

Introduction

NetWS-2040 will drive up to twelve ArtNet/sACN Pixel universes (2040 WS2811/WS2812/Neopixel Pixel-LEDs) over a wired Ethernet network. DMX protocol selection, device IP, and ArtNet/sACN settings are adjustable directly from your browser interface. Three 3-pin JST connections are provided for outputting the data to the Pixel LED strips/matrix. operational mode is indicated by a simple green 7 segment display. Product firmware updates can be sent over USB, and a serial diagnostics interface has also been included.

Specifications

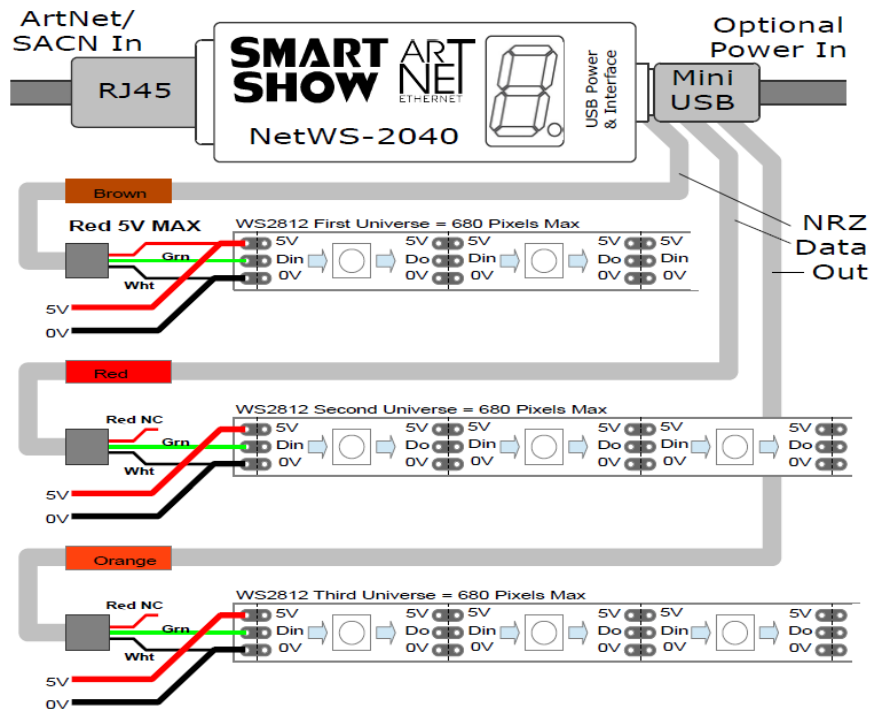
- IEEE 802.3 compatible Ethernet controller, integrated MAC and 10/100 Base-T/TX PHY
- Browser configuration server and UDP Client modes
- Isolated RJ45 Ethernet connection
- Twelve universe ArtNet II & III and sACN (E1.31) decoding NRZ data at 25fps typical
- Power Input : 5V USB Powered, or MAX 5V external power applied to RED wire of 'Brown' 3-Pin JST Connector

Parts Supplied

NetWS-2040 Interface, 3 x 3-Pin JST Plug/Cable, 1 x USB-MiniUSB cable (power, configuration & firmware upload)

Product & Pixel LED Connection

Connect a strip of WS2811 or WS2812 LEDs to each 3-pin JST connector. Most Pixel-LED strips come with this connector already supplied, if not then a female 3-pin JST connector is supplied with the kit. Use a 5V external power supply capable of powering your LEDs. To calculate the power supply required, multiply the number of LEDs by 0.25 (each Pixel-LED draws 0.25W). For example 680 Pixel-LEDs will require $680 \times 0.25W = 170W$, therefore a 200W/5V power supply should be perfectly adequate.



JST Output Colours : A=BROWN - B=RED - C=ORANGE

Powering Options

The NetPixel-Quad can be powered either from a USB power source, such as a quality mains-plug-in source (500mA min) or alternatively 5V power can be taken from the Pixel Strip supply, as long as **5V only is used**. The Brown output JST connector has an additional Red wire available for this purpose. Applying more than 5V to the product in this way may cause damage internally

LAN Ethernet Connection

The NetWS-2040 can be configured for almost any IP setting, although a default IP of 192.168.1.200 is supplied with the unit. In general this will be a similar IP to your home router/hub, therefore the NetWS-2040 can be connected directly to one of your router LAN Ports. Once connected it can be accessed from a PC that is also connected to that same network.

Device Configuration

It is possible to configure your device in one of two ways, either directly from your PC Browser (if you are on a 192.168.1.x network) or via a Serial configuration using the USB connection, this is useful for directly setting to an alternative network.

Browser Configuration Mode

To access the browser configuration, the NetWS-2040 must be put in configuration mode. Configuration mode is available for the first 8 seconds after power up, during this time the devices IP address will be shown in the display. To activate configuration mode you should open your PC browser (most browsers are supported) and type into the URL bar 192.168.1.200 and press return, hitting the return within the 8 second window will activate Configuration mode and will show a 'C' on the display (If you allow 8 seconds to elapse without any browser intervention then the NetWS-2040 will go directly into ArtNet mode 'A', or sACN mode 'S'). As long as the PC and the NetWS-2040 are connected to the same network at 192.168.1.200 the configuration interface should appear as follows:

DMX Protocol

Select either ArtNet or sACN (E1.31) to match the DMX data protocol coming from the host application
[SAVE] New DMX protocol settings will take immediate effect after they are saved to the NetWS.

Ethernet Settings & IP Configuration

MAC Address: This is not adjustable and is a unique number created in conjunction with the serial number of the supplied unit

Device IP: It is possible to set the IP address of the NetWS-2040 to almost any value, (many ArtNet devices will use standard IP addresses of 10.x.x.x or 2.x.x.x) only values of 0-254 can be used, 255 is not allowed.

SubNet Mask: Normally this should be left at 255.255.255.0, which will cover most applications.

[SAVE Configuration] New IP configuration will not take place until NetWS-2040 has its power cycled (or by pressing REBOOT). Saving the configuration will write the Device IP and SubNetMask values to the NetWS-2040 internal memory, so on the next power-up the new settings will be used.

Art-Net/sACN Settings

These values can be configured to match the requirements of your system. There are a total of 256 universe values for ArtNet II and 32,768 for ArtNet III, and 63,999 for sACN

Net: [Artnet only] any value in the range 0-127

SubNet: [Artnet only] any value in the range 0-15

Universe: ArtNet : any value in the range 0-15 – sACN : any value in the range 1-63,999

[SAVE Configuration]: New ArtNet/sACN settings will take immediate effect after they are saved.

Pixel LED Test

Buttons have been provided for testing connected Pixel-LEDs, all three output connections are tested at the same time. Pressing **RGB-[1],[2]** or **[3]** will test individual RGB channels. Pressing **RGBW-[1],[2],[3]** or **[4]** will test individual RGBW channels. Pressing **[OFF]** will clear all colour channels.

Show Extra Features > Universe Sizes

If your application is unable to set the size of the Universes, then each universe size can be entered into the boxes, one for each of the four universes 1/2/3/4, on each of the three outputs A/B/C

Show Extra Features > Pixel Colour Order

Select either GRB or RGB as the pixel colour order to match the application sending the data

REBOOT DEVICE

Pressing [REBOOT DEVICE] will restart the NetWS-2040 interface (a bit like cycling the power) and display the devices IP Address before entering ArtNet/sACN streaming mode, indicated by 'A' or 'S'. All newly saved settings (including IP values) will be used after reboot.

Private Wired Network Connection

It is highly recommended that you move the NetWS-2040 away from your home network and onto a private wired network connected directly between your PC and the NetWS-2040 device. Generally your home network (192.168.1.x) could have lots of traffic that could affect the consistency of ArtNet/sACN data, and may cause visual disturbances.

To move NetWS-2040 to a direct-wired network follow these instructions (MS Windows):

Go to Control Panel, select Network and Internet, then select Network and Sharing Centre

In the left hand column, click on 'Change Adapter Settings'

'Local Area Connection' should be shown, double click on it

Under the 'Networking' tab, select the line that says 'Internet Protocol Version 4 (TCP/IPv4)'

Then click 'Properties'

Click the radio button beside 'Use the following IP address'

Enter your required IP address & Subnet mask (e.g. 255.255.255.0) in the fields provided

NOTE : The IP Address entered here MUST match the NetWS-2040 IP address for communications to work

Leave the DNS Settings blank, click OK then click Close

Plug in the NetWS-2040 (if you haven't already done so) – **A cross-over Ethernet cable is required**

Serial Configuration Mode - Set-Up

Firstly, you need to install drivers for the Serial and DFU (upload devices).

Please install and run drivers/win/install_drivers.bat, these can be obtained on request from SmartShow-UK

Once installed, connect the NetWS-2040 via the USB connection.

Make a note of the serial port number for the device (see Device manager/Com Ports/'Maple Serial')

If you haven't already got a serial communications application, we recommend 'Termite' for simplicity.

You can find Termite at <https://www.compuphase.com/software/termite-3.3.zip>

Once installed and launched, adjust the settings for COM number, 9600/8/1/none, and set flow=DTR/DSR

Also select 'append CR' and chose the Font 'Monospaced'

NOTE : After a device reboot, Termite must be restarted

Serial Configuration Mode - Use

To access the configuration settings, the NetWS-2040 must be put into configuration mode. Configuration mode is available for the first 8 seconds after power up, this is shown as the devices IP address on the LED display. To activate configuration mode you should type '?' in the Termite chat window and press return, hitting the return within the 8 second window will activate configuration mode and will show a 'C' on the display (If you allow 8 seconds to elapse without any user intervention then the NetWS-2040 will go directly into ArtNet mode 'A' or sACN mode 'S'). In response to sending a '?' the device will respond with its device settings, and a Function Guide:

```
***** DEVICE SETTINGS *****
MAC Address   CA:EF:FF:1E:03:45
Device IP     192.168.1.200
SubNetMask    255.255.255.0
Starting Uni  (Net)0 (Subnet)0 (Uni)0
DMX Protocol  ARTNET
***** FUNCTION GUIDE *****
'i192.168.1.200<CR>'  Change local IP
's255.255.255.0<CR>' Change SubNetMask
'u0<CR>'             Change Start Uni
'a<CR>'             Change to Artnet Mode
'e<CR>'             Change to sACN(E1.31) Mode
'r<CR>'             Reboot device
'?<CR>'            Display settings & help
'$RESET<CR>'       Reset Defaults & Reboot
*** (ensure <CR> is enabled on send) ***
```

For example, typing 'i2.0.0.1' and pressing return will change the device IP to 2.0.0.1
Changes can be made to IP, SubNetMask, Starting Universe and DMX protocol.
For more information see 'Browser Configuration'

Lets Animate !

Open your LED animation application, we suggest Jinx as a good starting point, this can be downloaded free of charge from <http://www.live-leds.de/>

1. Configure Jinx to use your NetWS-2040 device, by selecting it as an 'ArtNet or sACN' device type from the 'Setup>OutputDevices' menu
2. Ensure the Broadcast check box is not checked
3. Enter the IP number of your NetWS-2040 interface (as you have set in NetWS-2040 config)
4. Select 510 channels, and set Net, SubNet and first output universe (as you have set in NetWS-2040 config)
5. Click OK to save changes
6. For the second and subsequent output universes, add another device (as above) but with the NEXT universe value. (the second Universe assumes it is one after the first universe) – **Note : sACN starts at universe ONE**
7. It is also possible to press SCAN in the output devices window, Jinx will communicate with the NetWS-2040 and create 12 universes automatically, but you may need to edit each one to your individual needs
8. Design your matrix size and shape within 'Setup>MatrixOptions'
9. Patch your matrix to the NetWS-2040 universes within 'Setup>OutputPatch'. Be careful to select the correct colour order for your LEDs, WS2812 are GRB, and NOT RGB, starting at channel zero.
10. Ensure ALL universes are patched to different parts of the Matrix
11. 'Setup>StartOutput' to start the show.
12. Ensure the NetWS-2040 is in ArtNet/sACN mode this should be identified by an 'A' or 'S' on the LED display.
13. Ensure your WS2812 LED strip/matrix is connected to the JST outputs, following the correct connections of GREEN=DataOut, WHITE=GROUND/0V (The Red connection is not used)
14. Once ArtNet/sACN data is being received the 'A' or 'S' LED display will flash. It will flash faster the more universes that are being sent to the device (a slow flash for 1 universe, and a fast flash for 12 universes)
15. Select the effect you want to see from Jinx's channel effects and have fun !

Universe Manager

Unlike other multi-output devices, NetWS-2040 has the ability to deal with different sized universes. Therefore any universe can be any length and NetWS-2040 will work out the best way to output the data. All you need to do is set the number of channels per universe in the hosting software (channels=3*pixels for RGB pixels). Each output has its own universe numbers assigned to it : A(Brown)=Uni1-4, B(Red)=Uni5-8, C(Orange)=Uni9-12. You don't have to send all universes to a particular output, and it is possible to skip universes. See example below:

```
OutputA (Brown)   : [Uni-1...] [Uni-2.....] [Uni-3] [Uni-4.....]
OutputB (Red)     : [Uni-5.....] [Uni-7.....]
OutputC (Orange) : [Uni-9.....] [Uni-10.....] [Uni-11] [Uni-12..]
```

Multiple Device Connections

If required you can add several NetWS-2040 to your network and have them controlled from the same application. Each NetWS-2040 would need to have a different IP address (x.x.x.1, x.x.x.2, x.x.x.3 etc) and be added to your application as a new device and patched accordingly into its own area of the matrix. Your Ethernet connection can be split into several outputs using a simple and inexpensive Ethernet 4 or 8 way switch.

Using RGBW (4-colour) LEDs

The NetWS-2040 is able to output data to either RGB or RGBW LEDs (depending on your host application). RGB LEDs use 3 channels per pixel and RGBW LEDs use 4 channels per pixel. If you select RGBW mode and are using RGB Pixel-LEDs then expect an unusual effect. Since RGBW uses 4 channels and there is a maximum of 512 channels per universe on ArtNet/sACN/DMX, the maximum number of Pixel-LEDs that can be connected to one universe is 128.

ArtNet/sACN Unicast, Multicast & Broadcast mode

It is recommended that Unicast mode is used when sending ArtNet/sACN data to the NetWS-2040. Limited & Directed Broadcasts are also accepted.

ArtNet Device Discovery & DHCP

There is the ability to discover IP addressing and device Information using ArtNetPoll, IP scan is available on most software, if unavailable, addressing can be done manually as described above. There is no DHCP function as IP addressing is Static, utilising client port 6454.

Pixel-LEDs that can be driven from the NetWS-2040

WS2811, WS2812, WS2812b, UCS1903, UCS2903, TM1804, SK6812

Dimensions

Length : 73mm (plus JST cables) – Width 24mm – Height 24mm

Software Compatibility

NetWS-2040 works with all free and commercial Art-Net/sACN compatible software. For free software, Jinx is highly recommended, visit <http://www.live-leds.de/> for more information.

Firmware Upgrades

From time to time we may issue revised firmware for our products. The latest firmware can be uploaded to any of our products using our upload tool plus the latest .bin file for the product. Please ensure that the firmware file matches the product you are uploading to.

SmartLoader can be provided on request or downloaded from our website www.smartshow.lighting

For further instructions, see the README file in the downloaded zip

Once the upload is complete, the NetWS-2040 will resume normal operation with a reboot

Technical Support

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