generators and controllers for DMX applications

CAPYBARA

Descrizione - Description

Capybara è un nodo ART NET e può gestire fino al massimo uno universe DMX quindi 512 canali. Oltre ad essere un nodo art net capybara trova-applicazione come recorder e player di show memorizzati una SD (opzionale), lo show registrato viene lanciato quando il capibara è alimentato. Capybara è anche in grado di gestire RDM over Art Net, quindi di gestire apparecchiature collegate sul DMX in modalità RDM con discovery dei dispositivi connessi, e con conseguente possibilità di cambiarne le personalità e lettura di tutte le informazioni di servizio disponibili in RDM. La programmazione dell'indirizzo IP e le modalità art net avvengono con i software Art net compatibili, o con il nostro Jartnet405, oppure con il nuovo Esuite scaricabile da: www.overled.com. Capybara è disegnato per essere installato su barra DIN oppure per essere attaccato con stringhe in velcro su tubolari o altro. Capybara è progettato per essere alimentato da HUB Ethernet POE, power over ethernet o tramite alimentatore esterno da 12 a 48vdc non incluso.

Capybara it is ART NET node, one universe available (512 dmx channel), it is a DMX recorder, DMX to Art Net Node, RDM over Art Net interface, DMX player. SD memory (optional) for a large DMX show storage, one show per SD, no multi show selection available. Capybara it is compatible with Art Net node protocol for setting IP, broadcast please use Esuite or Jartnet405 from site, the software it is free of charge. Capybara can be powered by external power supply (not included) with it's connector or by POE power over ethernet HUB. Capybara it can be mounted on electrical DIN BAR or by velcro strips on request.

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Techinal Specifications

RDM/DMX/ArtNet
ArtNet to DMX
RDM e1.20 Compliance
DMX to ArtNet
ArtNet Recorder
DMX Recorder
ArtNet + DMX Player
Aluminium satinated
Ethernet IEEE 802.3 10Base-T
USITT DMX512 B
2GB microSD card
IP 30
Operating Temp -5°C + 50°C
Power supply 12- 48 VDC – 500 mA
Power consumption 350 mA @ 12 VDC
Mounting DIN BAR or velcro strips
Humidity HR from 30 to 85%

Dimensioni - Dimensions

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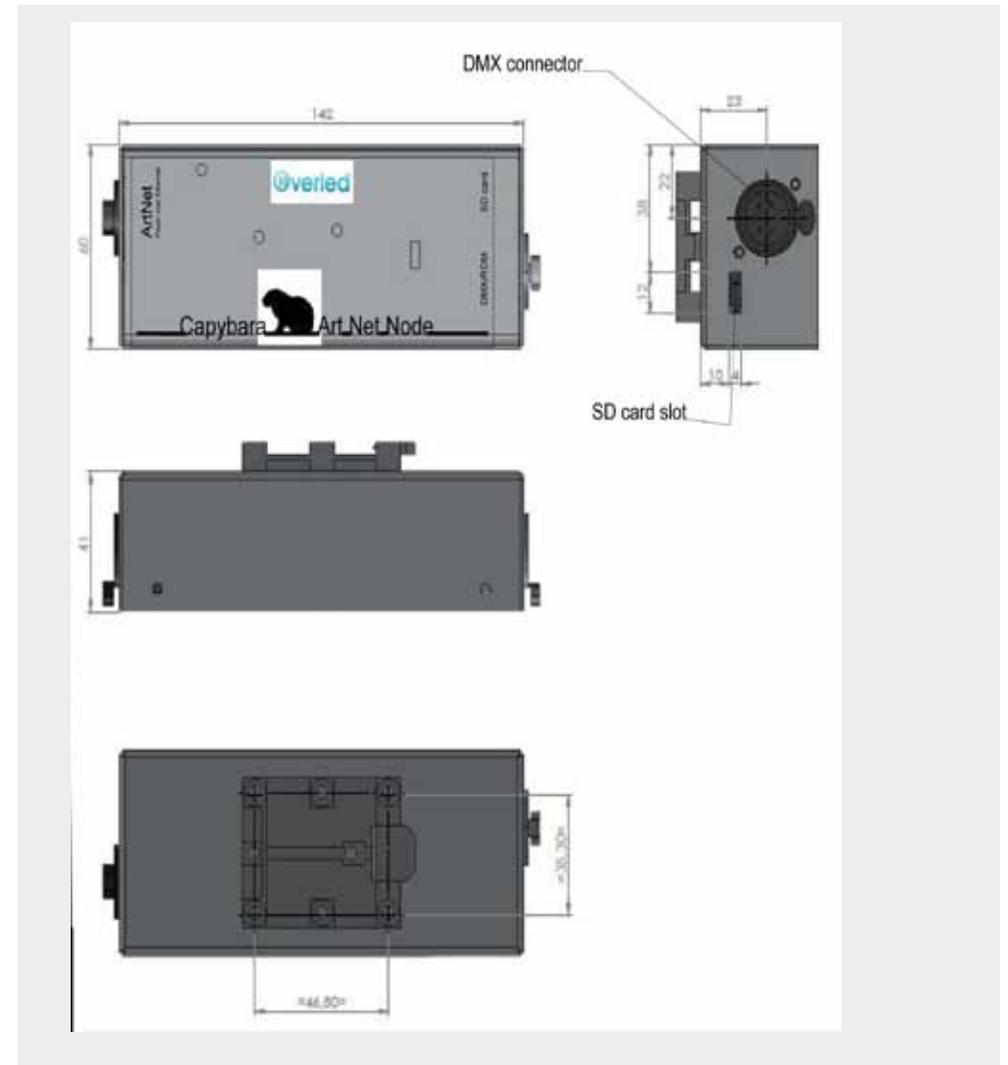
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Dmx 512

Developed by the Engineering Commission of United States Institute for Theatre Technology (USITT), the standard was created in 1986, with subsequent revisions in 1990 leading to USITT DMX512/1990.DMX512-A In 1998 the Entertainment Services and Technology Association(ESTA) began a revision process to develop the standard as an ANSI standard. The resulting revised standard, known officially as "Entertainment Technology — USITT DMX512-A— Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories", was approved by the American National Standards Institute (ANSI) in November 2004. This current standard is also known as "E1.11, USITT DMX512-A", or just "DMX512-A", and is maintained by ESTA.

Network topology

ADMX512 network employs a multi-drop bus topology with nodes strung together in what is commonly called a daisy chain. Anetwork consists of asingle DMX512 controller — which is the sole master of the network — and one or more slave devices. For example, a lighting console is frequently employed as the controller for a network of slave devices such as dimmers, fog machines and intelligent moving lights.Each slave device has a DMX512 "IN" connector and, in many case, a DMX512 "OUT" connector (sometimes marked "THRU") as well. The controller, which has only an OUT connector, is connected
via a DMX512 cable to the IN connector of the first slave. Asecond cable then links the OUTor THRU connector of the first slave to the IN connector of the next slave in the chain, and so on. The final, empty, OUTor THRU connector ofthe last slave on the daisy chain should have a terminator plugged into it. Aterminator is a stand-alone male connector with a built-in resistor.Theresistor — typically 120 Oto match the cable characteristic impedance, is connected across the primary data signal pair. If a secondary data pair isused, then another termination resistor is connected across it as well. Although simple systems, i.e., systems having few devices and short cableruns, may work reliably without a terminator, it is considered good practice always to use a terminator at the end of the daisy chain. Some DMXdevices have built-in terminators that can be manually activated with a mechanical switch or by software, or by
automatically sensing the absence of a connected cable.Each DMX network is called a "DMX universe". Large control desks (operator consoles) may have the capacity to control multiple universes, with an OUTconnector provided for each universe.

Electrical

DMX512 data are sent using EIA-485 voltage levels. However, quoting from E1.11, "The electrical specifications of this Standard are those of EIA-485-A, except where specifically stated in this document. Where a conflict between EIA-485-A and this document exists, this document is controlling as far as this Standard is concerned."DMX512 is a bus network no more than 1200 meters long, with not more than 32 devices on a single bus. If more than 32 devices need to communicate, the network can be expanded across parallel buses using DMX splitters. Network wiring consists of a shielded twisted pair, with a characteristic impedance of 120 Ohms, with a termination resistor at the end of the cable furthest from the controller to absorb signal reflections.

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Connectors

XLR-5 pinout

1. Signal Common
2. Data 1- (Primary Data Link)
3. Data 1+ (Primary Data Link)
4. Data 2- (Optional Secondary Data Link)
5. Data 2+ (Optional Secondary Data Link)
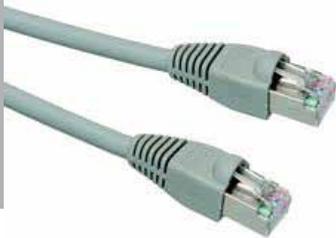
RJ-45 pinout

RJ-45 pinout
1. Data 1+
2. Data 1-
3. Data 2+
4. Not Assigned
5. Not Assigned
6. Data 2-
7. Signal Common (0 V) for Data 1
8. Signal Common (0 V) for Data 2

DMX512 1990 specifies that where connectors are used, the data link shall use five-pin XLR style electrical connectors (XLR-5), with female connectors used on transmitting (OUT) ports and male connectors on receiving ports. DMX512-A (E1.11) requires the use of an XLR-5 connector, unless there is insufficient physical space on the device, in which case an XLR-5 adapter shall be supplied. DMX512-A(E1.11-2008) allows the use ofeight-pin modular (RJ-45) connectors for fixed installations where regular plugging and unplugging of equipment is not required.Some DMX512 equipment manufacturers employ non-compliant connectors and pinouts; the most common of these is the three-pin XLR connector, since the electrical specification currently only defines a purpose for a single wire pair.There is risk of equipment damage if a novice unfamiliar with lighting technology accidentally plugs XLR 3-pin DMX into an audio device, since the DMX signal voltages are much higher than what audio equipment normally uses.Also, devices are sometimes fitted with four-pin connectors when both communications and power are sent through a common cable. The RJ-45 connector pinout matches the conductor pairing scheme used by Category 5(Cat5) twisted pair patch cables.The avoidance of pins 4 and 5 helps to prevent equipment damage, if the cabling is accidentally plugged into a single-line public switched telephone network phone jack. Cabling for DMX512 was removed from the standard and a separate cabling standards project was started in 2004.Two cabling standards have been developed, one for portable DMX512 cables (ANSI E1.27-1 - 2006) and one for permanent installations (draft standard BSR E1.27-2). This resolved issues arising from the differences in requirements for cables used in touring shows versus those used for permanent infrastructure.The electrical characteristics of DMX512 cable are specified in terms of impedance and capacitance, although there are often mechanical and other considerations that must be considered as well. Cable types that are appropriate for DMX512 usage will have a nominal characteristic impedance of 120 ohms. Cat5 cable, commonly used for networking and telecommunications, has been tested by ESTA for use with DMX512A.Also, cables designed for EIA485 typically meet the DMX512 electrical specifications. Conversely, microphone and line level audio cables lack the requisite electrical characteristics and thus are not suitable for DMX512 cabling. The significantly lower impedance and higher capacitance of these cables distort the DMX512 digital waveforms, which in turn can cause irregular operation or intermittent errors that are difficult to identify and correct.

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RDM Physical layer

The RDM protocol and the RDM physical layer were designed to be compatible with legacy equipment. All compliant legacy DMX512 receivers should be usable in mixed systems with an RDM controller (console) and RDM responders (receivers). DMX receivers and RDM responders can be used with a legacy DMX console to form a DMX512 only system. From a user's point of view the system layout is very similar to a DMX system. Thecontroller is placed at one end of the main cable segment. The cable is run receiver to receiver in a daisy-chain fashion. RDM enabled splitters are usedthe same way DMX splitters would be. The far end (the non console or splitter end) of a cable segment should be terminated.RDM requires two significant topology changes compared to DMX. However, these changes are generally internal to equipment and therefore not seen by the user.First, a controller's (console's) output is terminated. Second, this termination must provide a bias to keep the line in the 'marking state'when no driver is enabled.The reason for the additional termination is that a network segment will be driven at many points along its length. Hence, either end of the segment, if unterminated, will cause reflections.ADMX console's output drivers are always enabled. The RDM protocol is designed so that except during discovery, there should never be data collisions. To assure this lack of collisions, while making possible implementation on different platforms, there are times when all line drivers are required to be disabled. If nothing more than the termination was done, the line would float to some unknown level. In that case one or more random changes might be read on the line. These random changes greatly decrease system accuracy. So the biasing of the line is requiredTo assure this, section 2.4.1 (Line Bias Networks) of the standard says; "The command port shall provide a means to bias the termination of the data link to a value of at least 245 mV and verified by using the test circuit described in Appendix F."The standard further states that, the biasing mean "shall be polarized such that Data+ of the data link is positive with respect to Data- the data link. The Line Biasing network shall maintain this bias when the data link is loaded with the equivalent of 32 unit loads and common mode voltage is varied over the range of +7 volts to -7 voltThe standard does not require any particular circuit for providing the basis and termination; however, the simplest method is often a passive pull apart network.Whatever method is used must be tested with the chosen driver chip to see that the design combination still meets the requirement of E1.20. Tests are given in Appendix F of the standard. These tests are for design verification and are not required as production testing. Experience has shown many EIA485 drivers designed for 5 volt operation will pass the required tests. It is not so clear that all 3.3 volt parts will pass. In either case this performance must be verified. Details of the pull apart network and the tests can be found in.

Protocol

RDM packets are inserted in-between the existing DMX data packets being used to control the lighting data. The DMX 512 specification always requires that DMX packets begin with the start code. The default Start Code is 0x00(also known as the Null Start Code). By using the start code 0xCC, RDM packets can be safely inserted between DMX data packets without older non-RDM aware devices attempting to read them.The DMX 512 specification required DMX connectors to be a 5-pin XLR type, with only the first 3 pins being used (pins 4 and 5 were reserved for "future use"). Unfortunately, various manufacturers started using the final two pins for various, proprietary purposes, such as low-voltage power or proprietary talkback protocols. As a result, the decision was made to have all RDM communication on pins 2 and 3. This raises data collision concerns.The RDM standard addresses this problem by ensuring that in all cases (except discovery) only one device is authorized to be transmitting at any given time (somewhat similar to the token passing approach). Only the controller (of which there can be only one) can start an RDM exchange. Responders can speak only if spoken to. The controller will always initiate all RDM communication. All RDM devices have a unique identifier (UID) that consists of a manufacturer ID and serial number.Protocol RDM packets are inserted in-between the existing DMX data packets being used to control the lighting data. The DMX 512 specification always requires that DMX packets begin with the start code. The default Start Code is 0x00(also known as the Null Start Code). By using the start code 0xCC, RDM packets can be safely inserted between DMX data packets without older non-RDM aware devices attempting to read them.

ArtNet

ArtNet is an Ethernet protocol based on the TCP/IP protocol suite. Its purpose is to allow transfer of large amounts of DMX512 data over a wide area using standard networking technology. The latest revision of the protocol implements a number of new features and also simplifies the data transfer mechanism. The hanges are all based on feed back from manufacturers who are using the protocol.
Limitations: A theoretical limit of 255 universes of DMX512 exists in this specification. However a simplistic data rate comparison (DMX runs at 250KBaud, 10BaseT at 10MBaud) suggests a maximum of 40 universes of DMX is the limit. Art-Net uses a simple delta transmission compression technique that will provide about 40 universes. If an installation of more than say 30 universes is contemplated, then it is necessary to use the unicast features of Art-Net II and 100BaseT or better physical layer. If this is done the number of universes limit becomes purely related to the network bandwidth.
Credits: Artistic Licence require that companies who implement Art-Net in their products include a user guide credit of: "Art-Net™ Designed by and Copyright Artistic Licence (UK) Ltd".
Terminology:
• Node: A device that translates DMX512 to or from Art-Net is referred to as a Node.
• Universe: A single DMX512 frame of 512 channels is referred to as a Universe.
• Sub-Net: A group of 16 consecutive universes is referred to as a sub-net. (Not to be confused with the subnet mask).
• A central controller or monitoring device (lighting console) is referred to as a Server.
• IP: The IP is the Internet protocol address. It is expressed in either a long word format (0x12345678) or dot format (2.255.255.255). Convention is that the former is hexa   decimal and the latter is decimal. The IP uniquely identifies any Nodes or Servers on a network.
• Subnet Mask: Defines which part of the IP represents the Network address and which part represents the Node address. All Art-Net implementations require a Sub-Net mask of 255.0.0.0. This means that the first byte of the IP is the network address and the remaining three bytes are the Node address.
• Port: Actual data transmission on Art-Net uses the UDP protocol that operates 'on top of' the TCP/IP protocol. UDP data transfer operates by transferring data from a specific IP:Port address on a Node or Server to a second specific IP:Port address on a second Node or Server. Art-Net uses only one port address of 0x1936.
• Limited Broadcast: When a network first connects, the Server does not know the number of Nodes on the network, nor does it know their IP addresses. The Limited broadcast address allows the Server to send an ArtPoll to all Nodes on the network.
• Server: A generic term describing an Art-Net device with the primary task of generating control data. For example, a lighting console.
• Node: A generic term describing an Art-Net device with the primary task of receiving control data. For example, a dimmer or an Ethernet to DMX gateway.
• Media Server: A generic term describing an Art-Net device capable of generating control data based on the 'mx' Media Extensions to Art-Net.

Protocol operation

A Node operates in one mode, each Node having a unique IP address derived from its Ethernet MAC address. The UDP port used as sources and destinations is 0x1936. IP address configuration
The Art-Net protocol can operate on either a DHCP managed address scheme or using static addresses. By default an Art-Net product will factory start using a Class A IP address scheme. This allows Art-Net products to communicate directly and without the need for a DHCP server to be connected to the network. IP address configuration - DHCP Nodes report whether they are DHCP capable in the ArtPollReply packet. This document details packets on the assumption that static addressing is used. When DHCP is used, the addressing and subnet masks will be modified as dictated by the DHCP server. IP address configuration – Static Addressing The use of Class A addressing is allowed within a closed network. It is important to ensure that Art-Net data is not routed onto the Internet. Products implementing Art-Net should default to the Primary IP address of 2.?.?.?. The IP address consists of a 32 bit number designated as A.B.C.D. The lower the bytes B.C.D is calculated from the MAC address. The high byte 'A' is set to one of two values as shown in the following table. The MAC address is a 48 bit number designated u:v:w:x:y:z. This is a globally unique number. The upper three bytes 'u.v.w' are registered to a specific organisation. The lower three bytes 'x.y.z' are assigned by that organisation. In order to ensure that there is minimal possibility of IP address conflicts between different manufacturers supporting Art-Net, the product OEM code is added to the MAC address. The 'B' field of the IP address is calculated by adding the high byte of the OEM code with the low byte of the OEM code and the 'x' field of the MAC address. On power up, the Node checks its configuration for IP addressing mode. If it has been programmed to use a custom IP address, the following procedure is not used.

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Funzione ArtNet

La gestione delle funzioni ArtNet avviene per mezzo del programma JartNet403, che deve essere lanciato su un computer dotato di Java Runtime. Il computer ed il dispositivo devono essereinterconnessi in rete Ethernet. Nel caso piu' semplice,collegarli direttamen-te mediante un cavo cross. Alimentare il dispositivo. Premere il tasto "Board Manager" presente nella finestra principale del programma: si aprira' una seconda finestra che serve per la gestione del nodo. Nella nuova finestra (Board Manager) premere il tasto "Discover Nodes": se correttamente connesso, il nodo comparira' nella sezione a sinistra della fine-stra stessa. Dopo averlo selezionato (cliccando col tasto sinistro sulla riga che lo identifica) sara' possibile utilizzare tutte le funzioni operative e di impostazione descritte di seguito. Se l'indirizzo IP di default (che viene indicato sulla riga con tutti i dati) non cade all'inter-no della sottorete locale (ad esempio 10.0.0.x) occorre modificarlo mediante l'apposito pulsante.

ArtNet Mode

Art net ,use the java run time software JartNet403 Overled software, before to install check if your computer have Java Runtime.OverledBUSpilot must be connected thru ethernet HUB to PC or by cross ethernet cable.To find the overledBUSpilot Art net node mode, use Board Manager from JartNet403, select the Ip of Art net node, you want to use, set the ip in the software, and start the operation with DMX consolle, recording show or making effect. Art Net node mode is compatible with all kind of device compliant with this standard,please refer to ArtNet device to understand how to connect OverledBUSpilot.

OverLed Installation Example _ Art-Net_
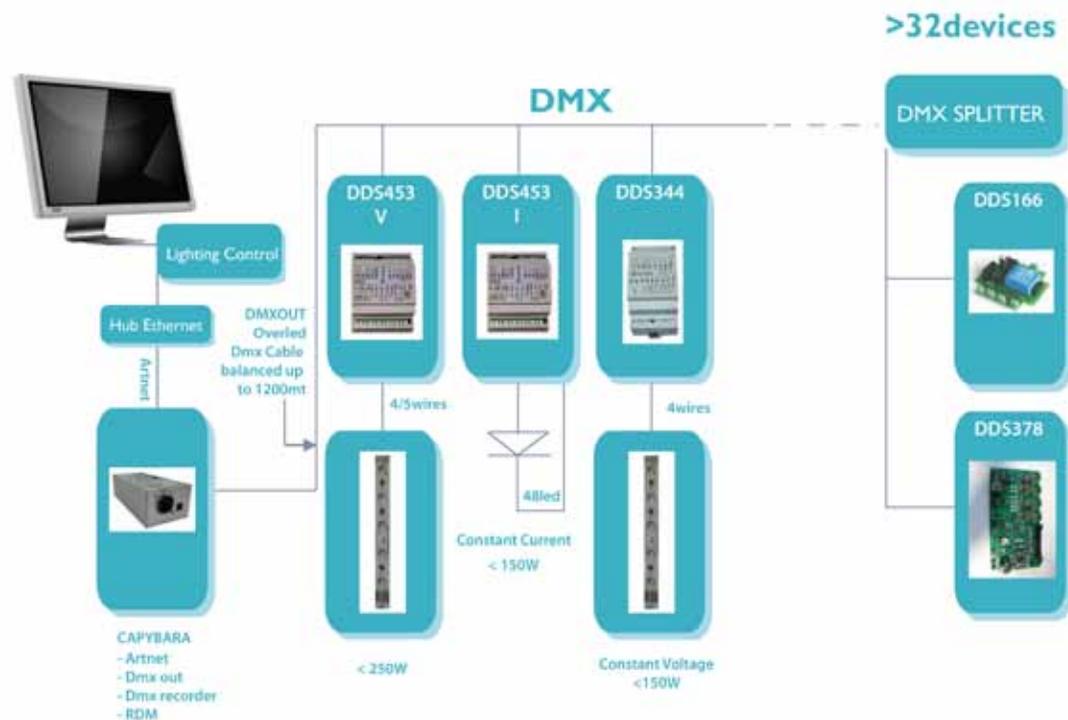
RDM Setting Screen Shot

Slave discovery

Slave identification on bus

Sub net device

DMX address