



eDMX MAX

LeDMX MAX

ultraDMX MAX

Record/Playback



USER MANUAL – Firmware v4.10 - Windows Utility v2.5

TABLE OF CONTENTS

Introduction	1
Features	1
Supported Devices	1
SD Card.....	2
Recommended Micro SD Cards	2
Installation / Removal	2
Concepts	3
Static Scenes	3
Dynamic Shows	3
Scenes and Shows	3
Basic Setup	3
Show Recording	6
Basic Operation	6
Steps required to record a show:.....	7
Steps required to record a scene:	7
Show Types:	8
Indicator States	8
Record Triggering	8
Show Playback	10
Basic Operation	10
Scene Playback Output Update Rates.....	11
Playback Triggering	11
Playback Master Level.....	12
eDMX Trigger	14
Playback Completion Action	17
Show Description	18
Next Show Auto Follow.....	18
Last Show Recall.....	19
Playback Automation	20

Internal Clock 20

Master script Show List format 22

Master Script Crontab Format 22

Example Master Script Show List Format 23

Example Master Script Crontab Format..... 23

Network Playback 25

Art-Net Control - ArtTrigger 26

File Access 27

Summary Of File Types 28

INTRODUCTION

All eDMX MAX, LeDMX MAX and ultraDMX MAX products are capable of recording and playing back static scenes. In addition products with SD card slot can also record any incoming Art-Net, sACN or DMX512 stream sent from your lighting control system. DMXKing recorders are built right into the output node, unlike other standalone recorder products, which not only removes another layer of equipment and cost but also provides distributed highly scalable near unlimited universe playback count. What you see at the output node is exactly what gets recorded.

Minimum firmware required v4.9+. Update to the latest firmware using eDMX Configuration Utility v2.4+ (Windows).

This user manual is written for v4.10 firmware with eDMX Configuration Utility v2.5. We highly recommend updating to the latest available firmware and configuration utility. Static scene recording was introduced in v4.9 firmware.

FEATURES

- On-Node recording and playback.
- Records whatever universes are configured on the device ports or alternatively up to 32 specified universes.
- Up to 52 static scenes. No SD card required.
- Up to 255 show streams. SD card required.
- Scripted show playback sequences and time/date-based.
- Last show recall upon power-up.
- Blackout show after Show end for static/blackout show or scene.
- Distributed recording and playback.
- High capacity SD cards supported 32GB, 64GB, 128GB+ with exFAT format.
- All protocols and merging supported by the device are also supported for recording.
- Live network stream merge with scene/show playback.
- Record Art-Net, sACN, DMX-IN and USB sources simultaneously.
- Multicast sACN and broadcast ArtNet playback to network. sACN Priority modifier during playback.
- Record DMX-IN ports for playback as DMX-OUT or ArtNet/sACN show streams or static scenes.
- Record USB DMX sources.
- Show/scene playback can be triggered on:
 - Power up.
 - Time/date-based show runs with optional internal battery backup.
 - ArtTrigger commands (broadcast and unicast)
 - Playback universe Art-Net, sACN, DMX-IN or USB DMX.
 - External contact closure (check hardware for I/O port support).
 - Reception of broadcast by a master external contact closure unit.

SUPPORTED DEVICES

All DMXKing MAX series nodes support **static scene** record/playback without requiring an SD card. Firmware v4.9+ is required.

Record/playback of **show streams** is supported on the following hardware when an SD card is installed:

- eDMX2 MAX
- eDMX4 MAX
- eDMX8 MAX
- eDMX1 MAX DIN
- eDMX4 MAX DIN
- eDMX8 MAX DIN

- eDMX4 MAX ISODIN22
- LeDMX2 MAX
- LeDMX4 MAX

SD CARD

RECOMMENDED MICRO SD CARDS

For performance reasons we only recommend the following Micro SD cards which have been extensively tested in DMXKing MAX series hardware under maximum throughput conditions.

- Samsung PRO+ 32GB, 64GB
- Samsung PRO Endurance 32GB, 64GB, 128GB
- Kingston Endurance 32GB, 64GB, 128GB
- Strontium Nitro A1 32GB, 64GB, 128GB
- SanDisk Extreme Pro UHS-II 32GB, 64GB, 128GB

Most SD cards come pre-formatted FAT32 or exFAT file system. Both are FAT32 and exFAT are supported by the DMXKing recorder system however we highly recommend exFAT because file sizes >4GB are supported. All 64GB+ cards come pre-formatted exFAT however most 32GB are supplied FAT32 formatted and should be re-formatted to exFAT before use. This is particularly important if your application uses a large number of universes over a long record duration.

Firmware version v4.0 may hang upon boot with certain SD cards. Update to firmware v4.2+

INSTALLATION / REMOVAL

Access to the internal SD card holder may require partial disassembly of the DMXKing unit. This should be performed by a competent technician. Antistatic precautions should be taken and power down the unit first.

Push – Push latching microSD card sockets are used. Do not attempt to pull the card out without first unlatching by pushing in.

For time-based playback NTP time sync can be used along with a CR1220 backup battery for true standalone operation without network. This is not intended for long term battery backup due to the low capacity.

CONCEPTS

STATIC SCENES

DMXKing MAX series nodes can store up to 52 static scenes without requiring an SD card. Each scene can be composed of up to 32 universes and include sACN Priority.

Scenes have a specified Duration, Fade In/Out times and an option to cross fade between scenes. The internally generated scene fading frames can also be streamed as sACN or ArtNet over a network connection.

DYNAMIC SHOWS

Nodes with an installed SD card can store up to 255 show streams. Show duration is limited only by available space or maximum 4GB file size if FAT32 is used. In most applications with exFAT formatted 32GB+ SD cards it is unlikely your show recordings will run out of space. As a rough guide use 140MB per universe per hour @ 40fps to calculate approximate file size.

Network streams arriving at the node are timestamped and recorded into the selected show file. Whatever streams arrive at the node which would potentially appear on an output, or optionally match the specified universe list, will be recorded regardless of whether another higher priority stream or merged source is also present. Non-network USB and DMX-IN sources may also be recorded. File format is pcap which can be opened in Wireshark for analysis.

Playback of show files replicates the same network streams with all sACN priority and other merging still occurring exactly the same as live output. Live universe streams may be merged with playback or completely take over output(s) if higher sACN priority for example. Any re-configuration of an output node such as assigning a different universe or pixel mapping will take effect because the recorded show file maintains universe specific information. A show .cap file may be copied to another SD card where identical playback is required on many nodes.

SCENES AND SHOWS

Scenes and Shows are overlayed on the same 255 possible show entries to maintain continuity between the 2 different types of playback. This permits both scenes and shows to be included in scripts and follow on show specifiers.

Show recording, scene recording, playback and tftp file access are mutually exclusive. Only 1 show/scene can be recorded or played back at a time and initiating a different show playback will immediately stop the previous activity.

BASIC SETUP

Update to latest firmware v4.9+ and configuration utility v2.4+. Earlier firmware and utility versions do not support all features described in this user manual.

Record and Playback controls require the eDMX MAX device to be on the same IP subnet as the host computer.

Network Port A Settings Port 1 Port 2 Port 3 Port 4 Recorder Universes

Recorder Settings

☒ Playback Enable

☒ Record Enable

☐ Playback Merge

☐ Record Monitor

☐ Network Playback

Time

NTP Server IP

NTP Poll Interval Hours

Time Zone

☐ US Date Format ☐ CRON wait

Daylight Savings

☒ DST Enabled

☐ Specified ☒ Recuring

DST Begin

Month

Week Num

Week Day

Hour

Show Triggering

☐ eDMX Trigger ☐ Up/Down/Go

☐ eDMX Control ☐ Skip Script

☐ Playback Trigger Universe

Universe

Playback Group

☐ Playback Master Level

DMX Channel

☐ Show Run Until Complete

☐ Broadcast Triggers

☐ Record Trigger Universe

Universe

DMX Channel

Show Settings

☐ B/O Show After Stop

☐ Hold Last Scene

☐ Last Show Recall

TFTP

☒ Read Access

☒ Write Access

Restricted Client IP

The Recorder tab contains all settings associated with record/playback operations. Output port settings are independent of these settings except whilst recording when they dictate which incoming universes will be recorded. Manual controls have been moved to a separate window accessed through the Advanced menu on the Windows version and the Controls tab on macOS version.

Recorder Settings

☒ Playback Enable

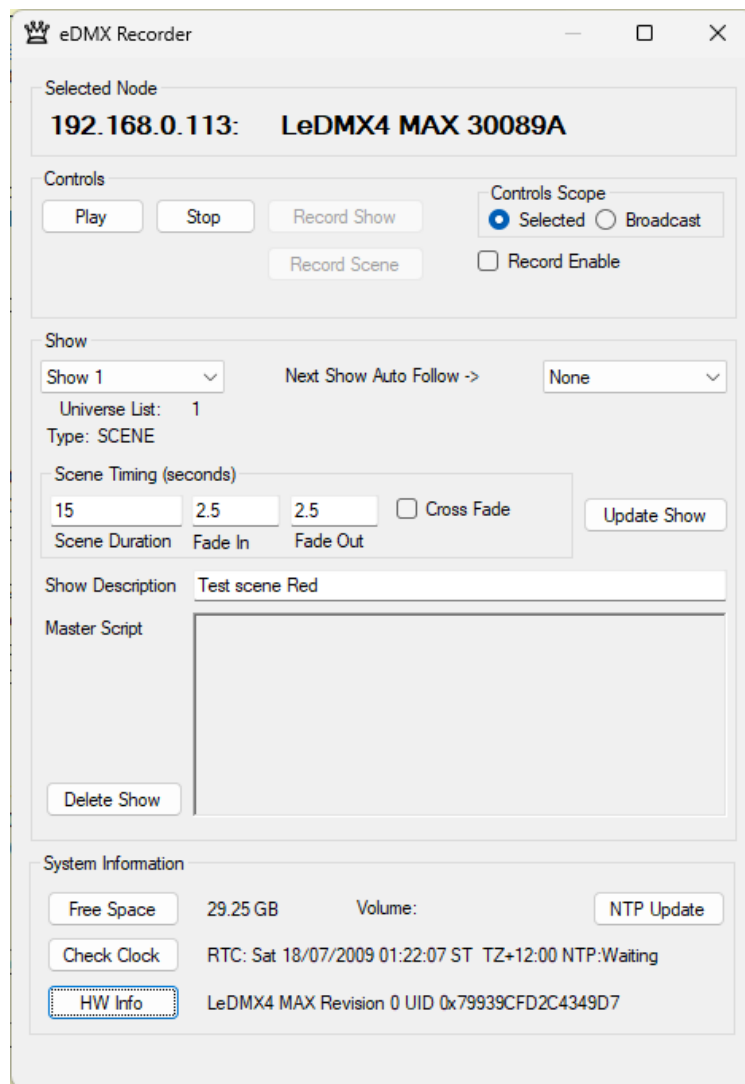
☒ Record Enable

☐ Playback Merge

☐ Record Monitor

☐ Network Playback

Playback Enable and Recorder Enable provide device wide control over what actions may occur through other controls or triggers. By default, both options are disabled and typical usage would be enabling both during show recording activities then disabling Recorder once the show(s) are stable so no accidental overwriting occurs.



The eDMX Recorder Controls panel contains a Controls Scope selection. You can direct Control commands to either the Selected Device or All Devices on a local area network segment through broadcast commands.

Playback operation sequence: Select a Show from the dropdown list followed by Play. Stop will immediately stop either playback or the Master Script.

Record operation sequence: Select a Show from the dropdown list. Record is gated with an Enable box to prevent accidental activation. Record Show will initiate the capture of incoming universe stream(s) and continue until Stop. Record Scene will initiate the capture of a static scene and Stop will trigger the actual scene capture.

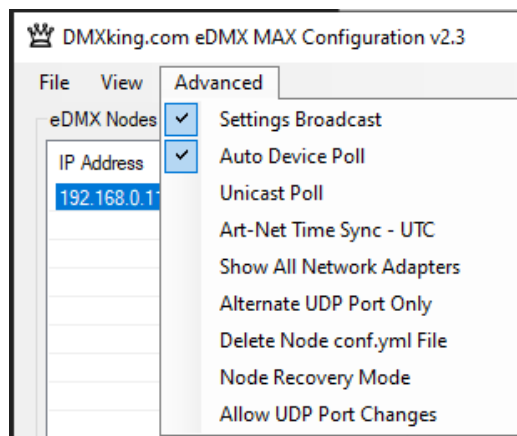
Node Report: #0001[137]DMX:0 PIX:30 SYNC:Async SHOW:000 REC:Idle

In the main eDMX MAX Configuration windows a Node Report is updated each time a node is polled (use Refresh button on macOS version). Although not real time the information can be helpful to assess the current status of an eDMX/LeDMX MAX unit. SHOW:nnn indicates which show has been selected. REC: indicates what the recorder is currently doing.

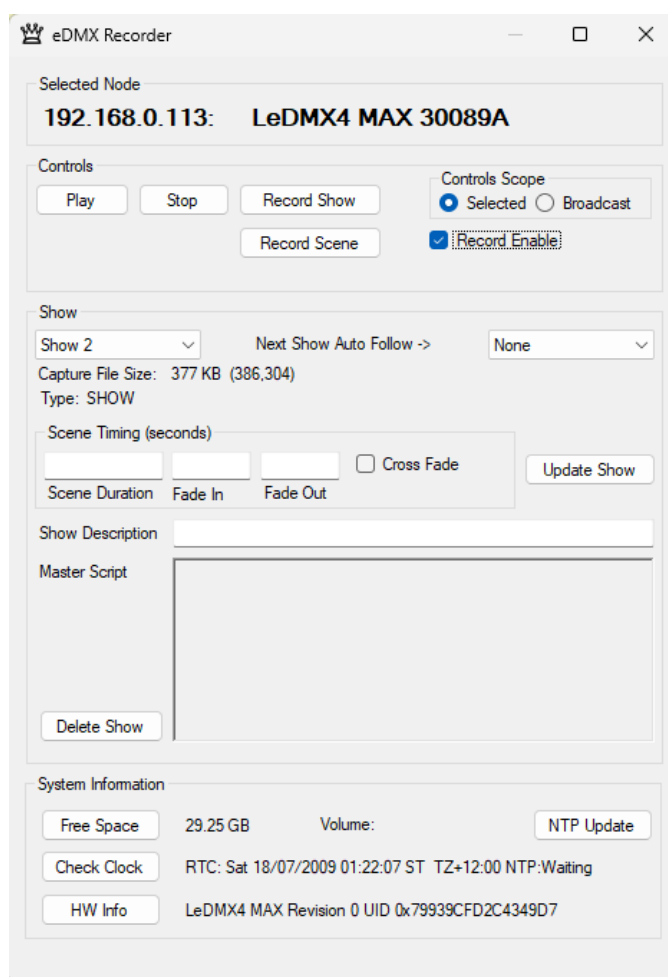
When Master Script crontab is running with no active show the recorder indication displays REC:Cron.

BASIC OPERATION

AutoDevicePoll should be enabled to maintain continuous communications from the ArtNet Master station (eDMX MAX Configuration Utility in this case) to the selected Node. On the macOS version polling is manually activated by the Node Scan button however the Node Report can be updated with the Refresh button.



Show recording can be initiated through the eDMX Recorder controls panel buttons or via network by Art-Net Trigger commands (refer to section on Art-Net Control). Record button is active only when Enable box ticked.



STEPS REQUIRED TO RECORD A SHOW:

- Verify your universe stream source(s) are functioning by observing DMX512 and/or Pixel outputs.
- Select **Show** number from dropdown dialogue. Show 255 is the “Blackout” show.
- Enable the Record buttons by selecting the adjacent **Enable** box.
- Start your universe stream sources(s) and click **Record Show**.
- Click **Stop** once the sequence/show has completed.

Now a capture file has been saved on the SD card which can be played back upon demand. If you select the same show number and Record again it will overwrite the existing show no questions asked. To prevent accidental overwriting of shows, untick the Recorder Enable setting in the Recorder tab and click Update.

The Show **Capture File Size** is displayed under the **Show** selector box. Both a rounded value and the exact number of bytes (in brackets) are shown.

Shows can be deleted by selecting the **Show** and clicking **Delete Show** followed by user confirmation. **Show Description** and **Next Show Auto Follow** are also deleted for the selected **Show**.

By default, during recording DMX512 and Pixel port outputs are disabled. By selecting the Record Monitor setting you can observe the output during recording. With LeDMX MAX configured for maximum pixels on every output with full pixel mapping depending on universe update rate there may not be sufficient processing capacity to record and output simultaneously. It is not recommended to enable Record Monitor for >8 universes of incoming data on LeDMX MAX hardware but there are many factors such as update rate and pixel type that will affect computational load.

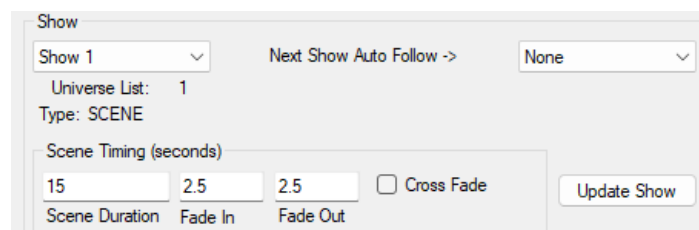
Stream recording starts from the first Art-Net or sACN message received after Record is clicked unless Record Trigger Universe is enabled. See Record Triggering for additional stream recording control based on DMX channel level.

STEPS REQUIRED TO RECORD A SCENE:

- Verify your universe stream source(s) are functioning by observing DMX512 and/or Pixel outputs.
- Select **Show** number 1 – 51 or 255 from dropdown dialogue. Show 255 is the “Blackout” show.
- Enable the Record buttons by selecting the adjacent **Enable** box.
- Start your universe stream sources(s) and click **Record Scene**.
- Click **Stop** to complete the scene capture.

Now a scene has been captured and saved internally. If you select the same show number and **Record Scene** again it will overwrite the existing scene no questions asked. To prevent accidental overwriting of shows, untick the Recorder Enable setting in the Recorder tab and click Update.

Scene Duration is required however **Fade In** and **Fade Out** are optional. Duration includes the fade in and fade out time. Very long duration scenes are supported.



The **Scene Universe List** is displayed under the **Show** selector box. When a scene is recorded any of the defined incoming universes will be captured and the Universe List shows this information.

Scenes can be deleted by selecting the **Show** and clicking **Delete Show** followed by user confirmation. **Show Description** and **Next Show Auto Follow** are also deleted for the selected **Show**.

SHOW TYPES:

When a Show is selected the Type is returned from the node. This is only applicable for firmware v4.9+. There are 5 types for a Show slot.

1. EMPTY – The show slot has no Scene and no Show capture file on SD card.
2. SCENE – There is a scene capture saved to this show slot.
3. SHOW – There is a show stream capture saved on the SD card.
4. SD CARD SCRIPT – Master Script stored on the SD card.
5. INTERNAL SCRIPT – Master Script stored internally.

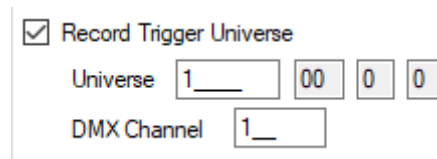
INDICATOR STATES

Port status indicators are used to show record and playback activity. Because all ports are active as record/playback at once the indicators will operate in unison, it's not possible to distinguish between states beyond slow or fast flashing however this is usually adequate to determine which action is occurring.

Port Indicators State	Meaning
Slow flash Green	Selected show does not exist
Slow flash Green	Show selected
Fast flash Green	Playing show
Fast flash Green	Recording show

RECORD TRIGGERING

Usually a show or lighting sequence has a definite start and finish state and it may be a little tricky to start the show and click Record then Stop at a precise moment especially if the show is intended to be looped for example without noticeable transition.



The screenshot shows a control interface for 'Record Trigger Universe'. It features a checked checkbox labeled 'Record Trigger Universe'. Below this, there are input fields for 'Universe' (containing '1'), '00', '0', and '0'. At the bottom, there is a 'DMX Channel' input field containing '1'.

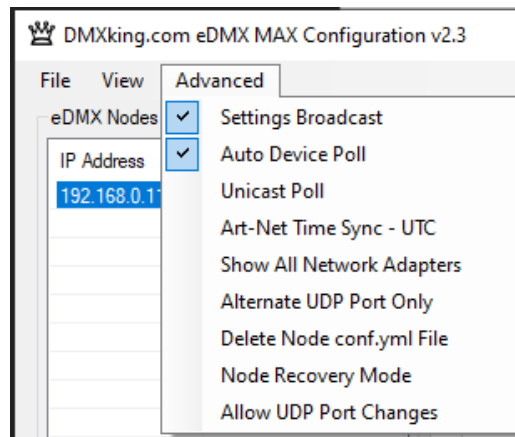
By selecting **Record Trigger Universe** and specifying the **Universe** and **DMX Channel** the show recording will be paused until the specified channel is above 0%. Universe is sACN 1-63999 with Art-Net equivalent displayed adjacent (all DMXKing products map Art-Net 00:0:0 to universe 1). DMX Channel 1-512 must also be specified. Record Trigger Universe is independent of any other configured universe on the device and in larger systems would be broadcast or multicast to multiple devices in order to synchronize recordings.

Steps required to record a show with triggering:

- **Enable Record Trigger**, enter the applicable **Universe** and **DMX Channel**. Click **Update**.
- Verify your universe stream source(s) are functioning by observing DMX512 and/or Pixel outputs.
- Select **Show** number from dropdown dialogue.
- Enable the Record button by selecting the adjacent **Enable** box.
- Click **Record**. (Nothing is recorded yet unless your trigger channel is already > 0%)
- Start your universe stream sources(s) including the Record Trigger universe.
- Stream recording is only active when the Trigger Universe/Channel is above 0%.
- Click **Stop**. (Record Trigger already paused stream recording prior to Stop if the channel level returned to 0%)

BASIC OPERATION

AutoDevicePoll should be enabled to maintain continuous Node Report updates (manual Refresh on macOS version).

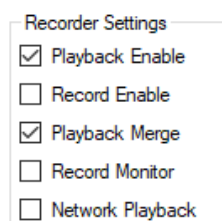


Show playback can be initiated through the Controls panel or via network through Art-Net Trigger commands (refer to section on Art-Net Control).



Steps required to play back a show:

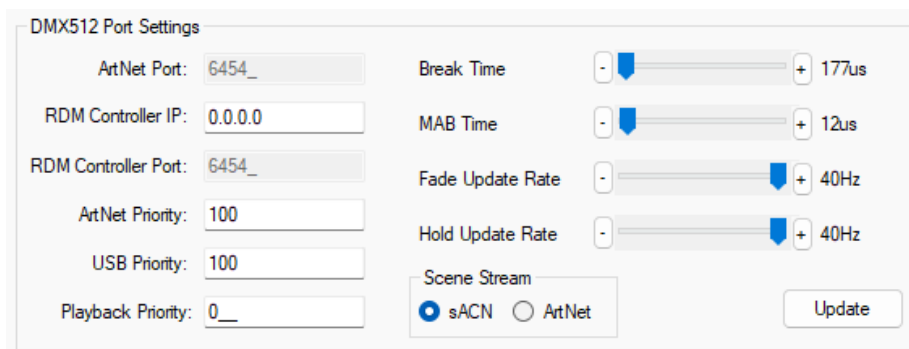
- Ensure **Playback Enable** is selected.
- Select **Show** number from dropdown dialogue.
- Click **Play**.
- To stop playback before the show has finished click **Stop**.



Selecting **Playback Merge** permits live network streams to be merged in with play back streams or completely take over depending on sACN Priority setting. Note that device limitations such as number of merge stream sources still apply regardless of live or playback source (i.e. you can't HTP/LTP merge 2 live streams with 1 playback stream since 3 streams exceeds the merge source limit of 2). There are no limits on the number of different sACN Priority streams and a scenario might be looped playback at priority 99 for standalone lighting which is overridden by a lighting console at priority 100 (only when present) which is overridden by a tablet computer used for rigging at priority 101 (only when present).

SCENE PLAYBACK OUTPUT UPDATE RATES

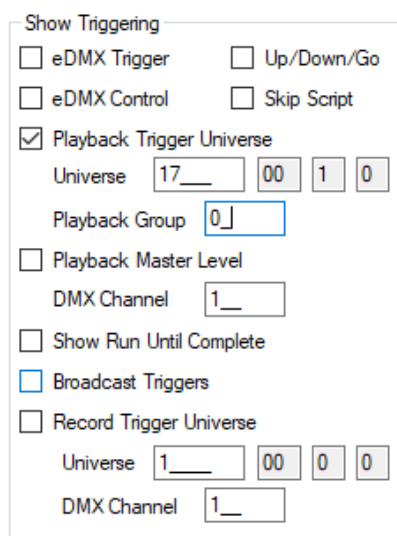
Scenes and dynamically generated with specified output update rates. The fade rate and hold rate (period between end of fade in and start of fade out) can be adjusted in the Settings tab. **Network Playback** can be used with scene playback and stream generation of sACN or ArtNet is supported.



DMX512 Port Settings

ArtNet Port: 6454_	Break Time: - [slider] + 177us
RDM Controller IP: 0.0.0.0	MAB Time: - [slider] + 12us
RDM Controller Port: 6454_	Fade Update Rate: - [slider] + 40Hz
ArtNet Priority: 100	Hold Update Rate: - [slider] + 40Hz
USB Priority: 100	Scene Stream: <input checked="" type="radio"/> sACN <input type="radio"/> ArtNet
Playback Priority: 0_	<input type="button" value="Update"/>

PLAYBACK TRIGGERING



Show Triggering

<input type="checkbox"/> eDMX Trigger	<input type="checkbox"/> Up/Down/Go
<input type="checkbox"/> eDMX Control	<input type="checkbox"/> Skip Script
<input checked="" type="checkbox"/> Playback Trigger Universe	
Universe	17_ 00 1 0
Playback Group	0_
<input type="checkbox"/> Playback Master Level	
DMX Channel	1_
<input type="checkbox"/> Show Run Until Complete	
<input checked="" type="checkbox"/> Broadcast Triggers	
<input type="checkbox"/> Record Trigger Universe	
Universe	1_ 00 0 0
DMX Channel	1_

A dedicated **Playback Trigger Universe** can be enabled. This is independent from any configured universes for DMX512 or Pixel outputs. Typically, this universe would be broadcast or multicast to multiple devices for synchronized playback triggering from a lighting console or other Art-Net/sACN source however unicast is also supported.

It is also possible to configure a node port for DMX-IN on the same universe as the **Playback Trigger Universe**. This allows a local DMX512 source to trigger show playback.

Playback Group is used to limit show triggering to a group of 10 shows allowing the same broadcast/multicast universe to trigger different shows on different units. **Playback Group** = 0 disables the group restriction. **Playback Group** = 1 -> show1 thru show 10, **Playback Group** = 2 -> show11 -> show 20 etc.

Mapping of the **Playback Trigger Universe** channels to Show number is as follows:

- **Playback Master Level** = Specified **DMX Channel** (only applicable to LeDMX4 MAX pixel outputs)
- Show 1 = Channel 2
- Show 2 = Channel 3
- [Show 4 thru Show 253]
- Show 254 = Channel 255
- Show 255 is the Blackout show and cannot be run through Playback Universe control
- Show 0 (script run) = Channel 257

Channel levels are split into 3 ranges to allow various options for playing back a show. Stop, Idle, Start.

- 0-33% Stop show
- 34-66% Idle
- 67-100% Start show

This mapping allows a slider to be used to active a show (67-100%) then whilst it runs move to Idle (34-66%) so it runs to the end and finally upon completion it can be moved to the Stop position (0-33%). Optionally the same show can be looped by simply leaving the channel in Start show range (67-100%). At any time, a show may be stopped with the channel in Stop (0-33%).

The lowest Channel takes precedence thus setting Channel 2 & 3 to 100% will run Show 1 but if Channel 2 is stopped (level 0%) then Show 2 will run since it was the next highest channel with a Start level.

Recorded universes matching **Playback Trigger Universe** will not trigger shows in order to preserve your sanity.

PLAYBACK MASTER LEVEL

Show Triggering

☐ eDMX Trigger ☐ Up/Down/Go

☐ eDMX Control ☐ Skip Script

☐ Playback Trigger Universe

Universe

Playback Group

☒ Playback Master Level

DMX Channel

☐ Show Run Until Complete

☐ Broadcast Triggers

☐ Record Trigger Universe

Universe

DMX Channel

Playback Master Level DMX Channel is used in conjunction with **Playback Trigger Universe**. It is not necessary to enable Playback Triggering via this universe in order to use the **Playback Master Level** control however you must specify the universe. Both may be enabled however take care to place your **Playback Master Level DMX Channel** away from the Trigger DMX Channels. DMX Channel 1 is unused by the Triggers DMX Channels > 256 are unused too. **Playback Group** can also be used to

reduce the Trigger DMX Channel footprint to 10 shows thus allowing a single universe to independently trigger shows on multiple units. Playback Group = 1 -> show001 through show010, Playback Group = 2 -> show011 through show020 etc. And Playback Master Level DMX Channel can also be independent for each Playback Group assigned unit.

EDMX TRIGGER

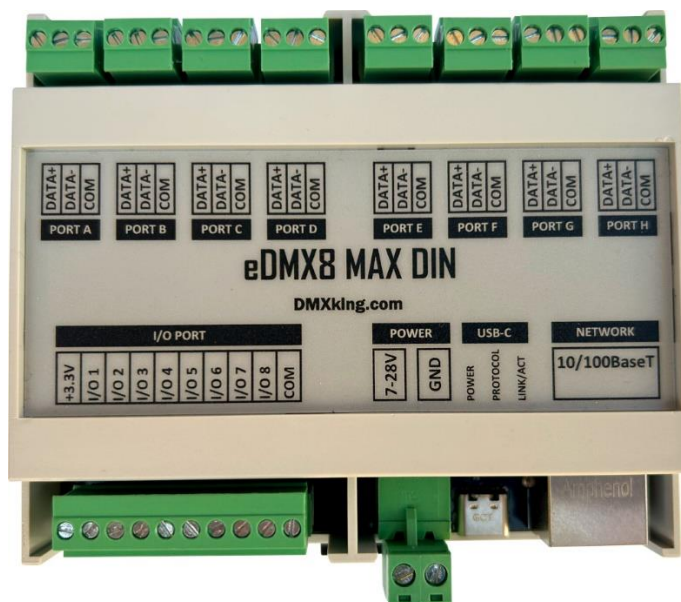
Simple contact closure external triggering is supported on some MAX product line units. The earlier eDMX Trigger accessory for PRO units is not used with MAX units however for configuration purposes the name is retained.



LeDMX4 MAX I/O Port 8x trigger inputs **Reversed I/O designations shown in this image

Errata

Some LeDMX4 MAX units have incorrect I/O PORT top panel labels. The I/O 1-8 designations are reversed i.e. I/O 8 -> I/O 1, I/O 7 -> I/O 2 etc.



eDMX8 MAX DIN I/O Port 8x trigger inputs

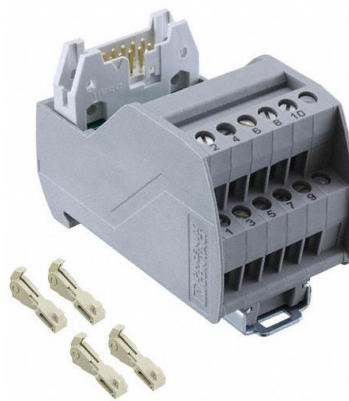


eDMX1 MAX DIN I/O Port header



eDMX2 MAX I/O Port header

Models with 10way ribbon cable headers require a breakout module or custom interfacing to other systems. Phoenix Contact part number 2315010 can be used for breakout in conjunction with a 10way 0.1" pitch 2x5 IDC plug cable.



Phoenix Contact P/N 2315010

IDH header pinout mapping

Pin	Function	Pin	Function
1	+3.3V	2	I/O 1
3	I/O 2	4	I/O 3
5	I/O 4	6	I/O 5
7	I/O 6	8	I/O 7
9	I/O 10	10	Common

There are 2 modes of operation for contact closure external triggering.

- Simple mode: Show 1, 2, 3, 4, 5, 6, 7, Master Script *or* Show 1, 2, 3, 4, 5, 6, 7, 8
- Show Up/Down/Go mode:

Up/Down/Go mode will only function on consecutive show numbers. For example, if you record show001, show002 and show004 the last one won't be accessible because show003 is missing. Once the highest consecutive show number is reached the next Up input will cause a loop back to show001. Once the lowest show number is reached further Down inputs will have no effect. This allows simple external reset to the first show by simply toggling Down at least the number of consecutive recorded shows before triggering Go which is helpful when external controllers are used to trigger the MAX unit.

Show Triggering
☒ eDMX Trigger
☐ Up/Down/Go
☐ eDMX Control
☐ Skip Script
☐ Playback Trigger Universe

Universe
17
00
1
0

Playback Group
0

☐ Playback Master Level

DMX Channel
1

☐ Show Run Until Complete
☐ Broadcast Triggers
☐ Record Trigger Universe

Universe
1
00
0
0

DMX Channel
1

Enable **eDMX Trigger** for Simple mode. Enable **Skip Script** for shows 1-8 or disable for shows 1-7 + Master Script.

Enable **eDMX Trigger** and **Up/Down/Go** for this operation mode.

Broadcast Triggers allows a single MAX node on the network to broadcast the Show run commands to other units on the same Local Area Network. Note sending show triggers to earlier eDMX/LeDMX PRO hardware is limited to the first 4 triggers and only MAX units will respond to all 8 triggers.

Show Run Until Complete ensures an externally triggered show runs until completion before another show can be triggered. This prevents multiple re-starts of a show if the input is re-triggered.

The **eDMX Control** option is not implemented.

Trigger port pin mapping:

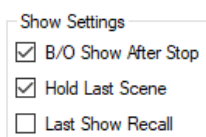
- I/O Port 1 = Show 1 / Up
- I/O Port 2 = Show 2 / Down
- I/O Port 3 = Show 3 / Go
- I/O Port 4 = Show 4 / Black Out
- I/O Port 5 = Show 5
- I/O Port 6 = Show 6
- I/O Port 7 = Show 7
- I/O Port 8 = Show 8 *or* Script Run

To trigger an input simply connect the I/O Port to COM/GND (pin 10) using a normally open contact push button. The input can also be driven low by a 3.3V logic level external driver or open drain logic device. Do not exceed 3.3V. Lowest I/O Port takes priority.

Single button next show triggering can be achieved by wiring 1 button to both I/O Port 1 (Up) and I/O Port 3 (Go). This will advance to the next show and immediately start the show.

PLAYBACK COMPLETION ACTION

When show playback reaches the end of a show file there are several options which determine what happens next to the DMX512 ports and/or Pixel outputs.

A screenshot of a 'Show Settings' dialog box. It contains three checkboxes: 'B/O Show After Stop' (checked), 'Hold Last Scene' (checked), and 'Last Show Recall' (unchecked).

Show Settings	
<input checked="" type="checkbox"/>	B/O Show After Stop
<input checked="" type="checkbox"/>	Hold Last Scene
<input type="checkbox"/>	Last Show Recall

Enabling **Hold Last Scene** will maintain whatever the last channel states were present at the end of a show file. If those states were an sACN stream terminate then outputs will of course be off already before the hold occurs. For DMX512 ports that should **Hold Last Scene** ensure **Timeout all sources** is not enabled since the recorder stream source will end.

Enabling **Blackout Show After Stop** causes show255 (a special show assigned to Blackout) to run immediately upon show end or after a Stop command is received through any of the show triggering mechanisms. Rather than just forcing everything to black/off you can also record your own "Blackout" show to provide flexibility for whatever fixtures are connected and provide a lights-on condition if desired.

SHOW DESCRIPTION

Show

Show 1 ▾ Next Show Auto Follow -> None ▾

Capture File Size: 3 MB (3,578,160)

Update Show

Show Description Show 1 - Test pattern RGB chase Universe 1

Master Script

Delete Show

Select the applicable **Show** and edit the **Show Description** text then click **Update Show**. The text is saved on the SD card in file infoNNN.txt where NNN is the show number.

NEXT SHOW AUTO FOLLOW

The Next Show Auto Follow option provides a simple method for stringing several shows together and/or looping back to a show.

Show

Show 1 ▾ Next Show Auto Follow -> Show 1 ▾

Capture File Size: 3 MB (3,578,160)

Update Show

Show Description Show 1 - Test pattern RGB chase Universe 1

Master Script

Delete Show

Select the applicable **Show** then select the **Next Show Auto Follow** show. In the example above Show 1 -> Show 1 will just loop Show 1 forever once it's started.

LAST SHOW RECALL

Show Settings

☐ B/O Show After Stop

☐ Hold Last Scene

☒ Last Show Recall

Last Show Recall saves the last running show number and recalls upon power up if the unit has been powered down. Master Script, if present, will override Last Show Recall upon power up. Typically Last Show Recall is used for Up/Down/Go trigger applications to ensure the last running show continues to run. Last Show Recall does not function with Scenes.

PLAYBACK AUTOMATION

There are two scripting mechanisms.

- Basic scripting intended to run a sequence of show files optionally looped and optionally auto-run at power on.
- A crontab style for playback automation allowing shows to be run at specific times/days and/or periodically.

All eDMX/LeDMX MAX hardware contains an internal volatile clock which can be synchronized to an NTP server (local or internet). Time zones and Daylight Savings time are supported. Optionally an internal CR1220 battery may be used to maintain the clock during power outages or when network/NTP access is unavailable. For crontab style master scripts that require correct date/time before starting there is an option CRON wait in the Recorder configuration that will pause crontab run until a successful NTP response is received.

The screenshot shows the 'Recorder' tab in a configuration window. It includes fields for 'NTP Server IP' (69.89.207.199), 'NTP Poll Interval' (2) Hours, and 'Time Zone' (UTC +12:00). There are checkboxes for 'US Date Format' (unchecked) and 'CRON wait' (checked). To the right of these fields are three checkboxes labeled 'S', 'C', and 'C'.

CRON wait option

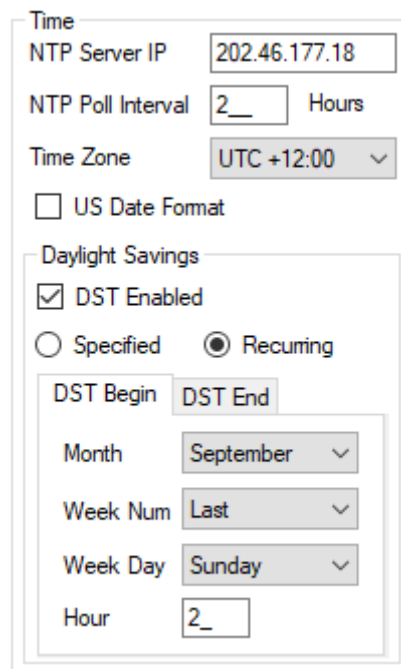
The screenshot shows the 'Show' configuration window. It has a 'Master Script' dropdown menu, a 'Next Show Auto Follow ->' button, and a 'Capture File Size' field. Below these is a 'Show Description' text area containing 'Master Script looping shows 1-4'. A 'Master Script' text area contains a list of script files: DMXKING, VER=0.1, AUTORUN, show001, show002, show003, show004, and show000. There are 'Update Show' and 'Delete Show' buttons.

Master Script can be edited directly by selecting **Show** Master Script. A Show Description can also be added. Click **Update Show** to save both items. Script files can also be accessed through a TFTP file transfer session, see the File Access section for file type information.

INTERNAL CLOCK

All eDMX/LeDMX MAX nodes implement an internal clock which initializes at Friday 17th July 2009 13:12:11 UTC+00:00 upon power up. Date/time updates through ArtNet TimeSync messages or a specified Network Time Protocol (NTP) server will be applied to the internal clock but are lost when the node is powered down unless the internal CR1220 battery is installed. Local time zone and daylight savings adjustments are applied from node configuration parameters.

If the eDMX/LeDMX MAX node has internet access via a router NTP time synchronization may be used. The Default Gateway must be correctly specified in Network Settings and applicable firewall permissions granted if your network has tighter security policies. Local network NTP time servers may also be used.



The screenshot shows a 'Time' configuration window with the following fields and options:

- NTP Server IP:** 202.46.177.18
- NTP Poll Interval:** 2 Hours
- Time Zone:** UTC +12:00 (dropdown menu)
- ☐ **US Date Format**
- Daylight Savings:**
 - ☒ **DST Enabled**
 - ☐ **Specified** ☒ **Recurring**
 - DST Begin / DST End:**
 - Month:** September (dropdown menu)
 - Week Num:** Last (dropdown menu)
 - Week Day:** Sunday (dropdown menu)
 - Hour:** 2 (text input)

Specify the IPv4 **NTP Server IP** address. Don't use the IP in this example because it's in New Zealand and probably a long way from your location, find a closer NTP server from <https://www.ntppool.org/en/> and lookup the IPv4 address using <https://whatismyipaddress.com/hostname-ip>

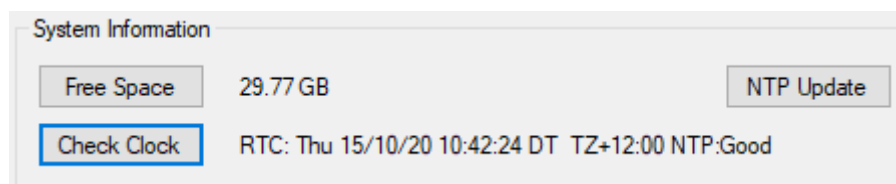
Set the **NTP Poll Interval** (Hours). To disable NTP set this to 0.

Select your **Time Zone**. <https://timezonedb.com/time-zones>

Chose **US Date Format** if desired.

Daylight Savings time offset can be configured as either a **Specified** date or **Recurring** date. Almost always, Recurring dates are used such as USA DST Begin 2nd Sunday March @ 02:00 and DST End 1st Sunday November @ 02:00. Daylight savings time by country: https://en.wikipedia.org/wiki/Daylight_saving_time_by_country

Click **Update** to save Time settings.



The screenshot shows a 'System Information' window with the following information:

- Free Space:** 29.77 GB
- Check Clock:** (button)
- RTC:** Thu 15/10/20 10:42:24 DT TZ+12:00 NTP:Good
- NTP Update:** (button)

Current date/time can be verified using **Check Clock**. The status of NTP synchronization is also displayed as Good/Waiting or Disabled. Click **NTP Update** for manual synchronization and then **Check Clock** to verify NTP server requests are working.

MASTER SCRIPT SHOW LIST FORMAT

The master show script file show000.txt is in ASCII text and must start with the following lines:

```
DMXKING  
VER=0.1
```

Followed by:

```
AUTORUN or AUTOOFF
```

A list of shows:

```
show001  
show002  
show006
```

And finally, to loop the show list (optional):

```
show000
```

Next Show Auto Follow does not apply to Master Script list format show automation.

MASTER SCRIPT CRONTAB FORMAT

This is an alternative master show script file show000.txt in ASCII text. Whilst not a true unix/linux crontab format because of different requirements it is still a chronological table. The file must start with:

```
DMXKING  
VER=0.1
```

Followed by:

```
CRONTAB or CRONOFF to enable or disable the Master Script.
```

Followed by:

A list of shows preceded by chronological parameters. Each parameter is separated by a SPACE character. Up to 20 CRON entries can be included in the script file.

```
[sec] [min] [hour] [month_day] [month] [week_day] [interval] [duration] showNNN
```

The first 6 parameters relate to a specified time/day showNNN should be run and each parameter can be set to a wildcard * instead of a number however **[interval]** and **[duration]** parameters can be used independently of time/day parameters or in conjunction with them. **[duration]** is how long in seconds showNNN should be triggered for ranging from 0 to 86400. **[interval]** is the time period between repeated runs of showNNN in seconds ranging from 0 to 86400. It is important to consider that unrealizable parameter combinations exist.

```
[sec] 0-59 or *  
[min] 0-59 or *  
[hour] 0-23 or *  
[month_day] 0-31 or * (some months < 31 days)  
[month] 1-12 or *  
[week_day] 0-6 or * (Sun = 0, Mon = 1, Tue = 2, Wed = 3, Thu = 4, Fri = 5, Sat = 6)  
[interval] 0-86400 (seconds). 0 = Disabled  
[duration] 0-86400 (seconds). 0 = Disabled
```

Next Show Auto Follow is observed with Master Script crontab format show automation and is used in concert for looping shows for a specified duration triggered at a time of day or interval.

See examples below. These can be copied and pasted into the eDMX Recorder window Master Script box (Ctrl-C Ctrl-V).

EXAMPLE MASTER SCRIPT SHOW LIST FORMAT

Example 1: Run master script upon power up, show001 looped forever.

```
DMXKING
VER=0.1
AUTORUN
show001
show000
```

Example 2: Run script only upon Trigger of show000. Starts with show006 followed by show002 followed by show006 followed by show003 then Stop.

```
DMXKING
VER=0.1
AUTOOFF
show006
show002
show006
show003
```

EXAMPLE MASTER SCRIPT CRONTAB FORMAT

Example 1: Run show001 every 55 seconds forever. Any date/time. [duration] must be 0.

```
DMXKING
VER=0.1
CRONTAB
* * * * * 55 0 show001
```

Example 2: Run show001 once at 10:00:00 every day.

```
DMXKING
VER=0.1
CRONTAB
0 0 10 * * * 0 0 show001
```

Example 3: Run show001 every 60 seconds for a duration of 1 hour (3600 seconds) at 15:30:00 every day.

```
DMXKING
VER=0.1
CRONTAB
0 30 15 * * * 60 3600 show001
```

Example 4: Run show001 once at 10:00:00, show002 once at 10:30:00, show003 once at 11:00:00, show004 once at 15:02:15 every day.

```
DMXKING
VER=0.1
CRONTAB
0 0 10 * * * 0 0 show001
0 30 10 * * * 0 0 show002
0 0 11 * * * 0 0 show003
15 2 15 * * * 0 0 show004
```

Example 5: Run show001 once at 09:00:00 on Mon and Wed, show002 once at 09:00:00 on Tue and Thu.

```
DMXKING
VER=0.1
CRONTAB
0 0 9 * * 1 0 0 show001
0 0 9 * * 3 0 0 show001
0 0 9 * * 2 0 0 show002
0 0 9 * * 4 0 0 show002
```

Example 6: Run show001 every 60 seconds for 250 seconds at 5 and 35 minutes past the hour every day.

```
DMXKING
VER=0.1
CRONTAB
* 5 * * * * 60 250 show001
* 35 * * * * 60 250 show001
```

Example 7: Run show001 at 30 seconds past the minute for a duration of 30 seconds. For this example show001 is a 5 second sequence but looped by using Next Show Auto Follow specified as show001 (i.e. show001 loops).

```
DMXKING
VER=0.1
CRONTAB
30 * * * * * 0 30 show001
```

Example 8: Run show001 from midnight Sunday for 24hrs, show002 from midnight Monday for 24hr, show003 from midnight Tuesday for 24hr, show004 from midnight Wednesday for 24hr, show005 from midnight Thursday for 24hr, show006 from midnight Friday for 24hr, show007 from midnight Saturday for 24hr. Each show needs to be looped by specifying the Show Auto Follow to the same show.

```
DMXKING
VER=0.1
CRONTAB
0 0 0 * * 0 0 86400 show001
0 0 0 * * 1 0 86400 show002
0 0 0 * * 2 0 86400 show003
0 0 0 * * 3 0 86400 show004
0 0 0 * * 4 0 86400 show005
0 0 0 * * 5 0 86400 show006
0 0 0 * * 6 0 86400 show007
```

Now for some bad examples that don't produce sensible results.

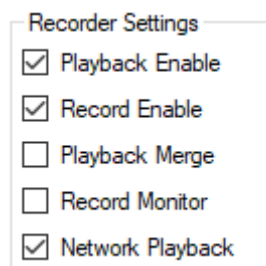
Bad Example 1: Results in only show002 running every 60 seconds. Why? Crontab entries are evaluated in list order and the first entry is run but immediately replaced by the 2nd entry with identical timing. Even if show002 is very short it won't be replaced by a longer show001 since this is only a show trigger.

```
DMXKING
VER=0.1
CRONTAB
* * * * * 60 0 show001
* * * * * 60 0 show002
```

Bad Example 2: Run show001 on Friday 1st January at 00:00:00 every 120 seconds for 6 hours (21600s). What's wrong with this? Over specified with both [week_day] and [month_day]. Shouldn't be specifying Friday since your new years show will only run during 2021, 2027, 2038 and so on. Changing the 5 to * will result in correct operation of the new years show running every year.

```
DMXKING
VER=0.1
CRONTAB
0 0 0 1 1 5 120 21600 show001
```

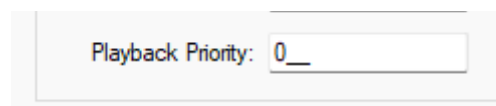
NETWORK PLAYBACK

A dialog box titled "Recorder Settings" with a light blue border. It contains five checkboxes: "Playback Enable" (checked), "Record Enable" (checked), "Playback Merge" (unchecked), "Record Monitor" (unchecked), and "Network Playback" (checked).

Recorder Settings	
<input checked="" type="checkbox"/>	Playback Enable
<input checked="" type="checkbox"/>	Record Enable
<input type="checkbox"/>	Playback Merge
<input type="checkbox"/>	Record Monitor
<input checked="" type="checkbox"/>	Network Playback

Enable **Network Playback** to output recorded streams over the network connection. Only Multicast sACN and Broadcast ArtNet are supported and the protocol headers are re-written accordingly so the source is differentiated from the original. This re-writing is performed on-the-fly thus copying an existing capture file to another device will result in the new device's CID and Source Name appearing in the header for sACN streams.

For large distributed applications Broadcast ArtNet network playback is not recommended and we suggest using sACN protocol whenever possible.

A text input field with the label "Playback Priority:" and the value "0".

Playback Priority: 0

Under the Settings tab **Playback Priority** can be set. This is an override of the recorded stream or scene universe sACN priorities which will cause the playback subsystem to re-write to the specified value. Disable by setting **Playback Priority** to 0.

ART-NET CONTROL - ARTTRIGGER

Underlying record/playback is controlled by ArtTrigger commands. See the latest version of the ArtNet specification for protocol details <https://art-net.org.uk/resources/art-net-specification/>

OEMCode 0xFFFF or 0x6A6B are accepted through either unicast or broadcast ArtTrigger messages.

Key = 3, SubKey = show number (0 – 255 where 0 is the script file “show”)

Key = 2, SubKey = command (see table below)

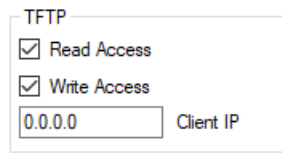
SubKey value (for Key = 2)	Command
'G' (Hex 0x47)	Show GO
'S' (Hex 0x53)	Show STOP
'R' (Hex 0x52)	Show RECORD
'Q' (Hex 0x51)	Scene RECORD

Typical ArtTrigger command sequences:

Sequence of ArtTrigger messages	Action
ArtTrigger Key = 3, SubKey = 1 + ArtTrigger Key = 2, SubKey = 'G'	Start playback of show001
ArtTrigger Key = 2, SubKey = 'S'	Stop playback or recording of current show (if any)
ArtTrigger Key = 3, SubKey = 99 + ArtTrigger Key = 2, SubKey = 'R'	Start recording show099
ArtTrigger Key = 3, SubKey = 0 + ArtTrigger Key = 2, SubKey = 'G'	Start script file playback

If you plan on implementing ArtTrigger in your own software use WireShark to observe messages generated by the eDMX MAX Configuration Utility when Play/Stop/Record are clicked to verify your own code is generating the correct message format.

Low level file access to the SD card is available through TFTP protocol. All files are stored in the root directory and may also be externally manipulated/copied/deleted using any computer capable of mounting FAT32 or exFAT volumes. For large show files of many GB size the speed of TFTP transfer is not great since the DMXKing device only have a fraction of the computing power a typical desktop computer has.



By default, TFTP file access is disabled. Read Access and Write Access is controlled separately and a specific Client IP may be specified to limit connections to only 1 computer. Setting Client IP to 0.0.0.0 allows any computer on the network access.

Microsoft Windows does not come with a TFTP Client program enabled. You can enable this application through Control Panel. Search “Turn Windows features on or off” and locate “TFTP Client” in the list.

It is recommended a folder is created under the root directory for storing show and script files. For example C:\shows. Then create sub folders for each DMXKing device using whatever naming convention suits your application (e.g. C:\shows\LeDMX-Unit-1)

To write a master show script file using Windows TFTP Client perform the following steps:

- Open a Command Prompt window.
- Type `cd c:\shows\LeDMX-Unit-1`
- Type `tftp -i 192.168.0.113 PUT show000.txt show000.txt`

Of course, you would need to have created the file show000.txt first on the computer and saved it in the c:\shows\LeDMX-Unit-1 folder. Also, the IP address of your unit may well be different from the example of 192.168.0.113 so change accordingly.

To read a master show script file:

- Open a Command Prompt window.
- Type `cd c:\shows\LeDMX-Unit-1`
- Type `tftp -i 192.168.0.113 GET show000.txt show000.txt`

The show000.txt file can be opened with Notepad, edited and the PUT back again as above. Obviously once the Command Prompt window is open and in the correct folder location you can skip those steps and just run tftp commands. Writing a few simple batch files can help simplify this upload process.

To delete a file:

Because the tftp protocol does not support deleting of files we have included a specially named file upload mechanism to perform deletions. Uploading a filename starting with _DEL will cause the matching file to be deleted. _DEL001.txt will delete show001.txt and _DEL055.cap will delete show055.cap for example.

- Open a Command Prompt window.
- Type `cd c:\shows\LeDMX-Unit-1`
- Create a blank txt file named `_DEL001.txt`
- Type `tftp -i 192.168.0.113 PUT _DEL001.txt _DEL001.txt`

To read the SD card root directory file list:

- Type `"tftp -i 192.168.0.113 GET files.txt files.txt"`

This is a special file that is dynamically generated upon request since the TFTP protocol does not support directory listing by itself. Open `files.txt` in Notepad to view the directory listing along with free space information.

You can use any TFTP Client application you like and for large file transfers the Windows TFTP Client doesn't actually comply with wraparound block counts so fails miserably. Our recommendation is the haneWIN TFTP implementation which can be found here <https://www.hanewin.net/tftp-e.htm> however take note the command line switch options are different.

File system datetime stamps use the internal clock.

SUMMARY OF FILE TYPES

File	Description
showNNN.cap	Show capture file. NNN = 001 to 255
showNNN.txt	Next Show Auto Follow script ASCII text file. NNN = 001 to 255
infoNNN.txt	Show Description ASCII text file. NNN = 000 to 255
show000.txt	Master Script ASCII text file
files.txt	Dynamic file generated upon tftp get. File listing of root directory
lastshow.txt	Last selected show ASCII text file (if option enabled)