Manual for the KWMATIK interface

Model: PRO-MYK V1.11

protocol: ART-NET versions 1-4

instruction version: 1.01

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1. Preface

Models starting with the **PRO-MYK** name are new ETHERNET / DMX512 type interfaces based on the ART-NET protocol. ART-NET protocol (DMX512 OVER Ethernet) like known from industrial automation MODBUS TCP can be sent in the stream computer network data. Thanks to this, the popular ETHERNET standard is parameter carrier controlling lighting on a much larger scale than a single range of 512 channels as in a typical DMX512. In the data stream Ethernet such 512 channel ranges, called Universe can be a lot more than using traditional serial interfaces such as OPEN ENTTEC USB.
The number of Universe's depends on the version of the ART-NET protocol (the latest is No. 4).

The **ART-NET** protocol can be sent via cable (copper oroptical fiber) and radio (WI-FI). Thanks to this, network interfaces based on this protocol does not require installing drivers. To observe the frames of this the protocol uses well-known and popular network tools such as: WIRESHARK, TCPDUMP, TSHARK, etc. The last version number 4 is from 2016 and can handle up to 32768 Universe's, it's open and free of charge, thanks to the number DMX512 applications compatible with it are huge, larger than for the OPEN standard ENTTEC. The UDP protocol (User Datagram Protocol → UDP) is used to transfer ART-NET frames on port number 6454 . On this port there is ART-NET devices listen and send messages to control applications. Therefore, it should be unblocked on the firewall. The DMX512 application is set up Universe number and that the data will control the lighting through the XLR-3 connector (xlr-5) the same Universe number must be set on the PRO-MYK interface.

DMX512 - the standard of digital network communication most often used in lighting control systems (dimmers, moving heads, stroboscopes, scanners, reflectors, lled walls, etc.) and stage effects (smoke generators, confetti launchers) at concerts, theaters, etc. The control takes place usually from the level of the control console of the producer. The standard was developed in 1986 by the American Institute of Scenic Techniques (USITT). It was not until 1990 received the name DMX512. The signal is sent via the RS-485 bus , practically 2 wires on which the states are opposite, i.e. it is differential transmission. Electrical standards are the same as for the RS485 standard . The ground cable is not necessary because the information carrier is the difference

the potential between the Data + and Data-cables. The maximum number of devices in one the line is 32 units without the use of a signal amplifier. However, you can increase it system capacity by dmx512 splitters .

2. Construction of the interface

PRO-MYK - the interface of the KWMATIK company, whose main task is receiving ART-NET frames from ETHERNET, processing them and delivering them to XLR-3 jack typical for DMX512. It is powered by 5V / 300mA

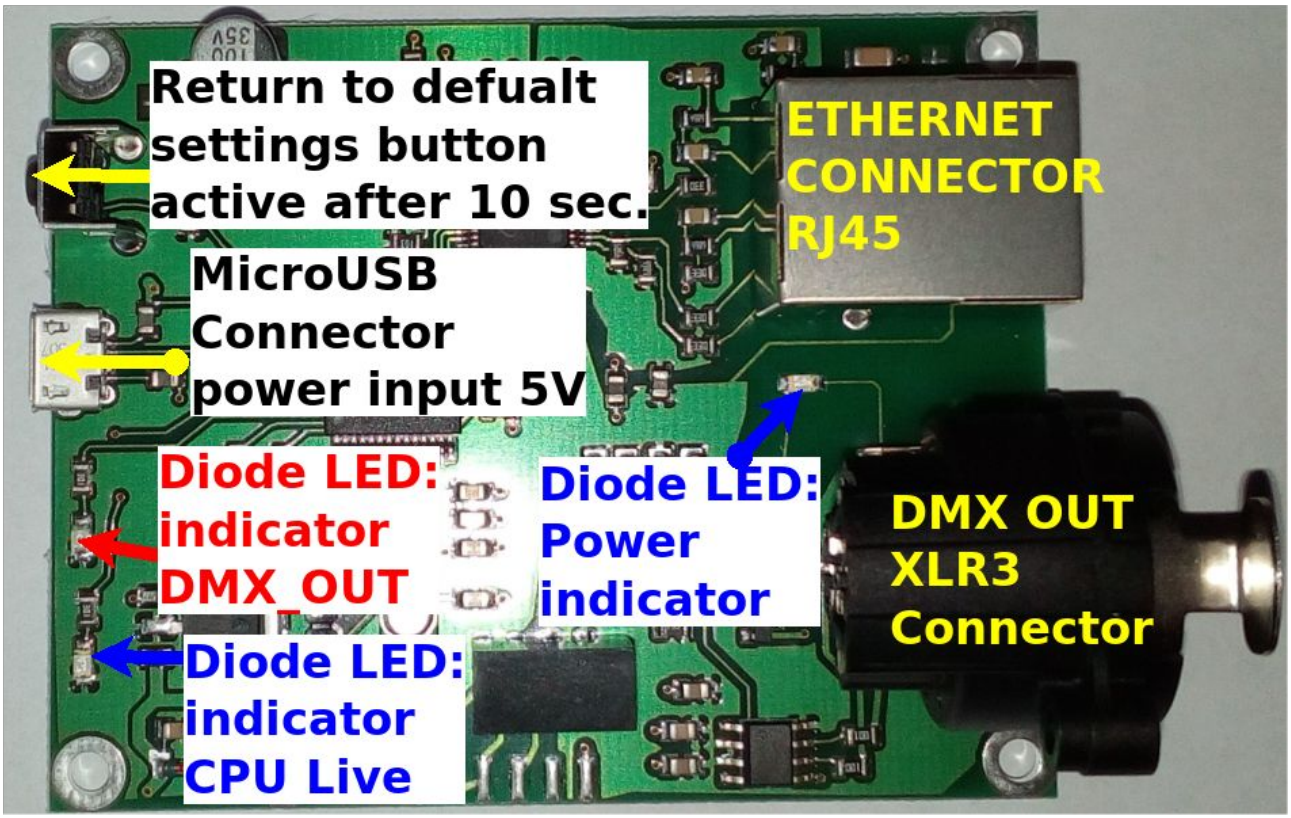

Fig. 1: Layout of LED diodes ,button and connectors

The PRO-MYK v1.11 interface is a device that has internal software for the implementation of the ART-NET / DMX512 converter function. The software is written in C language without using the operating system.
Internal software controls 32bit processor and 10/100 Mbps network card. The j3 (RJ45) connector is sliding for connecting an Ethernet cable from where ART-NET data is downloaded, after processing and comparing to the right Universe number they get to the j3 connector (XLR-3), UNiverse compatibility shows LED D1: DMX_OUT. LED D2: LIVE informs about the operating status by flashing: slow flashing (2x per second) is work devices without an active Ethernet connection, faster (about 3x per second) follows after checking the connection and assigning the IP address. No flashing LED CPU LIVE with lighting of LED POWER is a sign that the processor is not working or is damaged. LED (PWR) informs about connected power via J2 connector (MICRO-USB) and operation of an isolated converter for the DMX512 bus part (This part is separated from the rest of the device by opto-isolation).
To restore the factory settings, press and hold the button MK1 over 10 seconds.
All sockets and the button are mounted on a double-sided printed circuit board with metallization (metallization is a metal sleeve connecting the top layer of tracks with the bottom) what prevents the breaking of such joints.

3. WWW configuration page

Internal software (firmware) on a standard www port 80 displays the page configuration with IP address192.168.1.22 (mask 255.255.255.0 , MAC ADDRESS: 00-08-DC-29-4C- 7F, uses only IP addressing V4.0)

The Pro-Myk interface has built-in website configuration (similar to typical home routers). Preferred web browser is CHROME (FIREFOX also). On this page, in addition to the settings Ethernet can be set parameters concerning itself DMX512:

• **ART-NET Universe:** number "world" in which it will be operated, every UNIVERSE there are 512 channels. For each interface setting another ART-NET Universe (remember that you must change the final one MAC address octet to avoid conflict)

• **MAB (MARK AFTER BREAK)** -duration of the level high after finishing time BREAK,the minimum is 8uS

BREAK – duration low level amounting to minimum 88uS , BREAK and MAB signals are used to detect begin of Dmx512 frame.

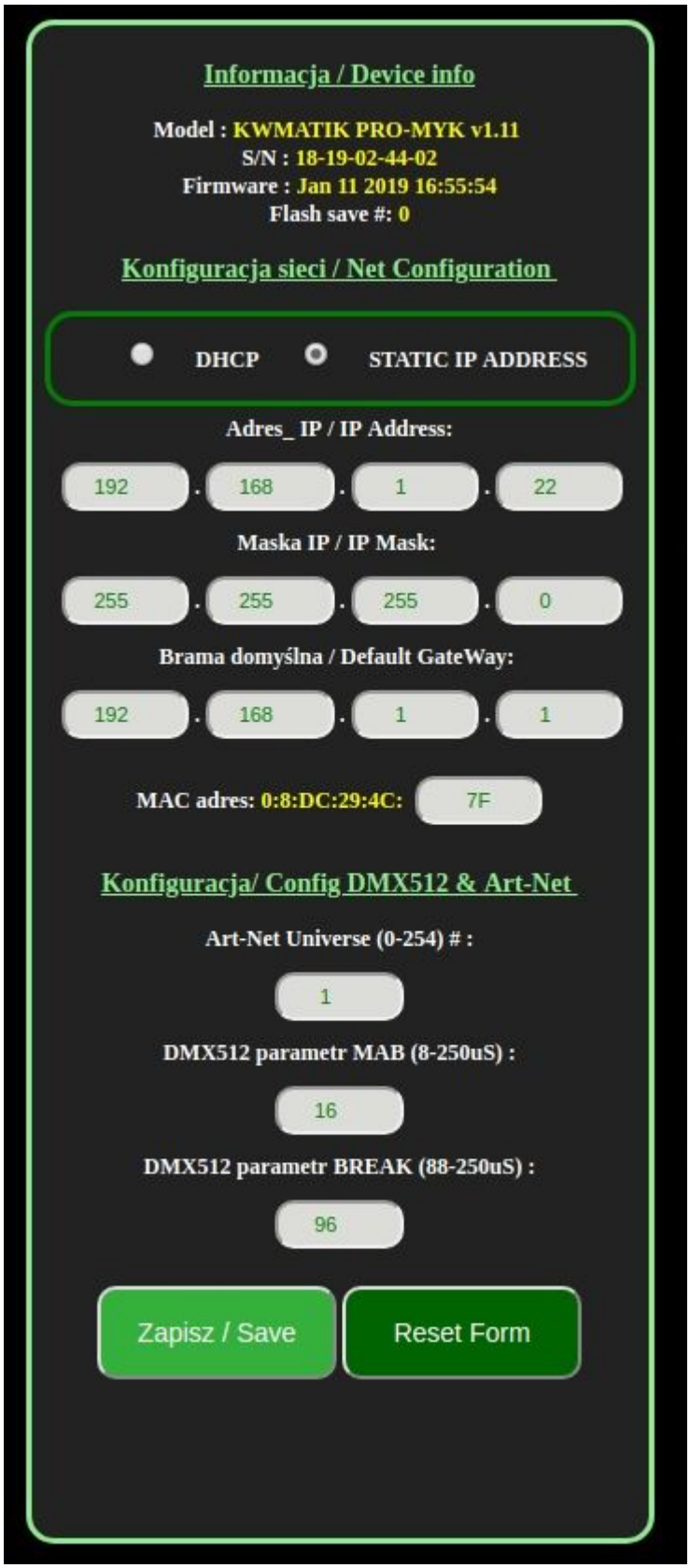

Fig. 2: Layout of settings IP and DMX512

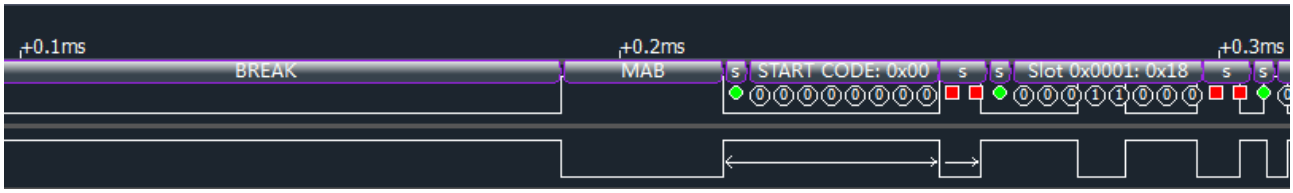

Fig. 3: DMX512 signal on begin : BREAK ,MAB and START CODE with zero value are used to detect begin of the dmx512 frame

After pressing the "Save / Save" button, the data is validated and saved to flash memory in the case of IP settings that the router can not handle or network card, the interface has a button to restore parameters factory (address 192.168.1.22). After saving, the interface resets and accesses new settings. The interface stores one FLASH memory configuration.

Other fields:

• "FLASH SAVE #:" shows how many times the configuration was changed.

• Model: The name and version of the interface model

• Firmware: the name of the interface software compilation, in the case

problems should be given so that you can refer to potential "bugs"

• S / N: serial number of the interface

• DHCP / STATIC: Setting whether the address should be static or use DHCP. The advantage of DHCP is "matching" the IP address, mask, the default gateway to the network being connected without the need to change it router. Please note that the interface's IP address will change and make it find it to use the tools of the router or DMX512 programs detecting ART-NET devices.

When the address changes with the help of the DHCP protocol, it is the information about the new address can be found:

• via the router

• a computer network scanning application

• through the ART-NET application e.g.: on ANDROID DMX 4 ALL (Figure 3) or OSRAM (Figures 4 and 5), the phone connected to the router via Wi-Fi gains the opportunity control DMX512 devices and obtain information about each device DMX512 on the network.

4. Kind of Ethernet connection

a) point-to-point

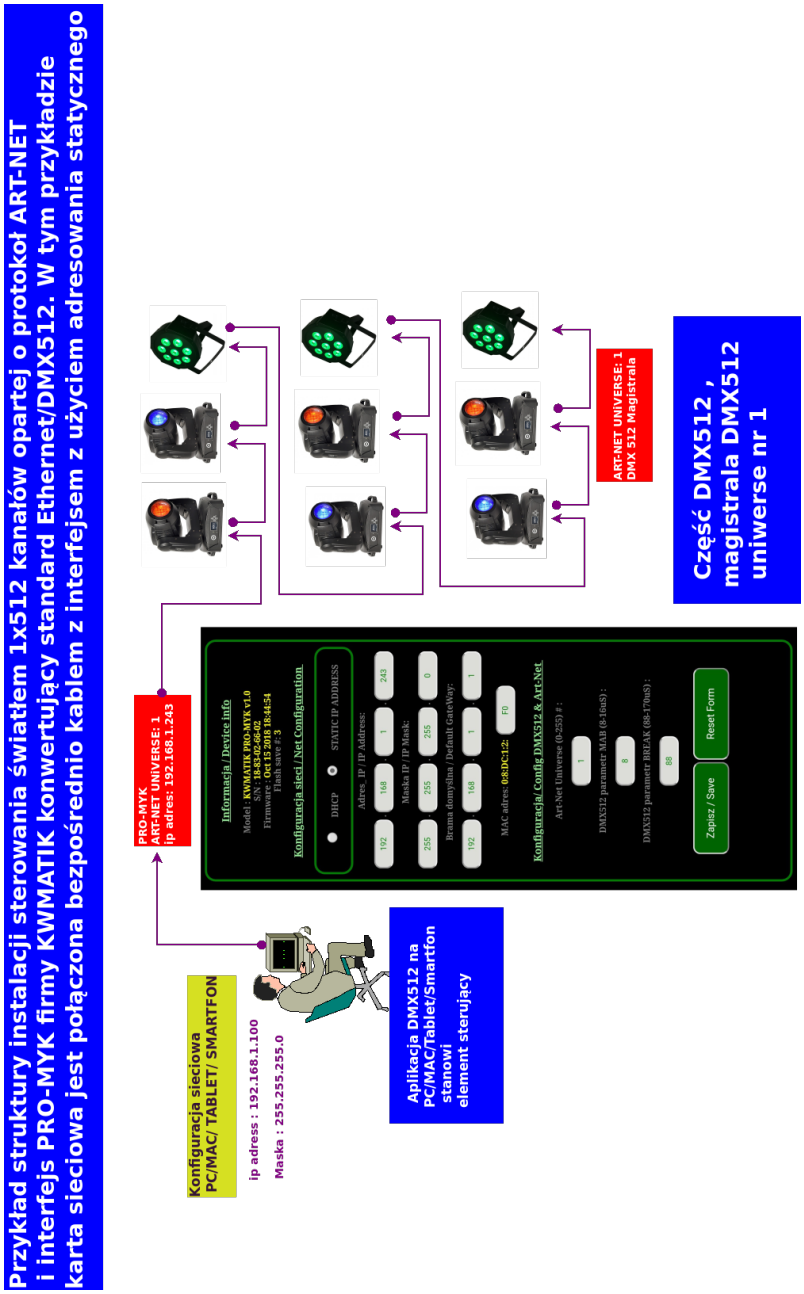

Fig. 4: Depends on statement connections direct between interface a network card computer, address IP card network mustto be in space address of the data network. Did not work then as a rule DHCP and should be set static address (exception are situations when for this card has been launched DHCP service)

b) LAN

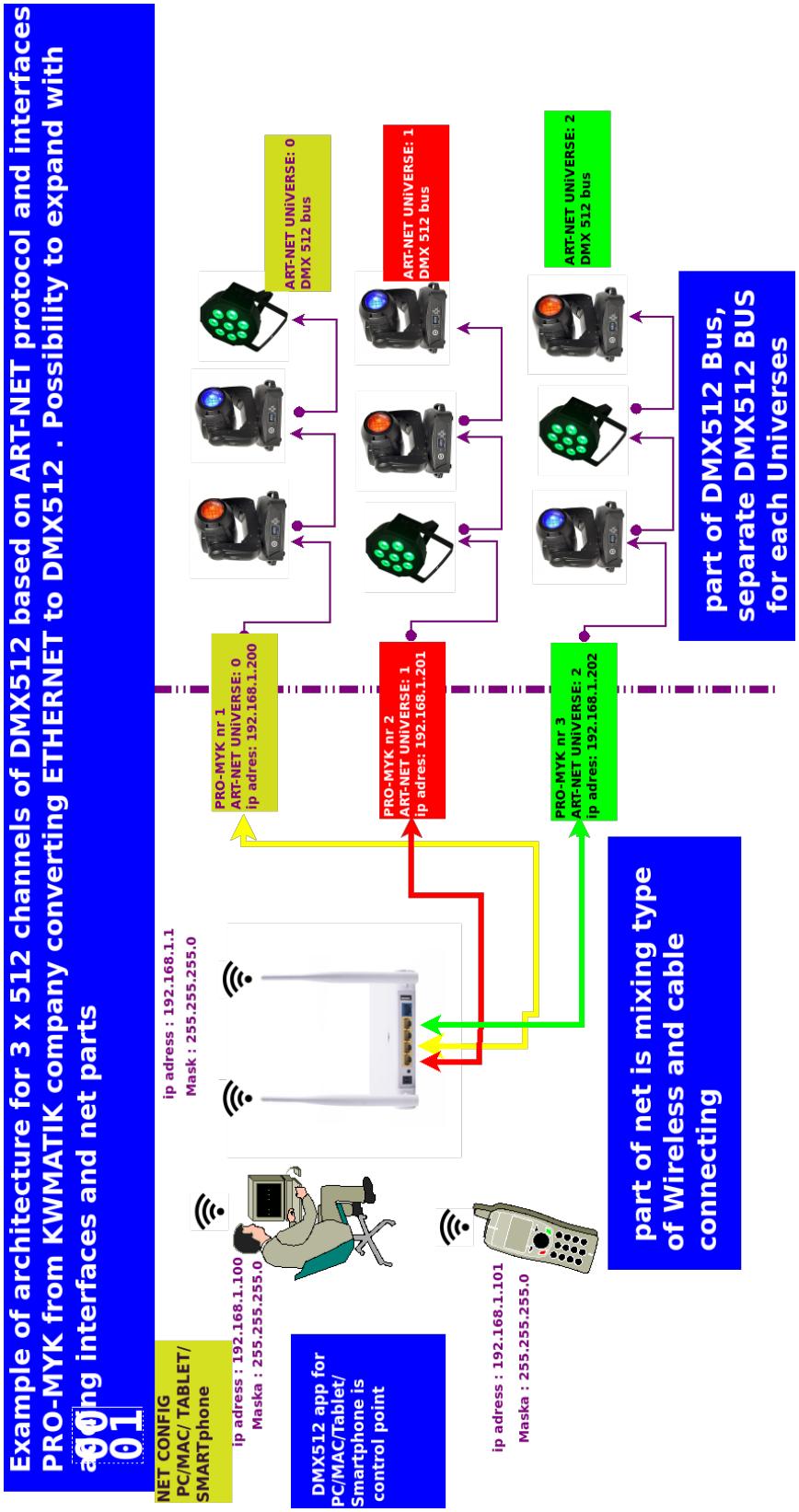

Fig. 5: Example of LAN with interfaces

5. Getting started

The new interface has settings as in Fig.2. Depending on thethe type of Ethernet connection shown in Figs. 4 and 5 should be customize the address of the router or computer (or any other device with the card)network) to the 192.168.1.0 network with the mask 255.255.255.0. How to do it describe instructions specific to a given network device or system. The PRO-MYK interface does not require separate drivers. Need access to port 6454 after which ART-NET packages are sent.

NOTE: not all networks will work with DHCP eg: 2.0.0.0/8

After enabling the DHCP option (used ports 67 and 68) and saving their interface PROMYK gets the next connection to the router thanks to the DHCP mechanism IP address, mask and default gateway no matter what the LAN will be. In the case of connecting more than one PRO-MYK interface to the LAN network you need to change its MAC address otherwise it will conflict physical addresses.

6. Examples of interface configurations in DMX512 apps

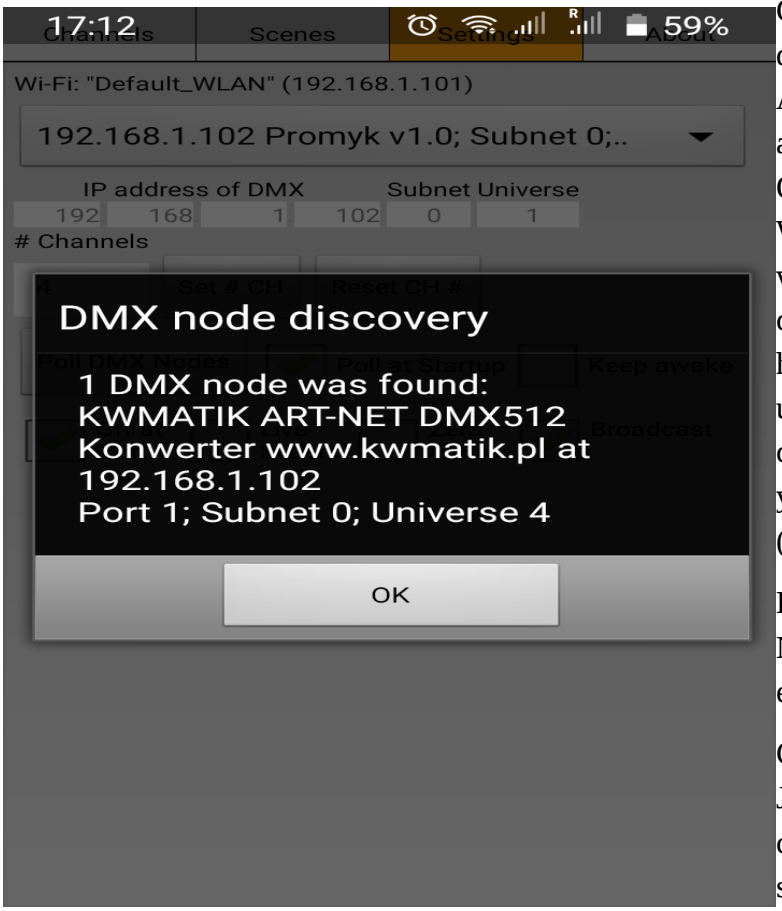

Fig. 6: OSRAM dmx512 app on Android

Configuration in each application comes down to pairing the number Universe ART-NET with interface with this application. I recommend to beginners QLC + application, because it works on WINDOWS and LINUX systems as well as on Apple MACintosh computers. It is simple to configure and has a tab "SIMPLE DESK" where we use the sliders to set the DMX512 channel values. And for mobile devices, you can propose an OSRAM application (Fig. 6).

However, the advantages of the ART-NET protocol can be seen in more extensive applications like

CHAMSYS MAGICQ or LIGHT JOCKEY M-PC. Data appears on the connector j4 (XLR-3) from ethernet is signaled by LED 1 (DMX OUT).

In first time should be make access to net.

ATTENTION ! Make sure one more app transmit DMX512 signal to one Universe

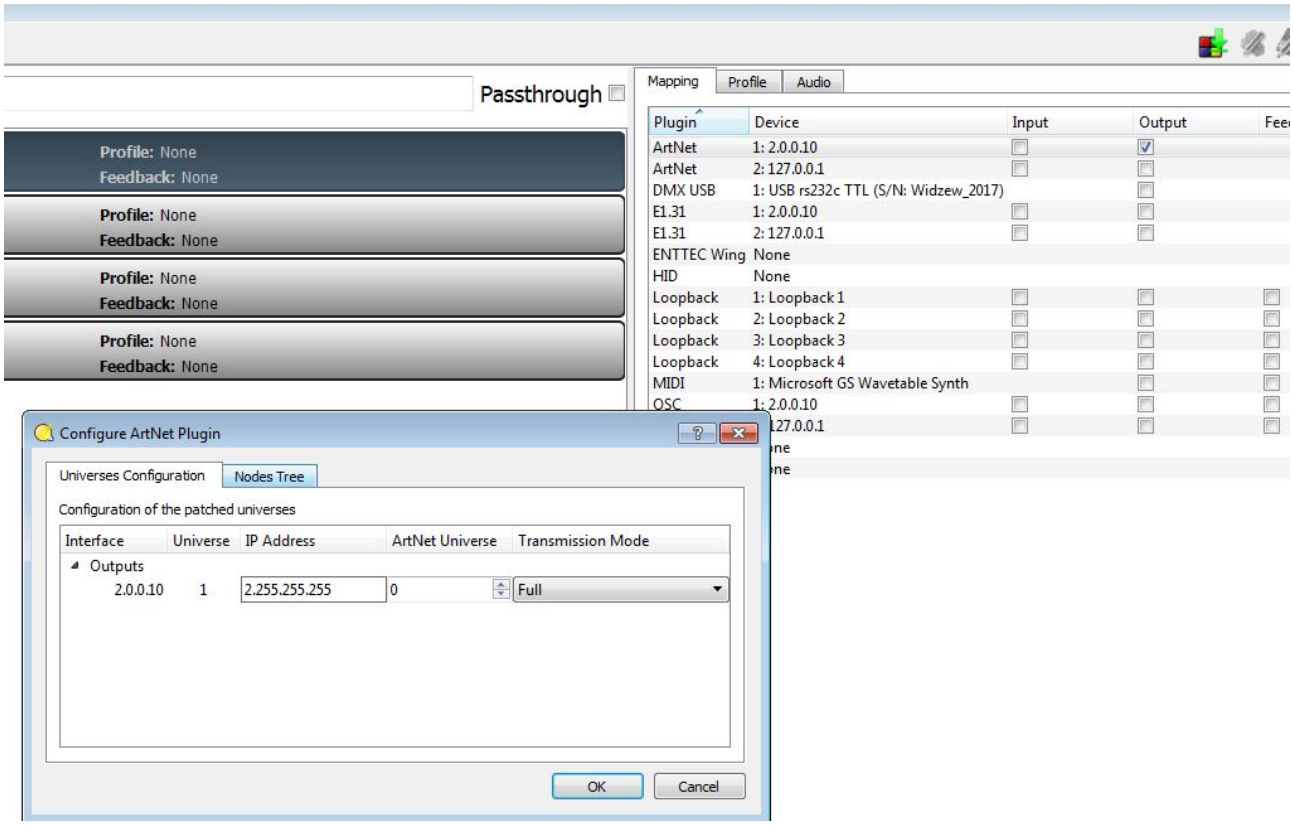

Fig. 7: QLC+ example for net 2.x.x.x/8 and static addressing

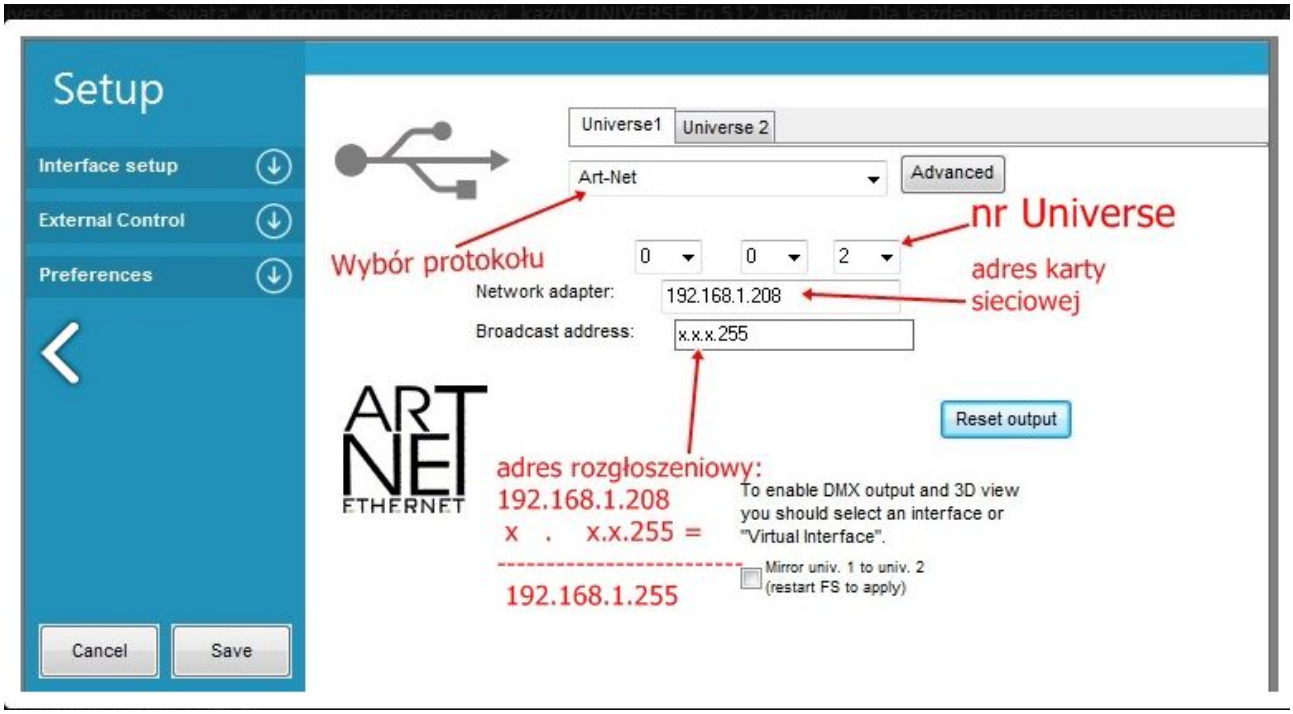

Fig. 8: Config for freestyler x2

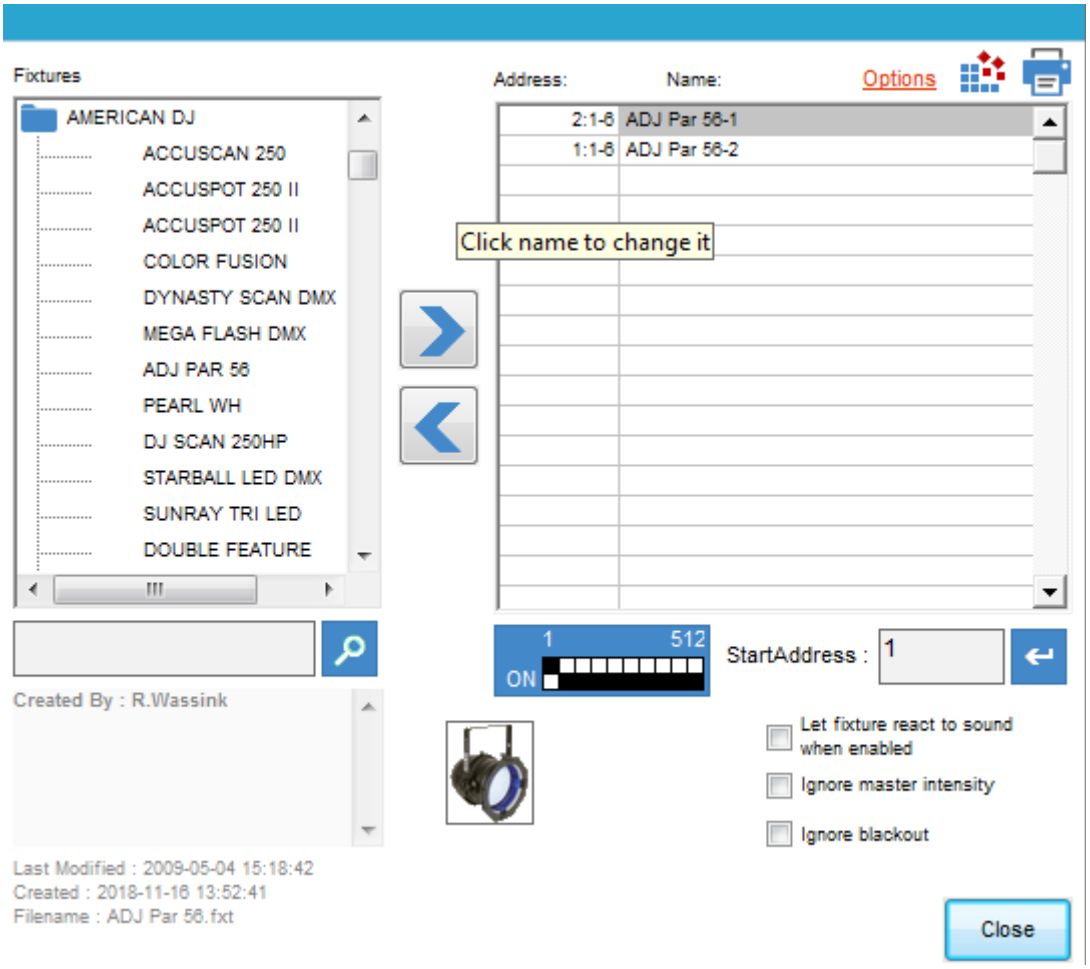

Fig. 9: settings in fixture window on case of 2 Universes

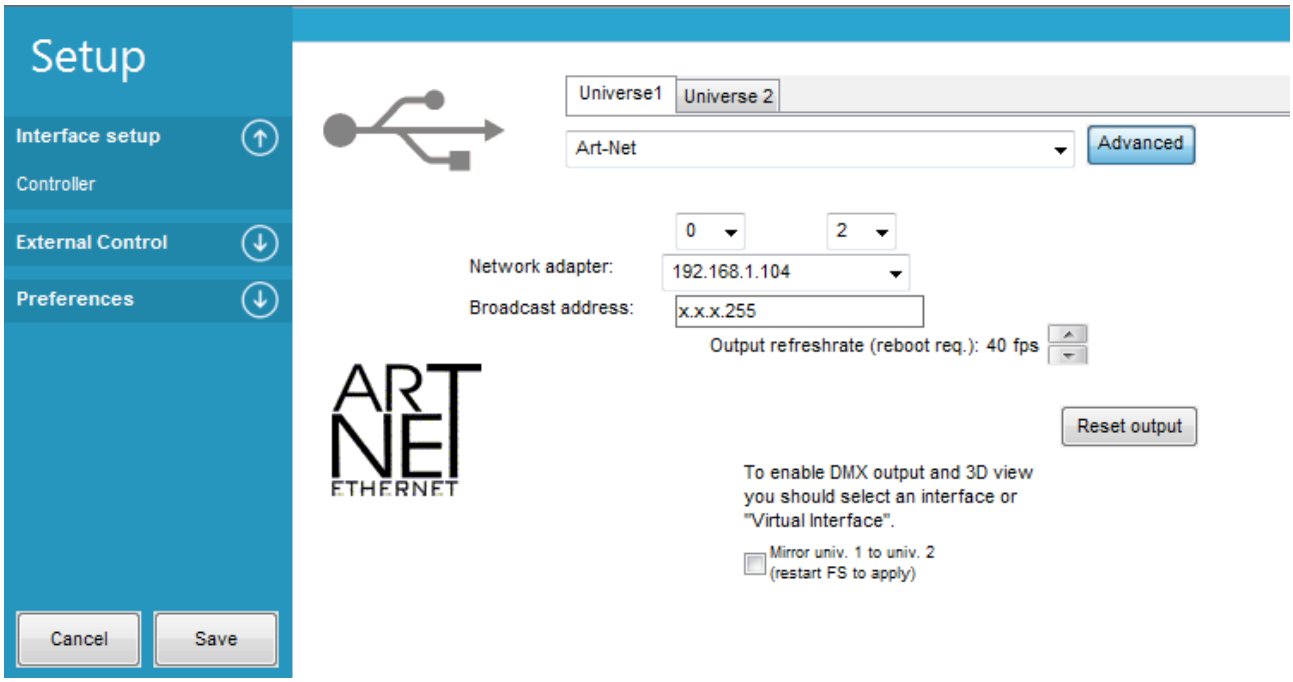

Fig. 10 Freestyler X2

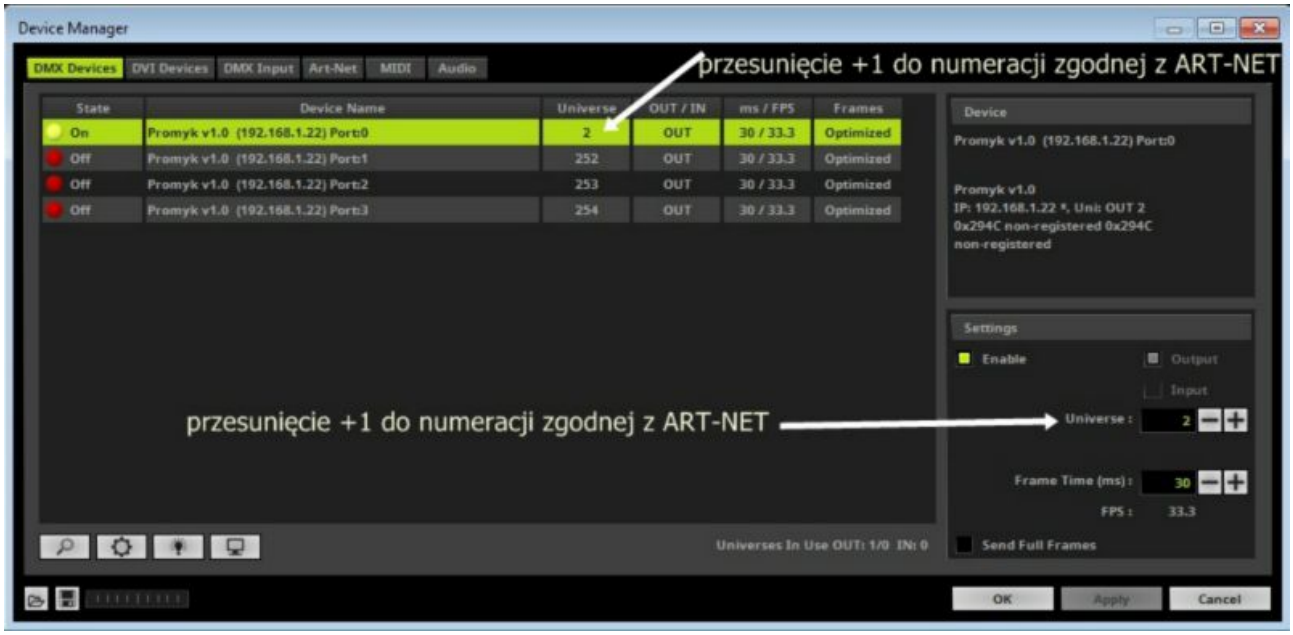

Fig. 11: MADRIX : setting for Art-NET

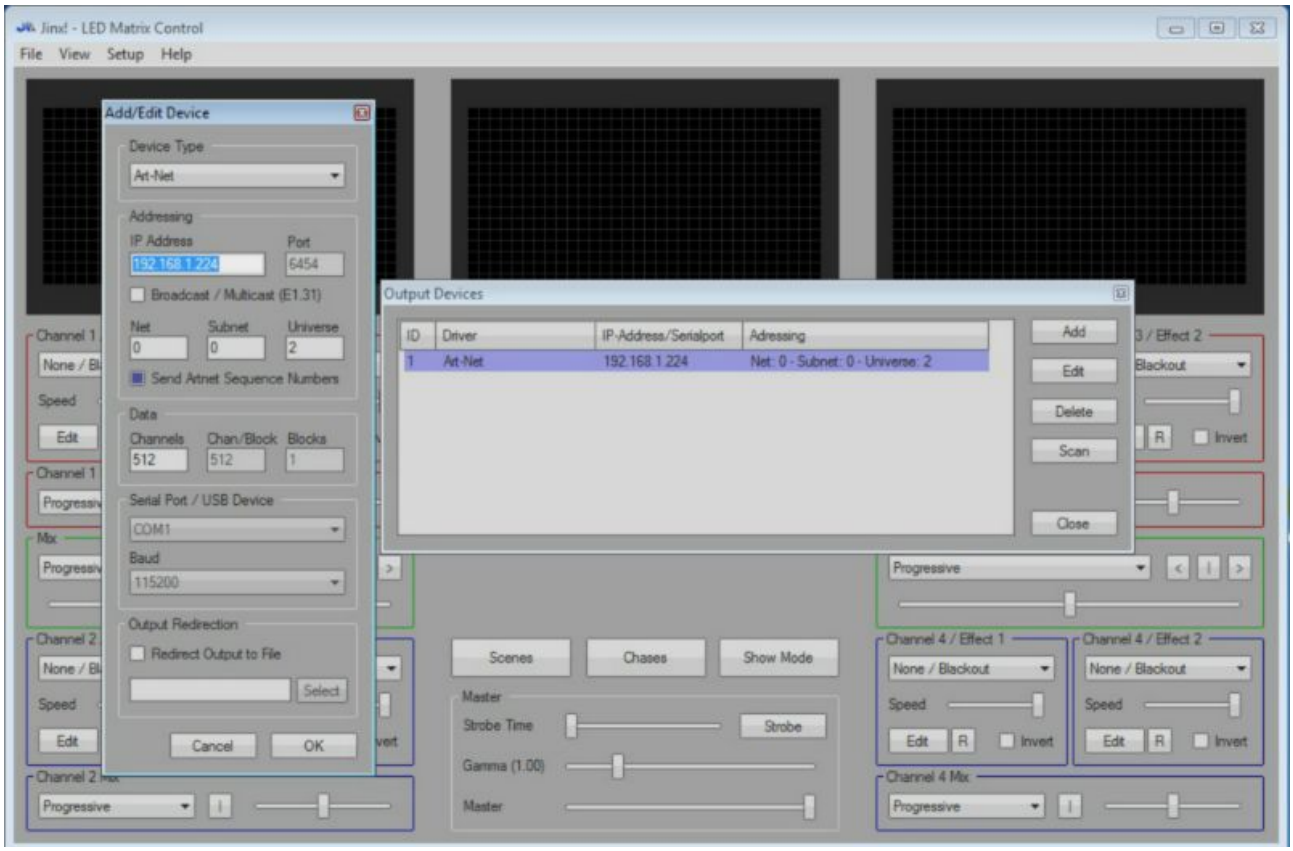

Fig. 12: JINX

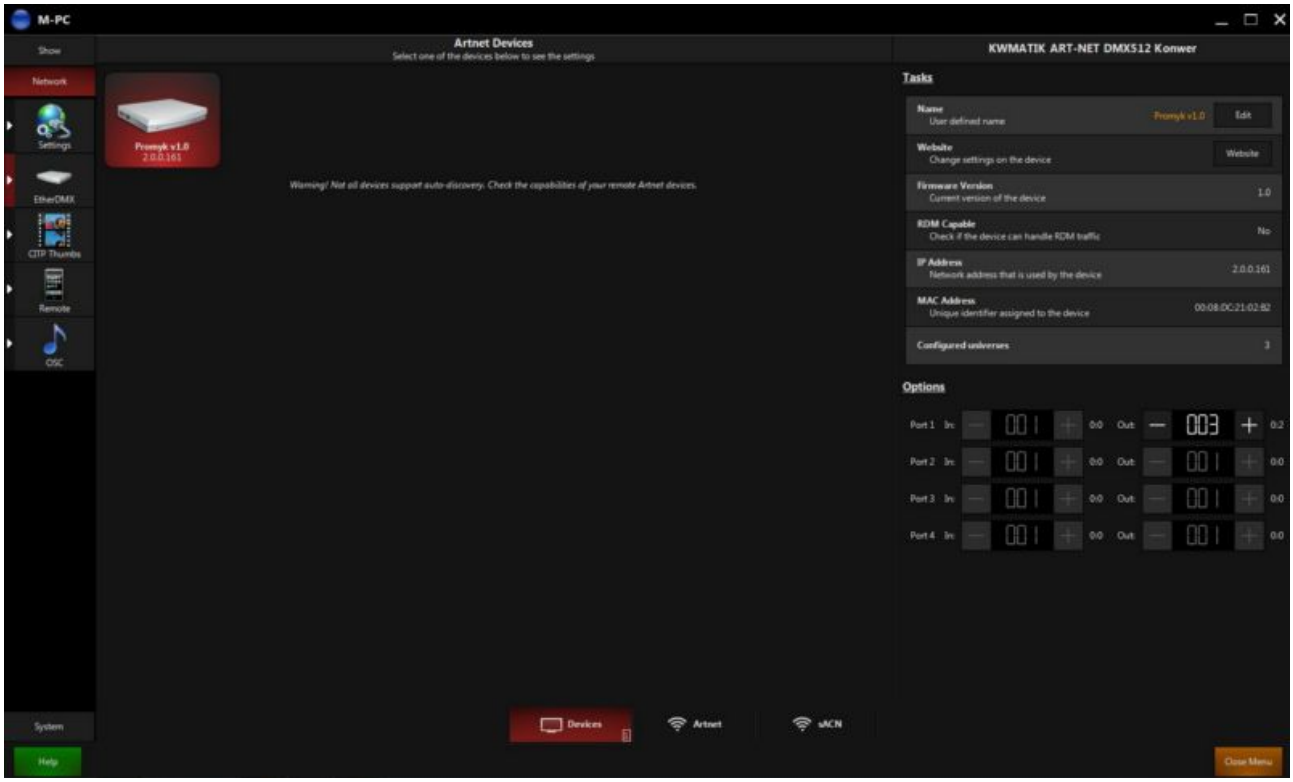

Fig. 13: LIGHT JOCKEY M-PC Art-NET settings

7. Troubleshooting

In the case of operation of the device that is not intended to be intended divide the problem zones:

• **power supply** - watching LED 2 (flashing 2x per second, no computer network, 3 per second is a network of computers , no flashing processor is not working) and LED PWR (continuous lighting -> good). Power supply capacity too low (below 0.25 A) may be related to DHCP or missing problems dmx512 signal on the bus. There may also be an accident damage to the power supply so that the voltage will be applied, LED PWR will be on, while LED LIVE may not be at all flashing or out of the description, these are the cases of generating impulses (so-called "throttling" the throttle) and change to another.

• **computer network** - j / w behavior of LED 2 and lighting of LEDs on RJ45 connector (The green LED is lit in the event of existence connection, and yellow flashes when transferring data). At the first The connected network card or LAN must be set to operate in network with the address 192.168.1.0, or 192.168.1.XXX with the mask 255.255.255.0. The factory address of the PRO-MYK interface is 192.168.1.22. If more than one interface is connected to the LAN, change it their MAC address so that there is no conflict. For the basic numbering of ART-NET 2.0.0.0/8 must not use DHCP, it is only for a network starting from 10.x.x.x, 172.16.x.x, 192.168.x.x. ART-NETUser manual (v1.01) of the interface KWMATIK PRO-MYK v1.11 www.kwmatik.pl12/16 uses the UDP protocol and port 6454, it must be unlocked in operating system and any network equipment. Down analysis of ART-NET frames is well-suited to the WIRESHARK program set the filter to UDP port

6454. Application to search for a node ART-NET sends a frame from OPCODE 0x2000, the node responds with an opcode frame 0x2100, and frames with DMX512 values occur with opcode 0x5000. IN you can see the Universe number and compare with that set in DMX512 file and PRO-MYK.

• **DMX512 bus -** The j4 XLR-3 connector is the DMX512 signal output. IN during "stop" (LED 1 (DMX_OUT) not light) voltage between pin 3 and 2 is about 4V-4.2V and between 3 and 1 is almost 5V. IN the time of sending the voltage (depending on the measurement averaging voltmeter) falls below 1V, and the navets have negative values at continuous transmission as in the QLC + application. And in mobile apps on android or winphone (example OSRAM) where the frame with opcode 0x5000

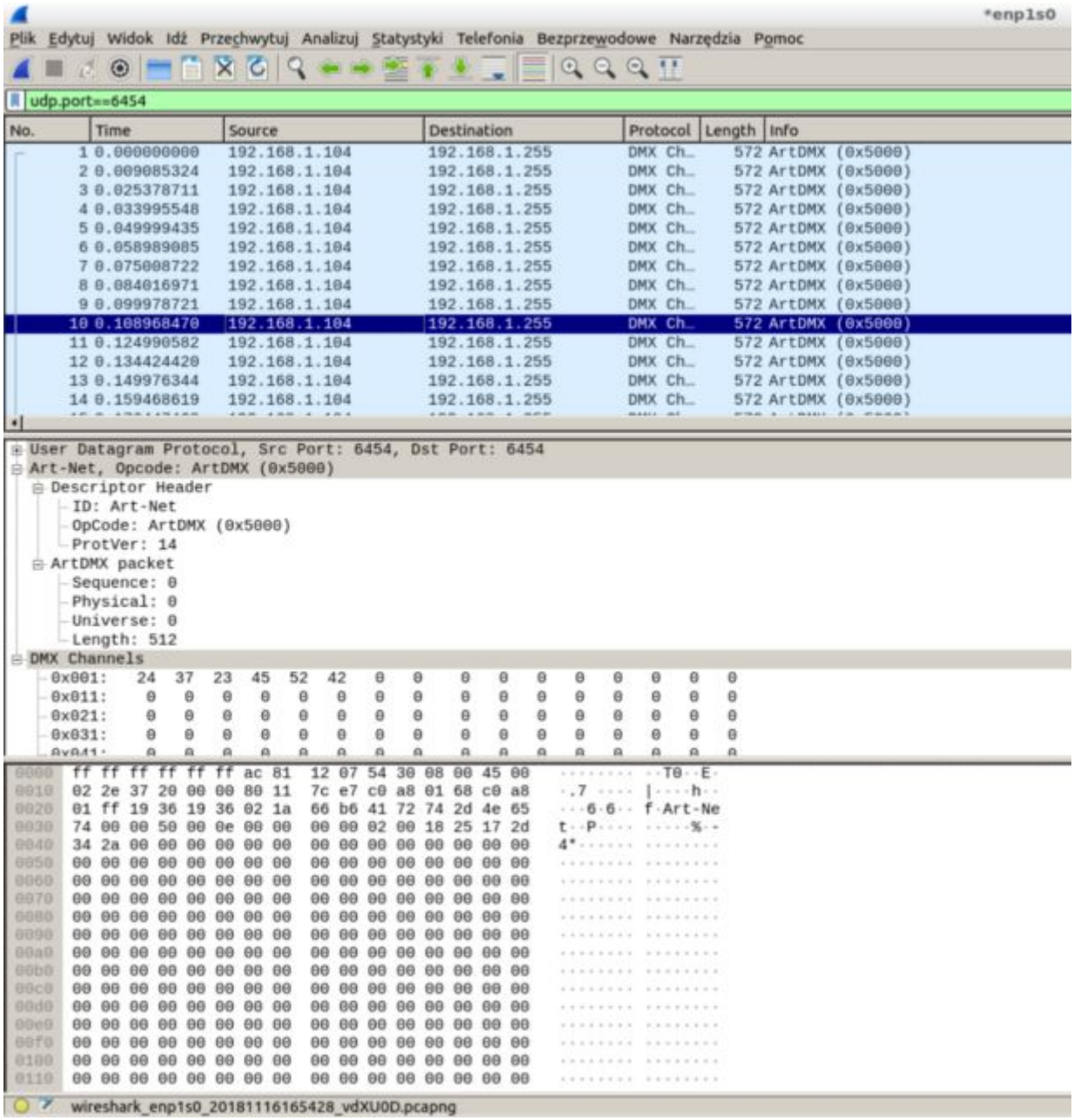

Fig. 14: Wireshark with UDP port 6454 filter

8. DMX512 software , technical data , additional info

a) LAN manuals:

1. https://www.mouser.com/pdfdocs/Ethernet_Basics_rev2_en.pdf
2. https://youtu.be/KOxdqo4eAZM

b) Specification of ART-NET protocol:

1. https://livesound.pl/tutoriale/3973-art-net-co-to-takiego
2. https://art-net.org.uk/

c) Specification of DMX512 protocol:

1. http://dmx512.krb.com.pl/dmx_prot.htm
2. https://pl.wikipedia.org/wiki/DMX512

d) DMX512 software:

1. http://freestylerdmx.pl/
2. https://www.qlcplus.org/
3. OSRAM https://play.google.com/store/apps/details?id=com.sylvania.dmxcontroller&hl=pl
4. android apps https://play.google.com/store/search?q=art-net&c=apps&hl=pl
5. https://www.madrix.com/
6. https://www.lightriderapp.com/
7. https://secure.chamsys.co.uk/magicq
8. http://www.live-leds.de/jinx-v1-3-with-resizable-mainwindow-real-dmx-and-sacne1-31/

e) Help for users on forums, news and news in the DMX512 topic

1. support group "QLC+ Polska" na FB https://www.facebook.com/groups/205142816645054/
2. support group "Freestyler DMX512" na FB https://www.facebook.com/dmxfreestylerpl/
3. support for FREESTYLER POLSKA https://www.facebook.com/groups/252230795108379/

f) www page of KWMATIK on FB, Twitter ,YT and other :

1. KWMATIK on Allegro.pl https://allegro.pl/uzytkownik/KWMATIK?order=m
2. KWMATIK on OLX https://www.olx.pl/oferty/uzytkownik/BDrj/
3. twitter: https://twitter.com/kwmatik
4. Facebook : https://pl-pl.facebook.com/Kwmatik-426110337410184/
5. channel on Youtube: https://www.youtube.com/user/KWMATIK
6. Blogspot DMX512 : http://kwmatik.blogspot.com/