HDMI 1x4 Distribution Hub
500420

Installation Guide

P/N: 94-000663-A SE-000663-A

MuxLab

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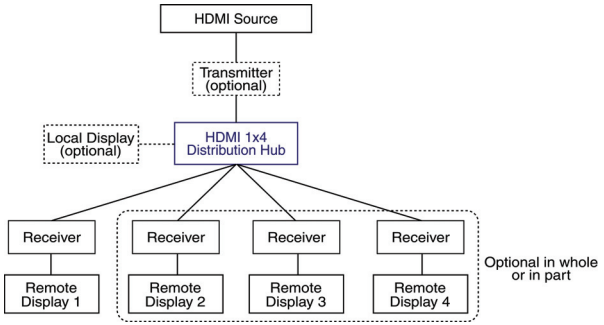
1. Overview

1.1. Description

The MuxLab 500420 HDMI 1x4 Distribution Hub allows one (1) HDMI source to be distributed to one (1) local display and up to four (4) remote displays via unshielded twisted pair (UTP) or shielded twisted pair (STP) cables for cost-efficient connectivity. The 500420 also has a Local Monitor output. Remote HDMI equipment can be connected up to 150 feet (46 meters) @ 1080p Deep Color via two (2) Cat 6 UTP cables. The Hub works in conjunction with MuxLab's HDMI/IR Transmitter Balun (500406) and Receiver Balun (500407).

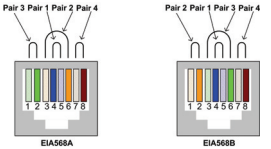


Applications include commercial and residential AV systems, classroom projector systems, digital signage, boardroom systems, multi-room systems, classroom training, retail systems, collaborative PC systems, and medical information systems.

1.2. Features

- UTP/STP inputs and modular RJ45 jacks on four (4) outputs.
- HDMI input and HDMI local output.
- IR support for remote control of HDMI source.
- Support for 1080p Deep Color up to 150 ft (46 m) via Cat 6 UTP cables.
- Configuration switch to support different EDID configurations.
- Seamless integration with MuxLab's HDMI/IR Receiver and Transmitter Baluns.

2. Technical Specifications

Environment	HDMI 1.3A		
Devices	LCD and Plasma TVs, DVD and Blu-Ray players, monitors, projectors, PCs, laptops, home theatre systems, home theater PCs, game consoles, servers that support HDMI.		
Transmission	Transparent to the user		
Bandwidth	Video: 225 MHz		
Signals	HDMI 1.3a protocol		
Connectors *HDMI Cables not included.*	Source Input: Local Output: Distributed Output:	One (1) HDMI receptacle One (1) UTP/STP input via a pair of RJ45S connectors One (1) HDMI receptacle Four (4) UTP/STP outputs via eight (8) RJ45S connectors for Cat 5e/6 UTP/STP cabling	
Maximum Distance **HDMI Source to Display** *Based upon a maximum length of 6.6 ft (2 m) of HDMI cable per end.*		**Cat 5e**	**Cat 6**
	480i/p	300 ft (91 m)	300 ft (91 m)
	720p, 1080i	300 ft (91 m)	300 ft (91 m)
	1080p	150 ft (46 m)	200 ft (61 m)
	1080p Deep Color	90 ft (27 m)	150 ft (46 m)
	NOTE: STP cables must be used in an electrically noisy environment. Also, cross-connection reduces the effective distance depending on the grade of twisted cable used. These distances are valid both at the UTP input AND the UTP output of the Hub. For example, there can be a distance of 150 ft before AND 150 ft after the Hub to distribute 1080p Deep Color via Cat 6 cabling.		
RJ45 Pin Configuration *Reverse Polarity Sensitive* *Use EIA/TIA 568A or 568B straight-through wiring*	**RJ45 A (HDMI A)** Pin 1 (R) Pin 2 (T) Pin 3 (R) Pin 6 (T) Pin 4 (R) Pin 5 (T) Pin 7 (R) Pin 8 (T)	**RJ45 B (HDMI B)** Pin 1 (R) Pin 2 (T) Pin 3 (R) Pin 6 (T) Pin 4 (R) Pin 5 (T) Pin 7 (R) Pin 8 (T)	
Cable	Two (2) Cat 5e/6 UTP/STP cables (or better) required per port		
Power Supply	One (1) 110-240V/12VDC, 1.25A power supply with three interchangeable blades		
Compatible Baluns	500405/500406/500407		
Power Consumption	15 Watts		
Configuration Switch	Sets Hub to support four (4) different EDID configurations (Factory Default: Position 1): Position 1: HDMI 1.2 Basic Profile (1080i, 8-bit) Position 2: HDMI 1.3 Profile (1080p, 12-bit Deep Color) Position 3: Copy EDID from first display device in chain Position 4: Adaptive EDID to dynamically support all connected display devices		
LED Diagnostics	Power (Blue) HDMI Source (Orange) HDMI Local Out (Orange) Display Out 1 to 4 (Green)		
Temperature	Operating: 0ºC to 40ºC Storage: -20ºC to 85ºC Humidity: Up to 95% non-condensing		
Dimensions	1U Rack Mountable: 19.00" x 6.75" x 1.75" (48.26 cm x 17.15 cm x 4.45 cm)		
Weight	3.3 lbs (1.5 kg)		
Regulatory	FCC, CE-EMC Directive 89/336/EE, RoHS, WEEE		
Warranty	Two (2) years		
Order Information	500420: HDMI 1x4 Distribution Hub (includes IR Sensor and IR Emitter)		

3. Installation Procedure

3.1. Parts List

The HDMI 1x4 Distribution Hub (500420) comes with the following parts:

- Base Unit
- One (1) IR Sensor and one (1) IR Transmitter
- One (1) 110-240V/12VDC, 1.25A Power Supply with three interchangeable blades
- Four (4) rubber feet for set-top operation
- Installation Guide

Please verify that all parts are present before proceeding.

3.2. Product Overview

The external connections and diagnostic indicators of the HDMI 1x4 Distribution Hub are detailed in the following diagrams. Please familiarize yourself with them before installing the unit.

Figure 1: Front Panel

Figure 2: Rear Panel

3.3. Pre-Installation Checklist

The HDMI 1x4 Distribution Hub provides a centralized HDMI distribution center via copper UTP/STP cables.

1. The HDMI 1x4 Distribution Hub is used in conjunction with MuxLab's HDMI/IR Receiver Balun (500407) and (optional) Transmitter Balun (500406).

2. The HDMI 1x4 Distribution Hub is typically installed in a remote telecom room and is connected to the HDMI video source and display devices via Cat 5e/6 UTP/STP cables. A MuxLab HDMI/IR Transmitter or Receiver Balun is installed at each HDMI device to support the connection to the Hub via Cat 5e/6 cables.

3.4. Physical Installation

MuxLab's HDMI 1x4 Distribution Hub comes with mounting brackets for standard 19" rack mounting. Select the final destination for the product and install the unit using standard rack-mount screws.

For set-top installation, the L-brackets on the side of the unit may be removed and the included rubber feet placed on the bottom of the unit. When removing the L-brackets, be careful to keep and reinstall the four screws on each side of the unit.

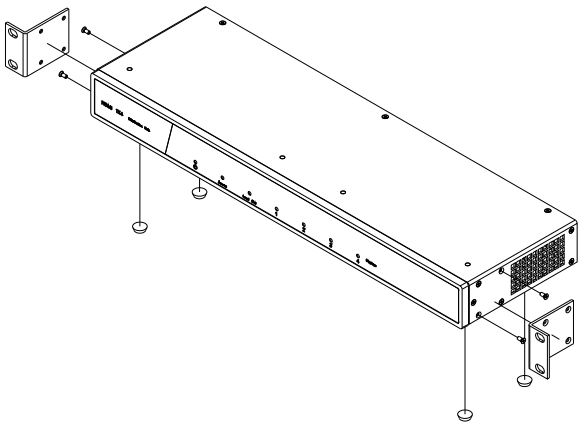


Figure 3: Procedure for Set-Top Installation

3.5. Installation Procedure

In order to install the product, please follow the steps below:

1. Place the HDMI 1x4 Distribution Hub in its final location.
2. Ensure that the power is turned off on the HDMI source and displays.
3. In order to distribute the HDMI, one (1) HDMI/IR Receiver Balun (500407) must be connected at each HDMI display. To install the Baluns, complete Steps 4, 5, and 6.
4. Identify the pin configuration of the Baluns. Two (2) Cat 5e/6 UTP/STP cables are required for each HDMI connection. The pin configuration follows the EIA/TIA 568A/B standard. The HDMI/IR Receiver Balun is reverse-polarity sensitive. Please ensure that the wiring is straight-through (Ring to Ring, Tip to Tip), and that the two HDMI twisted pair links are not crossed.
5. Using an HDMI cable (not supplied), plug the HDMI source to the HDMI input of the HDMI 1x4 Distribution Hub. If the Cat 5e/6 input is used, one (1) HDMI/IR Transmitter Balun (500406) must be connected to the HDMI source, and two (2) Cat 5e/6 UTP/STP cables are required. The HDMI/IR Transmitter Balun is reverse-polarity sensitive. Please ensure that wiring is straight-through (Ring to

Ring, Tip to Tip), and that the two HDMI twisted pair links are not crossed.

6. Using an HDMI cable (not supplied), connect an HDMI/IR Receiver Balun (500407) to each HDMI display.

7. Complete the connection between the Hub and each HDMI display using standard straight-thru Cat 5e/6 UTP/STP cables and connecting hardware, terminated on RJ45 plugs at both ends. Ensure that there are no split pairs or taps.

8. Select the desired EDID setting using the rotary dial.

9. Power up the Baluns and HDMI equipment first.

10. Connect the external 12VDC power supply to the Hub and plug the power supply into an AC power outlet. If power is present, the blue power LED will be ON.

11. Ensure that the source and appropriate display LEDs are ON. Images should appear on the displays within 10 seconds. Check the image quality and refer to the troubleshooting table in Section 4 if image quality is unsatisfactory.

12. The following diagrams show some typical configurations:

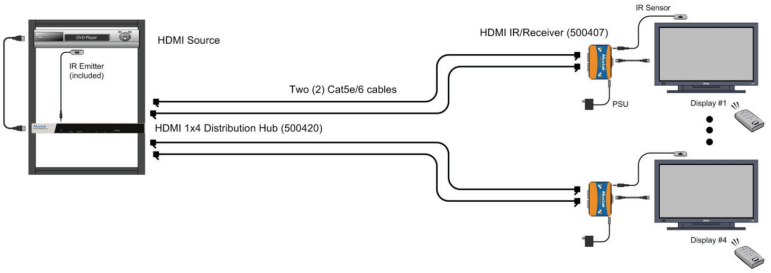


Figure 4: Typical Configuration – UTP on Output Only

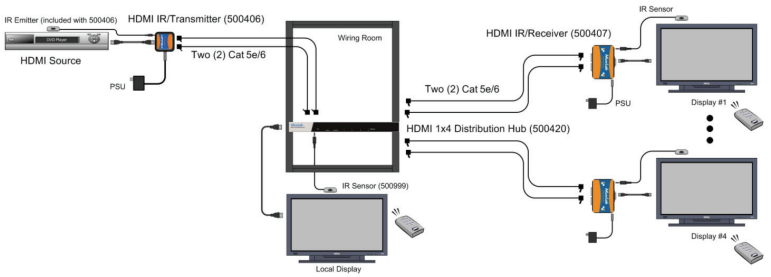


Figure 5: Typical Configuration – UTP on Input and Output

3.6. EDID

EDID (Extended Display Identification Data) is data that describes the capablities of a display device to a source device. The EDID includes the resolutions and modes supported by the display device.

In the context of MuxLab's HDMI 1x4 Distribution Hub, the source device consists of the HDMI source (typically a DVD player), and the display device consists of the remote & local displays (typically TVs), to which the Distribution Hub is connected.

The user sets the EDID via a four-position selector located on the back panel of the Distribution Hub (Figure 6). Each position communicates a different EDID setting to the HDMI source, establishing the resolution and mode at which the HDMI source will send data to the display devices.

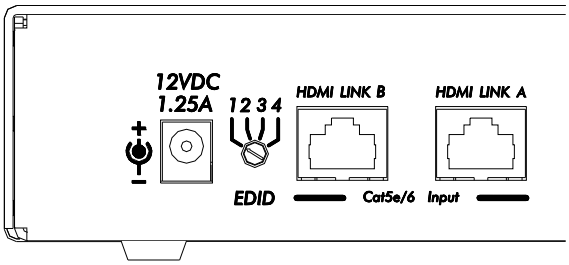


Figure 6: EDID Selector

EDID settings are described in detail on the following two pages:

Position 1: HDMI 1.2

- HDMI 1.2 Profile.
- Maximum resolution: 1080i.
- Supported color depth: 8 bits per color.
- Setting is most compatible with all display devices that support HDMI 1.2 or better.
- Disables Deep Color (affects all display devices).
- Prevents an HDMI source from auto-negotiating a resolution higher than 1080i.
- Supports most display devices on the market.

Position 2: HDMI 1.3

- HDMI 1.3 Profile.
- Maximum resolution: 1080p.
- Supported color depth: 8, 10, or 12 bits per color.
- HDMI source will auto-negotiate to resolution of 1080p.
- Display devices that do not support 1080p will not work at this resolution.

Position 3: Copy EDID

- Copies the EDID setting from the first display device in the chain.
- Port priority is UTP/STP Outputs first (1, 2, 3, 4) THEN Local Monitor Output.
- The user must place the lowest resolution display device on the copy port. All other displays will follow.
- As with Position 1, this does not prevent the user from manually selecting a resolution which a display device does not support.
- For the copy to take place, a display device must be plugged in when the Distribution Hub is powered up. Failure to do so will result in no display device working.

Position 4: Adaptive EDID

- Analyzes the EDIDs of all the display devices in the chain, and generates an EDID that represents them all.
- Allows dynamic changes to the chain. However adding a less robust display device to the chain will make other display devices glitch for a fraction of a second as settings are downgraded.

In short, Positions 1 and 2 establish generic EDID settings that never change, regardless of the display devices being used. Positions 3 and 4 establish EDID settings that depend on the display devices, and are typically more optimized for such devices.

If the user selects an EDID setting which a given display device does not support, that device will not function.

EDID resolutions are only taken into account when an HDMI source is auto-negotiating resolutions.

Color Depth

The color depth of a display device refers to the ability of its constituant pixels to display color. This ability is typically expressed in terms of bits: The greater the number of bits, the greater the number of different colors that a pixel can display. An 8-bit color depth (per color channel) is standard.

The term Deep Color refers to a color depth of 30 bits or higher (10 bits per color channel or higher in the RGB model). Consequently, a display device with a color depth of 30 bits or higher is known as a Deep Color display.

EDID Settings and Color Depth

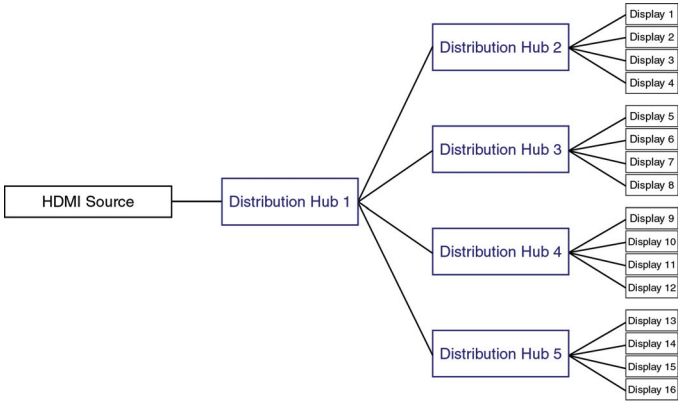
By setting the EDID selector to Position 1 (or by setting the EDID selector to Position 3 and placing a non-Deep Color display device on the copy port), the user disables Deep Color. This will allow for greater distances via UTP/STP cables.

Regardless of color depth mode, a display device will always receive the highest color depth signal it can support. This means that if the source delivers a color signal of 10 bits per color or higher, a Deep Color display will receive the signal unchanged, while a non-Deep Color display will receive a normal 8-bit signal. This is transparent to the user.

3.7. Cascadability

HDMI 1x4 Distribution Hubs may be cascaded in order to send an HDMI signal to more than four (4) displays. In fact by using the Local Monitor port of the Distribution Hub, in theory an unlimited number of Hubs may be connected in a daisy-chain configuration. This is possible because a clean video signal is regenerated at each Distribution Hub.

In more practical terms, the Distribution Hubs would typically be connected in a tree configuration:



Regardless of the configuration chosen, the EDID selector on each Hub should be set to Position 1 or 2 in order to avoid conflicts.

NOTE: When cascading via UTP cables, cable lengths must be kept within 75% of maximum allowable distance (see Technical Specifications, page 6).

4. Troubleshooting

The following table describes some of the problem symptoms, the probable causes and possible solutions. If the information below does not solve the problem, the technical support contact information can be found at the end of this section.

Problem	Probable Solutions
No Image	• Check that the **Power LED** (blue) is ON. If not, check power supply • Check that the **Source LED** (orange) is ON. If not, check that the HDMI source is on, and (if applicable) that the Transmitter Balun is on • Check that at least one **Display LED** (orange for Local Display, green for Remote Display) is ON. If not, check that display devices are on and (if applicable) Receiver Baluns are on
No Image	• If **Source LED** and at least one **Display LED** is ON, check that UTP/STP cables are not inverted
No Image	• Display devices may not support the current EDID setting. Set EDID selector to Position 1 or 2
No Image	• Ensure that the HDMI source is plugged to the Hub input, not the Hub output • Power down and then power up the Hub
No Image	• Connect the display devices directly to the HDMI source to ensure that this works • Ensure that HDMI cables are less than 6 ft long • Ensure that Receiver/Transmitter Baluns are powered up and work on their own • Ensure that Power Supplies are not mixed-up (Hub requires 1.25 A; Baluns require 500 mA)
White Dots in Image or Flickering Image or Choppy Sound	• Verify cable lengths • Use STP cables • Set EDID selector to Position 1 or 2 • If cascading multiple hubs, ensure that UTP cable lengths are 25% less than maximum allowable
Wrong Image Appears	• Only one source may be connected to the Distribution Hub at any one time. MuxLab does not support switching between input ports
Not All Display Devices Work	• Ensure that all cable lengths are within specification • If EDID selector is in Position 3, ensure that lowest resolution display device is connected to the Copy Port. • Set EDID selector to Position 1 or 2 • Ensure that the HDMI source is outputting a signal compatible with all the display devices (try 1080i or 480p). NOTE: The EDID selector does not prevent the user from choosing an incompatible mode

When contacting your nearest MuxLab dealer or MuxLab Technical Support at 877-689-5228 (toll free in North America) or (+1) 514-905-0588 (International), please have the following information ready:

- Unit model number.
- Cabling layout. Please include the model of the HDMI source and receiver, cable length and type.
- Description of problem.
- List of tests performed.

5. Product Warranty Policy

Items Under Warranty - Company Policy
MuxLab guarantees its products to be free of defects in manufacturing and workmanship for the warranty period from the date of purchase. If this product fails to give satisfactory performance during this warranty period, MuxLab will either repair or replace this product at no additional charge, except as set forth below. Repair and replacement parts will be furnished on an exchange basis and will be either reconditioned or new. All replaced parts and products become the property of MuxLab. This limited warranty does not include repair services for damage to the product resulting from accident, disaster, misuse, abuse, or unauthorized modifications or normal decay of battery driven devices. Batteries, if included with the product, are not covered under this warranty.

Limited warranty service can be obtained by delivering the product during the warranty period to the authorized MuxLab dealer from whom you purchased the product, or by sending it to MuxLab. MuxLab will not accept any such product for repair without a Return Material Authorization number (RMA#) issued by its Customer Service Department and a proof of purchase date. If this product is delivered to MuxLab by mail, you agree to assume risk of loss or damage in transit, to prepay shipping charges to the warranty service location, and to use the original shipping container or equivalent.

THE ABOVE LIMITED WARRANTY IS THE ONLY WARRANTY COVERING YOUR MUXLAB PRODUCT. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SOME STATES DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

IF THIS PRODUCT IS NOT IN GOOD WORKING ORDER, YOUR SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED FOR ABOVE. IN NO EVENT SHALL MuxLab BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING ANY LOSS OF PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF OR INABILITY TO USE THIS PRODUCT, EVEN IF MUXLAB OR AN AUTHORIZED MuxLab DEALER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES; NOR WILL MUXLAB BE LIABLE FOR ANY CLAIM BY ANY OTHER PARTY. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

Warranty Periods

Any product found to be defective within three (3) months of invoice, including one (1) month shelf life, may be returned for replacement by a new unit or a satisfactory repair within one (1) month of receiving any returned product. The customer must provide MuxLab with the serial number and proof of purchase of the defective unit being returned. All R.M.A.'s issued are subject to inspection by MuxLab, and will be returned to customer if not properly package – units must be returned in original container or equivalent. MuxLab will not accept any such product for repair without an authorization for its Technical Support department and without a return authorization number issued by MuxLab Customer Service department. For credit & replace R.M.A., customer will be liable to pay replacement invoice if defective products are not returned.

Product more than six months old, including shelf life.

The defective unit must be returned prepaid to MuxLab and then the unit will be repaired or if repair is not possible, replaced by an equivalent unit and returned to the customer within one (1) month of receiving any returned product. There is no charge for repair (parts and labor) during the full warranty period.

Items Defective and not under Warranty

For products which are no longer under warranty the policy is repair and return. An amount of 25% of the products published list price at the time of purchase will be charged. Customer must issue a purchase order to cover the cost of repair.

Each unit will be returned to the customer within one (1) month from receipt of the unit by MuxLab. The defective unit must be returned prepaid to MuxLab. The repaired unit will be returned to the customer FOB MuxLab. The repaired unit has a 90 day warranty.

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