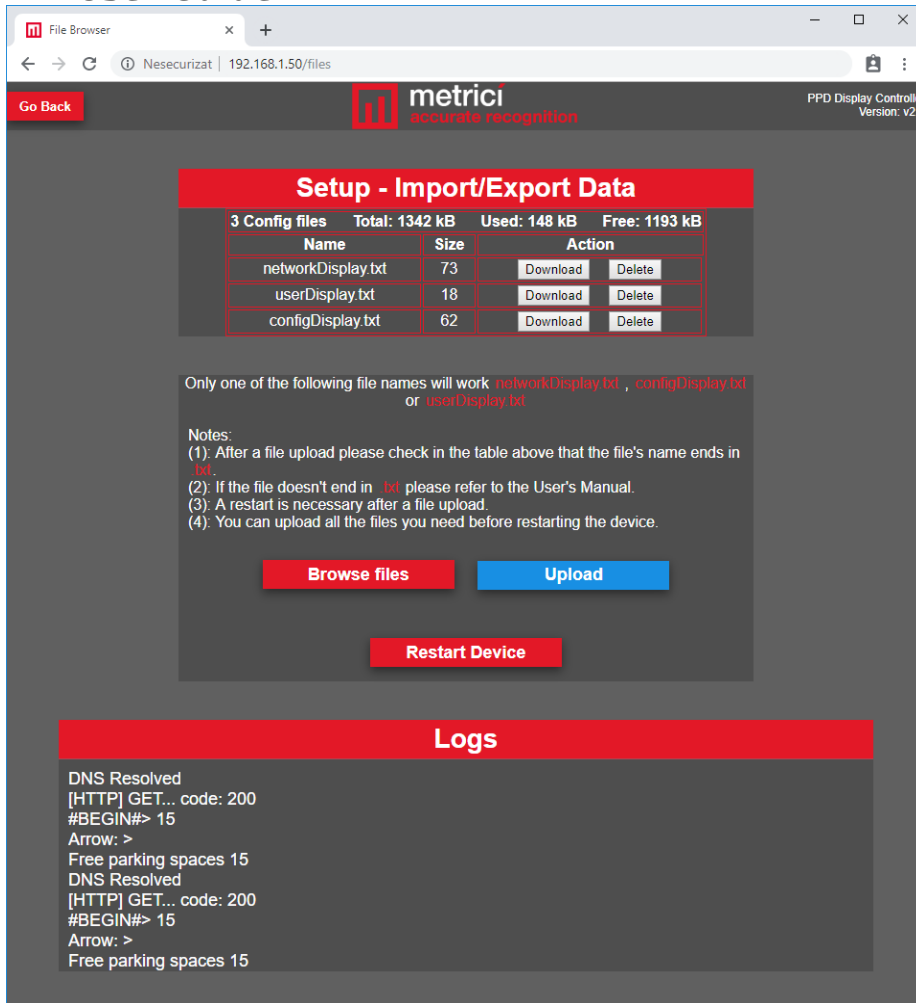
You also have the possibility to change the Network Settings from Home page. Just press **Go To Network Configuration** button and you will be redirected to the same page as the one in AP Mode.
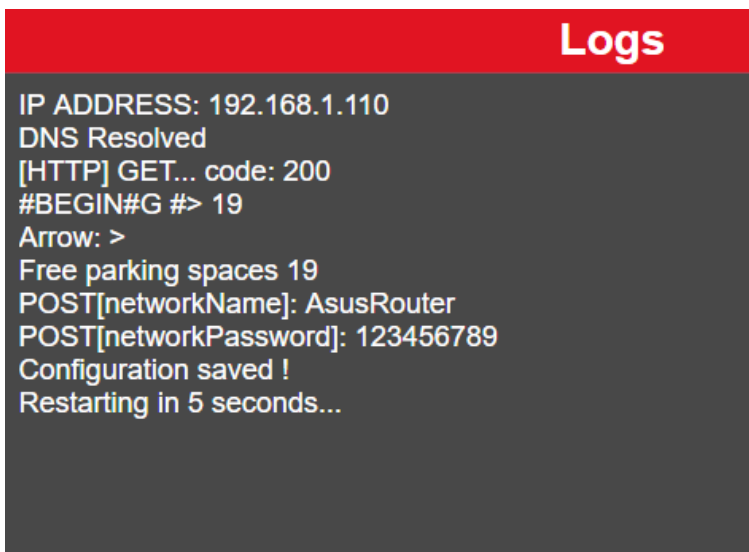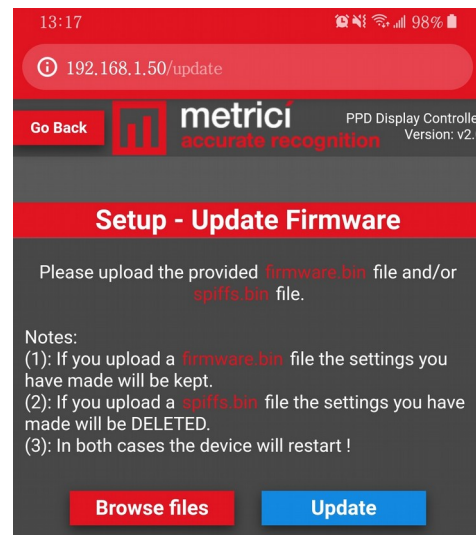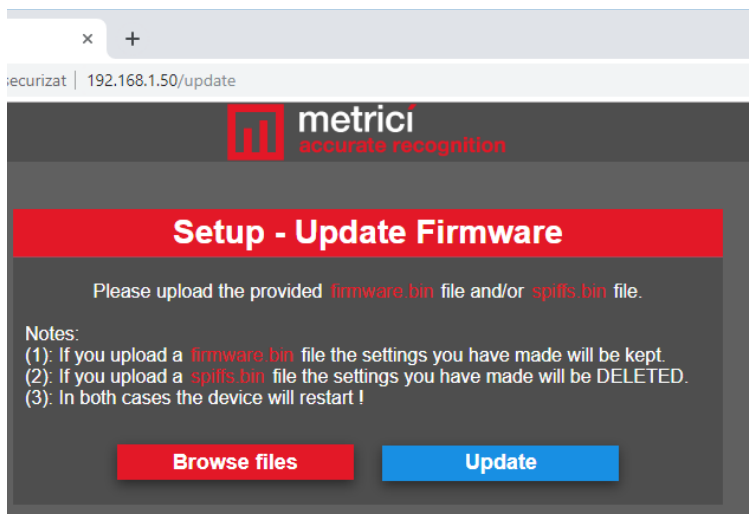
Upon entering new values and clicking **Save and Reboot** the display will begin it's 5 seconds restart sequence.

On boot it will try to connect to the desired Access Point/Router/Modem using the new network credentials.

5.4 Update firmware

One feature that is only available in STATION Mode is the **Update** Page.

Here you will be able to update the firmware of the device. The firmware.bin and spiffs.bin files will be provided and founded on support.metrici.ro.

On this page go to firmware folder and browse for the firmware.bin, download and hit Update. The device will then restart and continue its normal activity, because the previously made settings will not be disturbed. Metrici also provides a spiffs.bin file. Updating spiffs.bin will delete any saved settings and you will have to set-up the display again. In this case we recommend downloading/exporting all of the settings files that are available on the File Browser page before updating spiffs.bin.

The spiffs.bin update process should follow the next steps:

- First, browse for the firmware.bin file, select it and hit Update. The device will restart and resume its normal activity.

- Secondly, if you've been provided with a spiffs.bin file, we recommend to download/export all of the settings files that are available on the ==File Browser== page. Afterwards you will have to return to the Update Page and browse for the spiffs.bin file, select it and hit Update. This will restart the device and delete all of the settings files.

- Finally, you will have to connect to the device's AP Mode, just like a regular set-up and set it up again or upload/import the previously saved settings files and restart the device by hitting the Restart Device button.

You should now have a working Metrici PPD Display! If you followed the instructions correctly you will have in your browser a result similar to the next images.
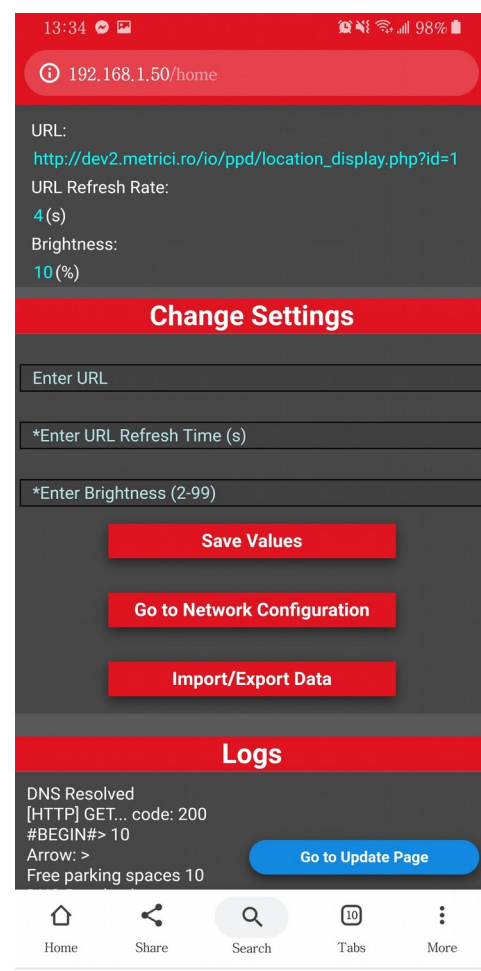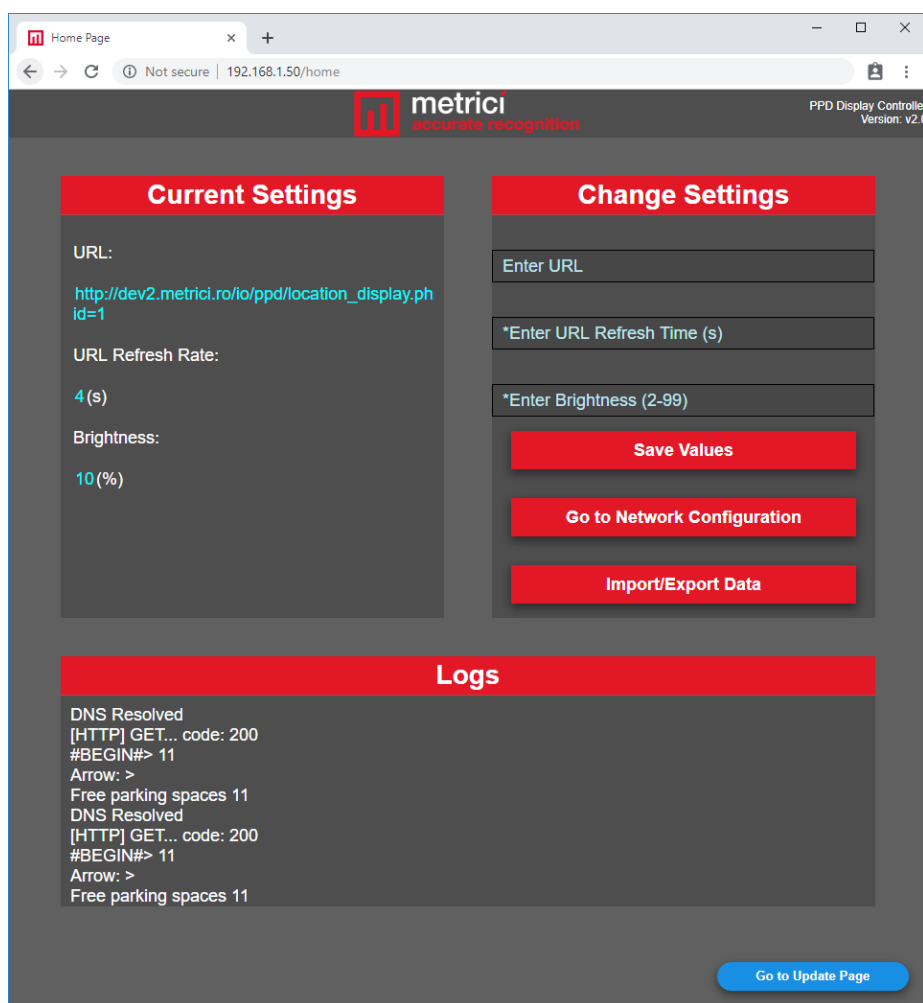
5.5 Factory reset

The Display also features a **Reset** button. Be aware that resetting the display will delete all the settings you have made and return the display to the factory settings. Use the factory reset button only if you want to delete the settings.

To reach the Reset button you will have to unscrew the 4 Phillips screws that hold the back-plate.
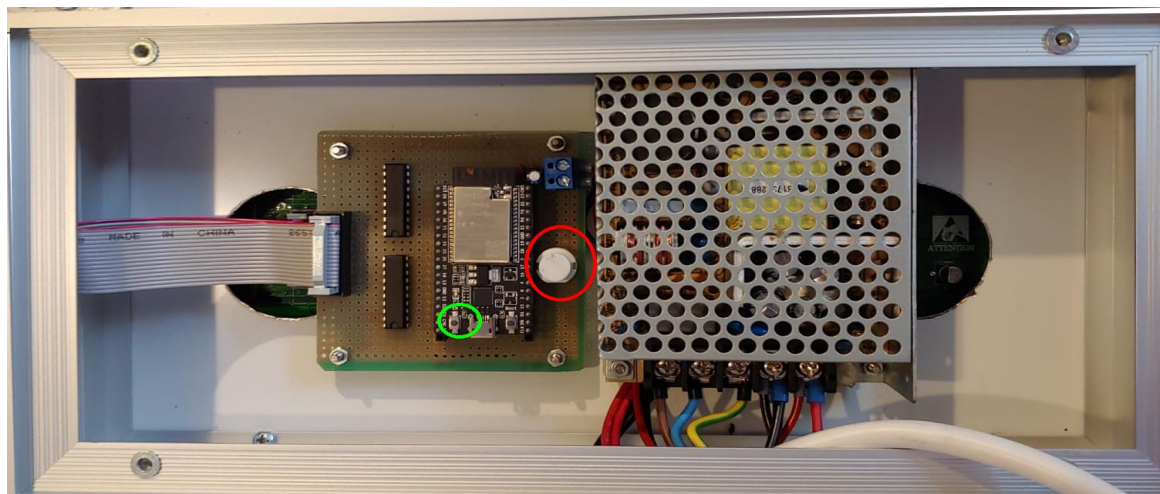
To reset the display to its factory setting, unplug it from the power source, push the reset button and keep it pressed while plugging the display back to power. Wait until it outputs the following message and stop pressing the button.

Reset button was pressed ! AP will start momentarily

The factory reset button is the white one, circled with red in our example image.

5.6 Reboot

If the displays needs a little refresh and a restart, but plugging and unplugging it didn't to the trick, you can find a little button on the Metrici controller inside the case, named **EN or RESET**. Press it once and the Display will reboot without deleting any information you have stored.

The reboot button is the little one, circled with green in our example image.