

thinklogical®

A **BELDEN** BRAND

TLX CATx

VIDEO & KVM EXTENSION

UNCOMPRESSED 4K



Full 4K-30 Hz & 60Hz Video and KVM CATx Extension

TLX10 and TLX20 CATx Extenders Product Manual

Rev. E, March 2020

Thinklogical, A BELDEN BRAND • 100 Washington Street • Milford, Connecticut 06460 U.S.A.

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Thinklogical, A BELDEN BRAND
100 Washington Street
Milford, Connecticut 06460 U.S.A.
Telephone: 1-203-647-8700

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thinklogical®



TLX 10G

Subject: TLX10 and TLX20 CATx Extender Products Manual
Revision: E, March 2020



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PREFACE

About Thinklogical A BELDEN BRAND



Thinklogical, A BELDEN BRAND
100 Washington St.
Milford, CT 06460

Thinklogical, a Belden brand, is the leading manufacturer and provider of fiber-optic and CATx video, KVM, audio, and peripheral extension and switching solutions used in video-rich, big-data computing environments.

Thinklogical offers the only fiber-optic KVM Matrix Switches in the world that are accredited to the Common Criteria EAL4, TEMPEST SDIP 24 Level B, and NATO NIAPC Evaluation Scheme: GREEN and the U.S. DoD DISA JITC UCR 2013 APL information assurance standards. And Thinklogical Velocity products are the first system with both KVM and video matrix switching capabilities to be placed on the Unified Capabilities Approved Product List (UC APL) under the Video Distribution System (VDS) category.

Thinklogical products are designed and manufactured in the USA and are certified to the ISO 9001:2015 standard.

Information Assurance



Thinklogical is headquartered in Milford, Connecticut and is owned by Belden, Inc., St. Louis, MO (<http://www.belden.com>). For more information about Thinklogical products and services, please visit <https://www.thinklogical.com>.

Note and Warning Symbols

Throughout this manual you will notice certain symbols that bring your attention to important information. These are **Notes** and **Warnings**. Examples are shown below.



Note: Important Notes appear in blue text preceded by a yellow exclamation point symbol, as shown here.

A note is meant to call the reader's attention to **helpful** information at a point in the text that is relevant to the subject being discussed.



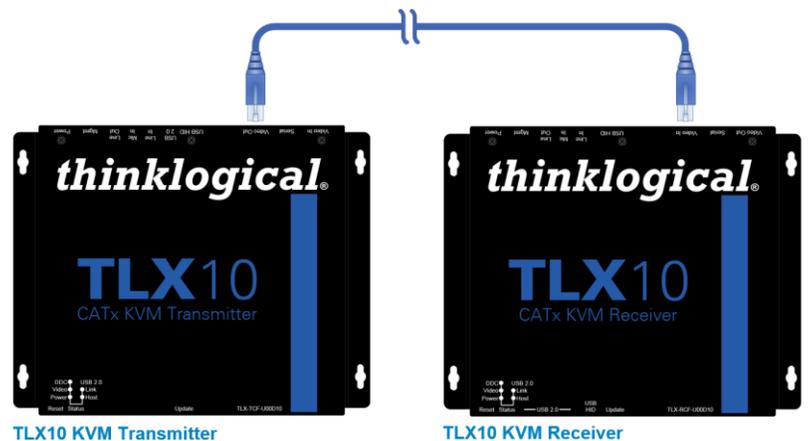
Warning! All Warnings appear in red text, followed by blue text, and preceded by a red stop sign, as shown here.

A warning is meant to call the reader's attention to **critical** information at a point in the text that is relevant to the subject being discussed.

**READ THE INSTRUCTIONS THOROUGHLY
BEFORE STARTING ANY PROCEDURE!**

The Scope of This Document

This **Product Manual** is intended to provide customers with a full overview of the features, functions, usage and support for Thinklogical's **TLX10 CATx Extender Transmitters and Receivers**, capable of extending a single Video Display and Data at a rate of **4096x2160 @ 30Hz** for up to 100m over a **single** shielded CAT6a 23 AWG Cable...



...and for Thinklogical's **TLX20 CATx Extender Transmitters and Receivers**, capable of extending a single Video Display and Data at a rate of **4096x2160 @ 60Hz** for up to 100m over a **pair** of shielded CAT6a 23 AWG Cables.



Introduction

Introducing Thinklogical's newest family of switching and extension solutions, for uncompressed, high resolution video and KVM systems over fewer cables.

UNCOMPRESSED 4K



Features of the TLX Extension & Matrix Switch System

Offering a higher bandwidth solution, the TLX product line provides 10Gbps bandwidth per port to preserve signal integrity and provide uncompressed, high resolution video with no artifacts, latency or lost frames.

The TLX Product Family offers these features to enhance ease of integration:

- Hybrid switching solutions (fiber and CATx) start at 12 ports and scale up to 640 ports.
- Offers a higher bandwidth solution to address new video resolutions and prepare for future protocols.
- The TLX system reduces cabling by half through higher bandwidth.
- Extend and switch:

Single display up to 4096x2160 @ 30Hz with full 4:4:4 color depth, over a single fiber or a single shielded CATx cable

Single display up to 4096x2160 @ 60Hz with full 4:4:4 color depth, over two fibers or a pair of shielded CATx cables

Dual connectors on TLX Extenders, offering support for both HDMI and DisplayPort, **reduce the number of extenders and converter cables required** and enable users to future-proof system designs.



*This connector is installed on every TLX Video and KVM extender module.
(HDMI 2.0 is supported by the "E" versions of CATx extenders, only.)*

Product Overview

- All TLX Extenders are compatible with each other, **but not backwards compatible with Velocity** 6.25 Gbps transport.

TLX Video and KVM Extension Systems

- Video connector supports **HDMI 1.4** (4K @ 30Hz), **HDMI 2.0** (4K @ 60Hz, *E10 and E20 versions only*) and **DisplayPort 1.2** (4K @ 60Hz) cables
- 10Gbps bandwidth per port
- Extension of up to 100 meters over shielded CAT6a cables, 23 AWG solid S/FTP
- Support for a single display up to 4096x2160 @ 30Hz over a single CATx cable
- Support for a single display up to 4096x2160 @ 60Hz over two CATx cables
- Supports HDCP content
- Ethernet port for configuration and management
- Mini-USB port for updates
- Supports embedded audio, de-embed at the Receiver
- Supports unbalanced analog audio and serial RS-232
- Options include USB HID (1.5 Mbps) and USB 2.0 (480 Mbps)

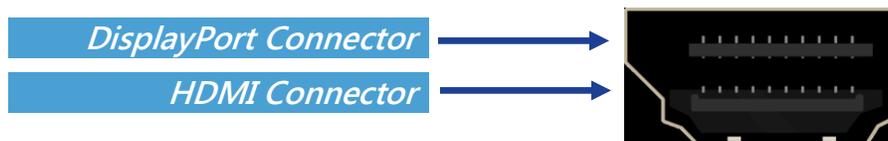


DisplayPort & HDMI Connector

Thinklogical includes an innovative video connector on its TLX Extenders. The video connector can receive HDMI 1.4, HDMI 2.0 and DisplayPort 1.2 cables, reducing the number of extenders needed and eliminating the need for an external adapter or dongle to convert from DisplayPort to DVI or HDMI. It also allows the customer to upgrade from HDMI to DisplayPort with no change in equipment. When combined with a Thinklogical TLX Matrix Switch, it's easy to combine and connect HDMI/DVI and DisplayPort sources and displays.



Note: [DisplayPort 1.2 Video Cables](#) and [HDMI 2.0 Cables](#) (*E versions only*) support up to 4K @ 60Hz. [HDMI 1.4 Video Cables](#) support up to 4K @ 30Hz. [Install either DisplayPort or HDMI cables at both the Transmitter and Receiver.](#)



Form Factor

TLX CATx Extension Systems are available in a compact, desk top form factor. The chassis includes a pair of mounting brackets that can be removed or installed to mount the unit above or below a bench, desk or shelf. *All Transmitters and Receivers, in both D and E versions, have the same dimensions.*



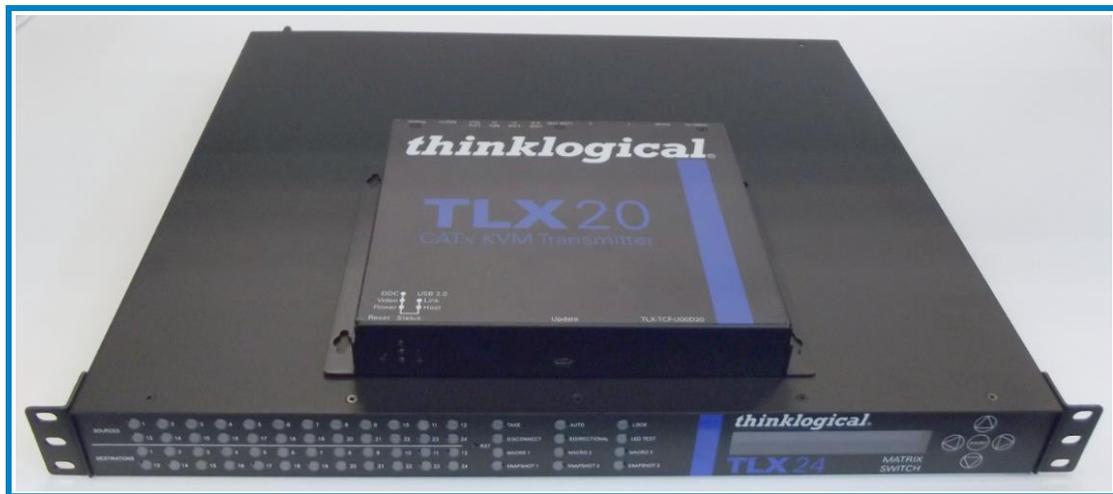
Height: 1.20" (30.5mm)

Depth: 7.20" (182.9mm)

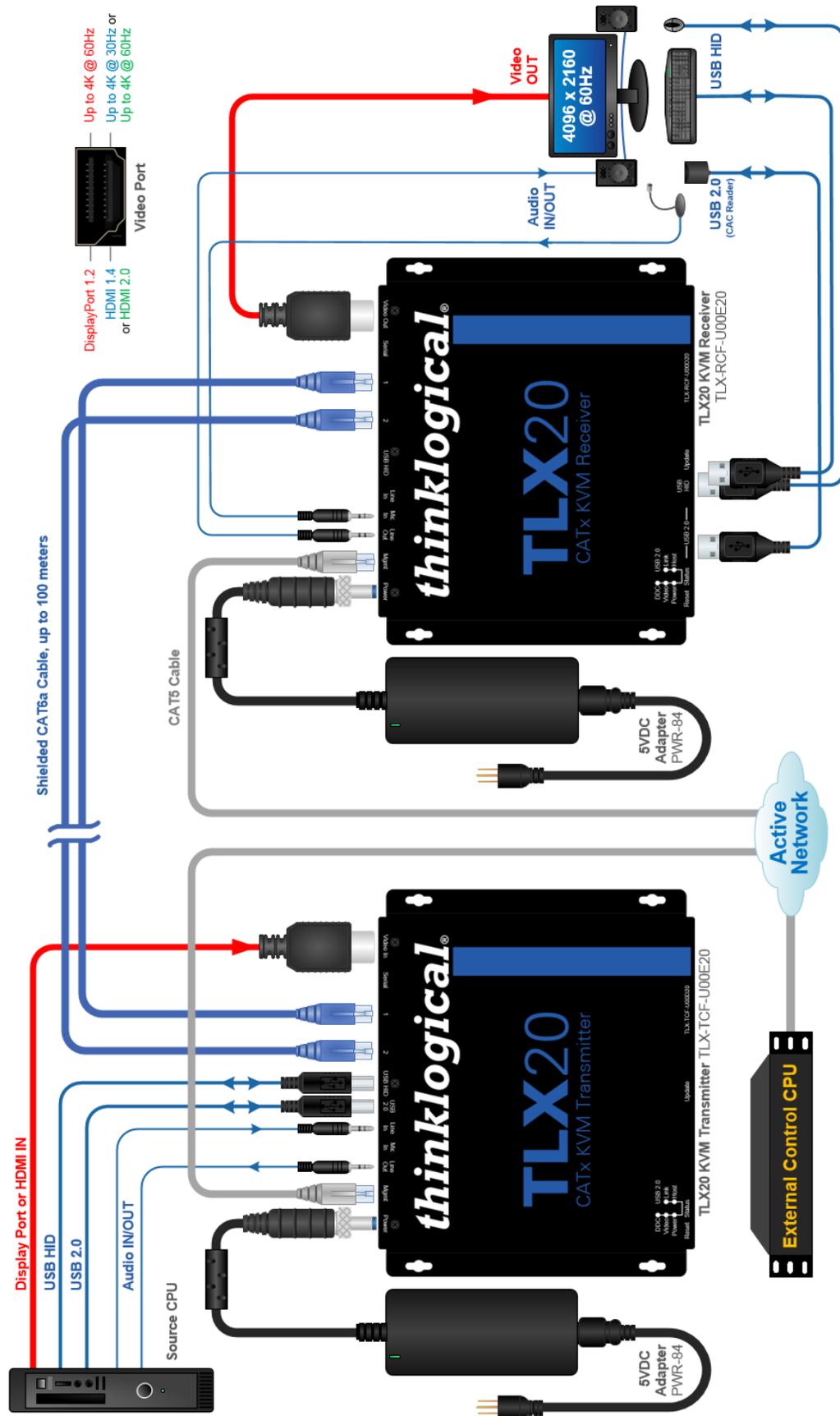
Width: 7.62" (193.5mm)

Depth (mounting bracket holes): 5.50" (139.7mm)

Width (mounting bracket holes): 8.36" (212.3mm)



The TLX20 Extender and the 19" rack-mountable TLX24 Matrix Switch



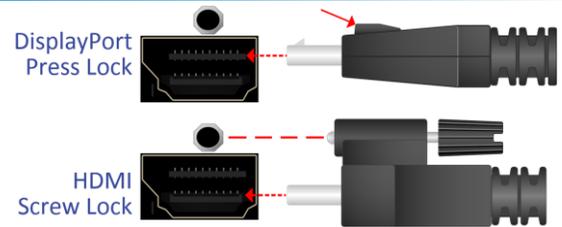
Typical TLX CATx Application

Operating Features

- DisplayPort 1.2 Video
- HDMI 1.4 / 2.0 Video



Note: Install either DisplayPort or HDMI cables at both the Transmitter and Receiver.



- **Mechanical lock for DisplayPort and HDMI connectors**
- HDCP Compliant
- 10.3125G Copper Interface (CATx)
- Audio Option
 - Supports standard L/R Audio; Line/Mic In, Line Out on both TX and RX (pg. 17).
- RS-232 Serial Port Extension Option (includes a CAT5 cable and RJ45 to DB9 Adapters)
- The Management (MGMT) Port
 - For module status and software updates
 - In-band System Management Interface
 - Ethernet on module (i.e. Wiznet)
- Bi-color indicator LEDs
- EDID Table DDC Modes: Static, Dynamic, Remote Acquire, Load Custom
- **Supported Tables**

<u>Supported Tables</u>	<u>Format</u>
1024x768 @ 60Hz	DVI
1920x1080 @ 60Hz	DisplayPort, HDMI, DVI
1920x1200 @ 60Hz	DisplayPort, HDMI
2560x1440 @ 60Hz	DisplayPort, HDMI
3840x2160 @ 30Hz	DisplayPort, HDMI
3840x2160 @ 60Hz	DisplayPort, HDMI
4096x2180 @ 24Hz	DisplayPort, HDMI
4096x2160 @ 60Hz	DisplayPort
- Temperature sensor
- Power: 5V @ 7A Max.
- Remote Update of S/W and Firmware
- FPGA Configuration supports 'Golden Boot Image' as backup for failed update on E versions
- Audio De-embedding in Receiver Module
 - Line Out User Selectable between TLX Line In or De-embedded Audio
- DisplayPort 1.2 and HDMI 1.4 or HDMI 2.0 cables included, as applicable.

TLX20 TX Rear Panel



TLX20 RX Rear Panel



TLX20 TX Front Panel



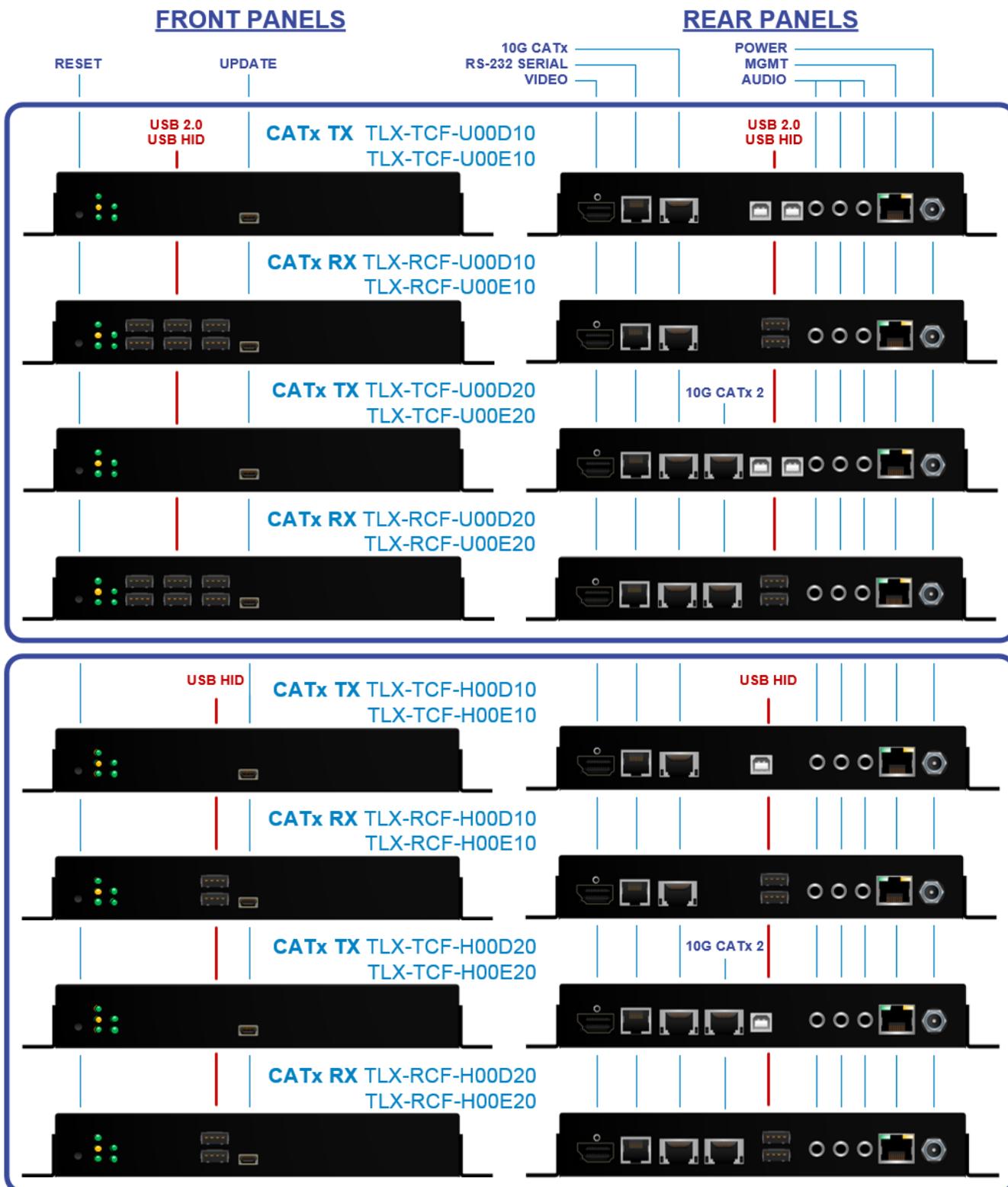
TLX20 RX Front Panel



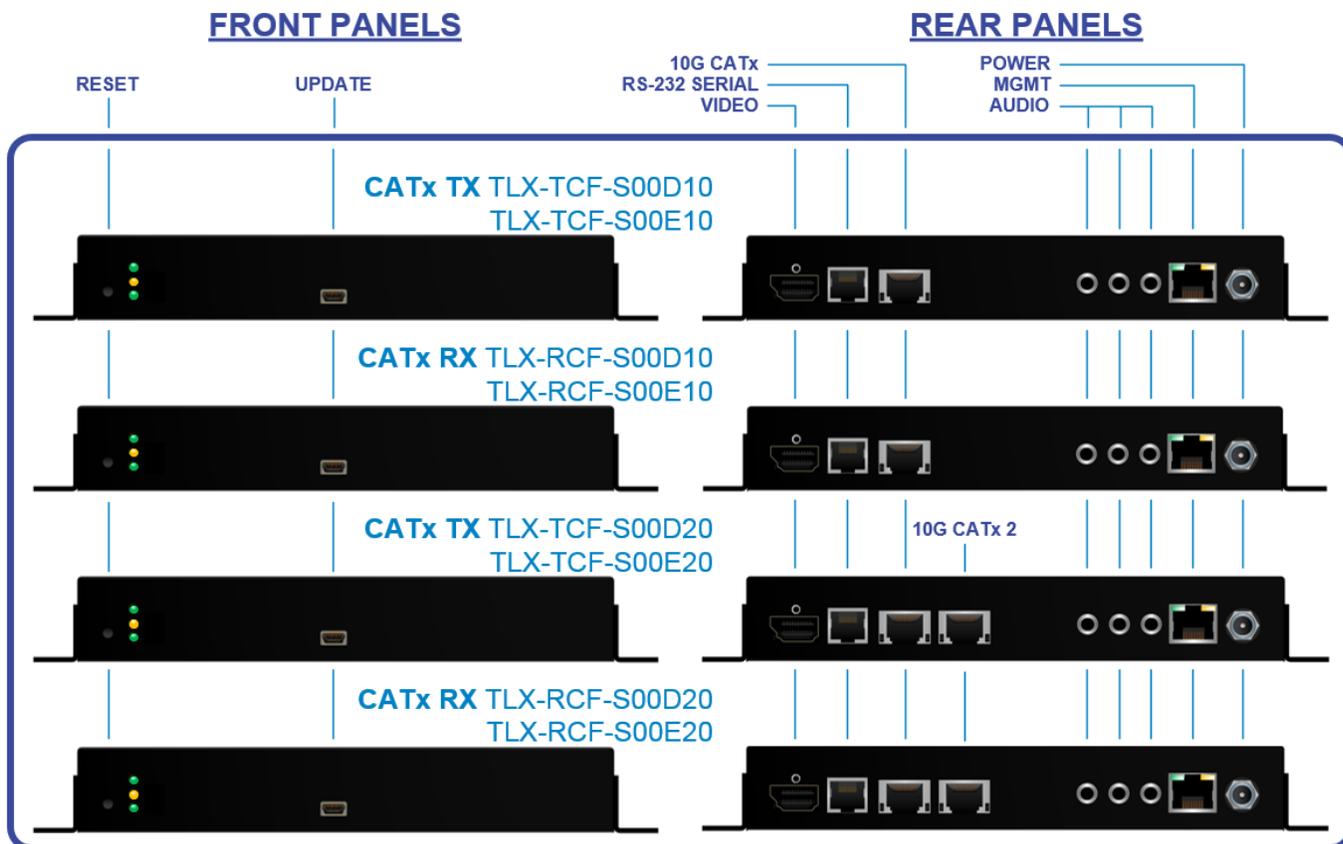
Interface Configurations

All physical connections to the product use industry-standard connectors. Non-supplied cables that may be needed are commercially available. E10 and E20 versions support HDMI 2.0.

TLX10 and TLX20 CATx Extender Configurations - USB & Serial



TLX10 and TLX20 CATx Extender Configurations - Serial only

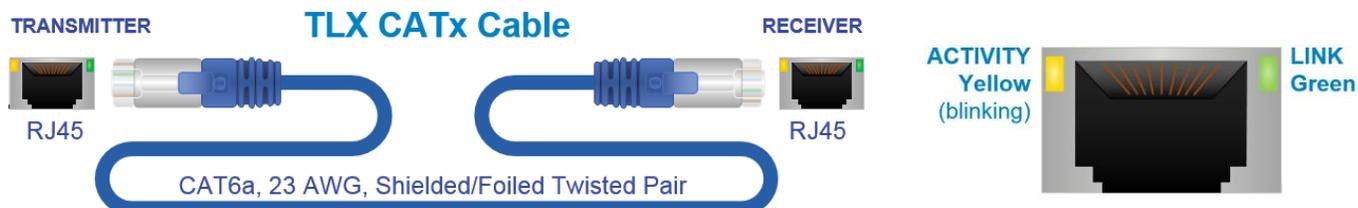


All Transmitters and Receivers are connected to each other via shielded CATx cables (pg. 15). The transmitter connects to the CPU with supplied video, audio, serial and network cables. (USB A-B cables are supplied with applicable models.) The receiver provides an interface to the monitor, audio, serial and network devices (and USB 2.0 and USB HID devices in applicable models).

Shielded CATx Cables

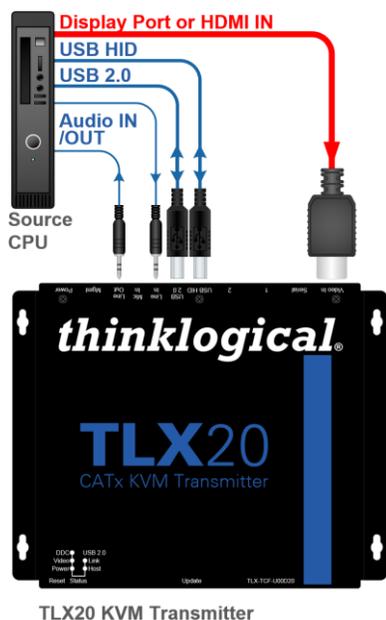
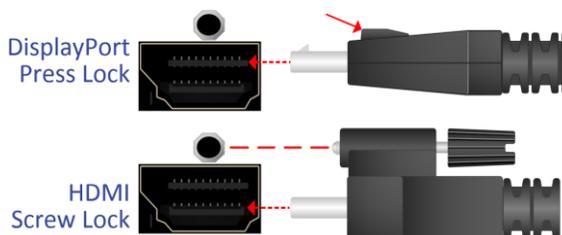
In all applications where more than one CATx cable is used, Thinklogical recommends shielded cabling to reduce alien crosstalk, which can occur between adjacent cables.

There are currently several versions of shielded CATx (category 6/6a/7/7a, etc.) cables with RJ-45 connectors on the market. **Thinklogical recommends CAT6a 23 AWG Solid, Shielded and foiled (S/FTP- Shielded/Foiled Twisted Pair) Cabling for TLX applications, which can operate over channel lengths of up to 100 meters.** Assume a 30% derating for 26 AWG CAT6a shielded cabling.



Video Cables

DisplayPort 1.2 Video Cables support up to 4K @ 60Hz and are supplied with all Transmitters. **HDMI 1.4 Video Cables** support up to 4K @ 30Hz and are supplied with TLX-D10 and TLX-D20 Transmitters. **HDMI 2.0 Video Cables** support up to 4K @ 60Hz and are supplied with TLX-E10 and TLX-E20 Transmitters. Each connector features a locking mechanism.

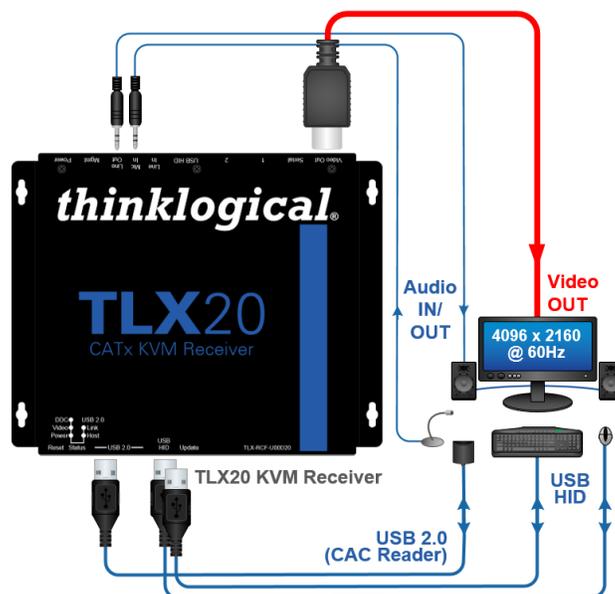


Transmitter

A transmitter chassis connects to the CPU/peripheral sources through standard copper cables. The available connector configurations of the TLX Transmitters can be viewed in detail on pgs. 10 and 11.

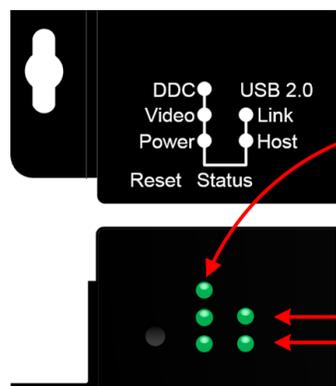
Receiver

A receiver chassis connects to a viewing device (monitor, projector, etc.) and audio devices with their own standard cables. The available connector configurations of the TLX Receivers can be viewed in detail on pgs. 10 and 11.



Status Indicator LEDs

The status indicator LEDs on the TLX CATx Extenders are provided as a visual reference for the various states the device may be in during normal operation.



DDC: Solid **GREEN** when receiving DDC information

Video: **OFF** = No active video signal, no CATx cable (Tx & Rx)

Flashing Green = Active video signal, link between Tx and Rx (Tx & Rx)

Solid Green = Active video signal, no CATx cable (Tx only)

Yellow = CATx cable connection, no active signal

Power: Solid **GREEN** when power is ON.

USB 2.0 Link: (Through CATx Cable) Solid **GREEN** for proper Tx to Rx connection.

USB 2.0 Host: (Through USB 2.0 Cable) Solid **GREEN** when an active USB device is detected at the Rx.

Supplied Cables

- **TLX-D10 and TLX-D20** Transmitters are supplied with an **HDMI 1.4 cable** (supports 4K @ 30Hz).
- **TLX-E10 and TLX-E20** Transmitters are supplied with an **HDMI 2.0 cable** (supports 4K @ 60Hz).
- **All Transmitters** are supplied with a **DisplayPort 1.2 cable** (supports 4K @ 60Hz).
- **All Transmitters** are supplied with **Audio** and **USB A-B** cables (2 each).
- **All Transmitters and Receivers** are supplied with a **CAT5** cable and an **RJ45 to DB9 Adapter**.

<u>PART NUMBER</u>	<u>CABLE QTY</u>	<u>DESCRIPTION</u>
TLX-TMM-U00D10		1 30Hz Display Tx
ADP-000025-R	1	RJ-45 to DB-9F
CBL000001-002MR	1	CAT5, 2 Meters
CBL000015-006FR	2	USB A-B, 6 ft.
CBL000016-006FR	2	3.5mm to 3.5mm plug, M/M, 6 ft.
CBL000103-002MR	1	HDMI 1.4 to HDMI 1.4, 2 Meters
CBL000104-002MR	1	Display Port 1.2 to Display Port 1.2
TLX-RMM-U00D10		1 30Hz Display Rx
ADP-000019-R	1	RJ-45 to DB-9M
CBL000001-002MR	1	CAT5, 2 Meters
TLX-TMM-U00D20		1 60Hz Display Tx
ADP-000025-R	1	RJ-45 to DB-9F
CBL000001-002MR	1	CAT5, 2 Meters
CBL000015-006FR	2	USB A-B, 6 ft.
CBL000016-006FR	2	3.5mm to 3.5mm plug, M/M, 6 ft.
CBL000103-002MR	1	HDMI 1.4 to HDMI 1.4, 2 Meters
CBL000104-002MR	1	Display Port 1.2 to Display Port 1.2
TLX-RMM-U00D20		1 60Hz Display Rx
ADP-000019-R	1	RJ-45 to DB-9M
CBL000001-002MR	1	CAT5, 2 Meters
TLX-TMM-U00E10		1 HDMI 2.0 30Hz Display Tx
ADP-000025-R	1	RJ-45 to DB-9F
CBL000001-002MR	1	CAT5, 2 Meters
CBL000015-006FR	2	USB A-B, 6 ft.
CBL000016-006FR	2	3.5mm to 3.5mm plug, M/M, 6 ft.
CBL000108-002MR	1	HDMI 2.0 to HDMI 2.0, 2 Meters
CBL000104-002MR	1	Display Port 1.2 to Display Port 1.2
TLX-RMM-U00E10		1 HDMI 2.0 30Hz Display Rx
ADP-000019-R	1	RJ-45 to DB-9M
CBL000001-002MR	1	CAT5, 2 Meters
TLX-TMM-U00E20		1 HDMI 2.0 60Hz Display Tx
ADP-000025-R	1	RJ-45 to DB-9F
CBL000001-002MR	1	CAT5, 2 Meters
CBL000015-006FR	2	USB A-B, 6 ft.
CBL000016-006FR	2	3.5mm to 3.5mm plug, M/M, 6 ft.
CBL000108-002MR	1	HDMI 2.0 to HDMI 2.0, 2 Meters
CBL000104-002MR	1	Display Port 1.2 to Display Port 1.2
TLX-RMM-U00E20		1 HDMI 2.0 60Hz Display Rx
ADP-000019-R	1	RJ-45 to DB-9M
CBL000001-002MR	1	CAT5, 2 Meters

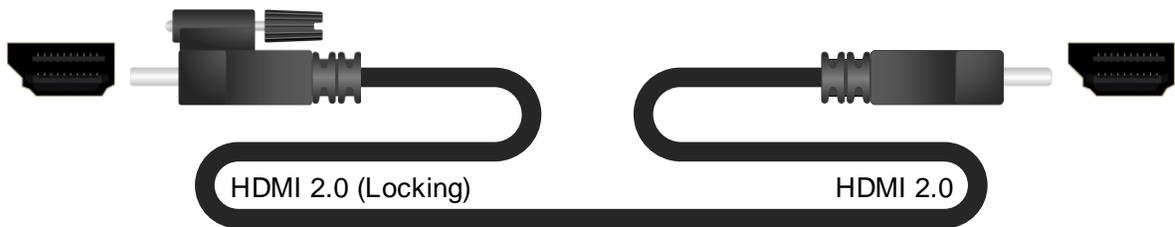
Supplied with all TLX-D10 and TLX-D20 Transmitters:

HDMI 1.4 to HDMI 1.4-locking (CBL000103-002MR)



Supplied with all TLX-E10 and TLX-E20 Transmitters:

HDMI 2.0 to HDMI 2.0-locking (CBL000108-002MR)

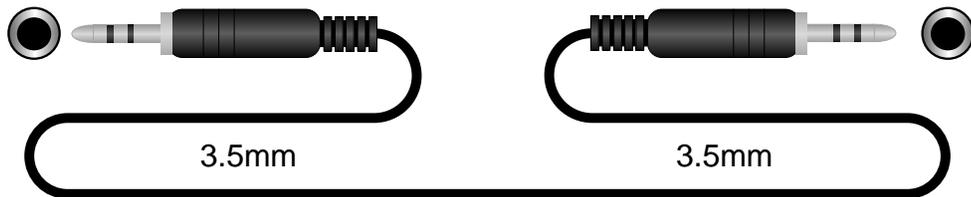


Supplied with all Transmitters:

DisplayPort 1.2 to DisplayPort 1.2, locking (CBL000104-002MR)



3.5mm to 3.5mm Audio Cable, 6 Feet (CBL000016-006FR) – 2 each



USB A-B Cable, 6 Feet (CBL000015-006FR) – 2 each



Supplied with all Transmitters and Receivers:**CAT5 Serial Cable, 6 Feet (CBL000001-006FR) – 1 each****RJ45 to DB9 F & M Adapters (ADP-000025, ADP-000019)***

*See pin-outs in Appendix B, pg. 22

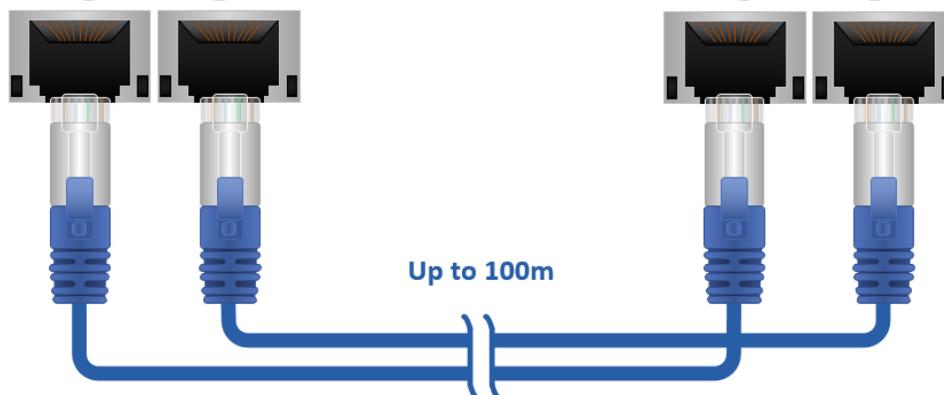
TLX10 and TLX20 CATx Cable Configurations

There are currently several versions of shielded CATx (category 6/6a/7/7a, etc.) cables with RJ-45 connectors on the market. **Thinklogical recommends CAT6a 23 AWG Solid, SFTP (Shielded/Foiled Twisted Pair) Cabling for TLX applications, which can operate over channel lengths of up to 100 meters.** Assume a 30% derating for 26 AWG CAT6a shielded cabling.

TLX10 CATx Configuration, Video/KVM Extension, 4096x2160 @ 30Hz

TRANSMITTER

RECEIVER

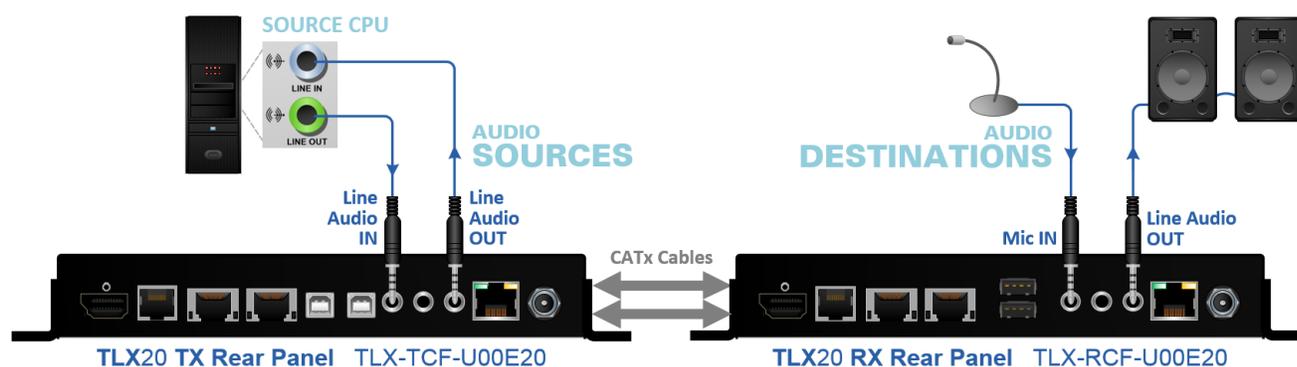
**TLX20 CATx Configuration, Video/KVM Extension, 4096x2160 @ 60Hz**TRANSMITTER
1 2RECEIVER
1 2

TLX10 and TLX20 Extender Technical Specifications

PHYSICAL	
TLX10 Tx & TLX10 Rx TLX20 Tx & TLX20 Rx	<u>Dimensions:</u> Height: 1.20" (30.5mm) Depth: 7.20" (182.9mm) Width: 7.62" (193.5mm) Depth (bracket holes): 5.50" (139.7mm) Width (bracket holes): 8.36" (212.3mm)
CATx Cable Distance	Shielded CAT6a 23 AWG: Up to 100 meters Shielded CAT6a 26 AWG: Up to 70 meters
ELECTRICAL	
Input Rating	100-240 VAC, 50-60 Hz, Universal AC. DC power supply, 5VDC/7A
Power Consumption	TLX10: Rx; 31 W @100 meters Tx; 28 W @100 meters TLX20: Rx; 33 W @100 meters Tx; 31 W @100 meters
ENVIRONMENTAL	
Temperature	Operating: 0° to 50°C (32° to 122 °F) Ambient Storage: -20°C to 70°C (-4°F to 158°F)
Humidity	Operating: 5% to 95% RH, non-condensing Storage: Unlimited
Altitude:	Operating: Thinklogical components are rated to 1000m max. elev. Max. operating temp. de-rates by 3% for every 330m > 1000m Storage: Unlimited
THERMAL	
	Heat load (BTU/HR): <i>Equal to max. DC power consumption x 3.412</i> TLX10: Rx; 105.8 BTU/HR Tx; 95.5 BTU/HR TLX20: Rx; 112.6 BTU/HR Tx; 105.8 BTU/HR
REGULATORY	
	US/Canada EN 90650, FCC 47 CFR Part 15, ICES, CE
WARRANTY	
	12 months from date of shipment. Extended warranties available.

TLX10 and TLX20 Extender Audio Specifications

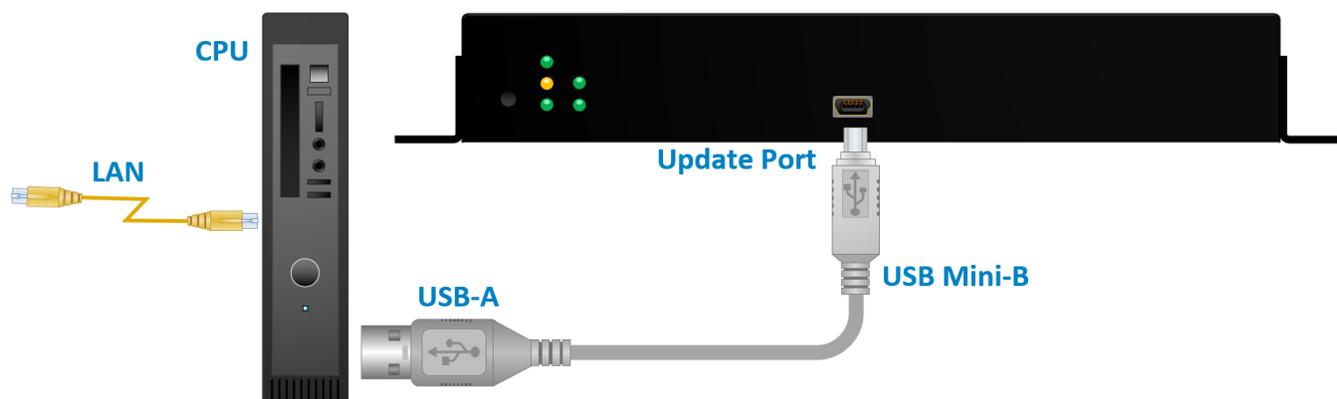
AUDIO	
Line	Line In Voltage (max): 3.15 V p/p (1.11 Vrms, 3.15 dBu) Line Out Voltage (max) into 1K Ω : 3.50 V p/p (1.24 Vrms, 4.10 dBu) Frequency Response: 20-20kHz Line In Impedance: 6.8KΩ Line Out Impedance: 470Ω
Mic	Frequency Response: 20-20kHz Mic In Voltage (max): 105 mV p/p (0.037 Vrms, -26.40 dBu) Mic In Impedance: 60KΩ



Standard TLX Extender Audio Line In/Out Configuration

FPGA and Firmware Update Applications

FPGA and Firmware Update Applications are available through Thinklogical's Technical Assistance Department. Please call us at 1-203-647-8700 and we'll be happy to provide you with all the assistance you'll need to keep your system up and running at its optimum performance level.



Regulatory & Safety Compliance

Symbols Found on Our Products

Markings and labels on our products follow industry-standard conventions. Regulatory markings found on our products comply with all required domestic and many international requirements.



Regulatory Compliance

Thinklogical's® products are designed and made in the U.S.A. These products have been tested by a certified testing laboratory and found compliant with the following standards for both domestic USA and many international locations:

North America

Safety

UL 62368-1:2014Ed.2

CSA C22.2#62368-1:2014Ed.2

LASER Safety

CDRH 21 CFR 1040.10

Class 1 LASER Product

Canadian Radiation Emitting Devices Act, REDR C1370

IEC 60825:2001 Parts 1 and 2

Class 1 LASER Product

Electromagnetic Interference

FCC 47CFR Part 15 Subpart B: 2013 Class A

Industry Canada ICES-003: 2016 Ed. 6

Australia & New Zealand

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take corrective action.

European Union

Declaration of Conformity

Manufacturer's Name & Address:

Thinklogical, A BELDEN BRAND
100 Washington Street
Milford, Connecticut 06460 USA

Thinklogical's products comply with the requirements of the Low Voltage Directive 2006/95/EC, the EMC Directive 2004/108/EC, the RoHS Directive 2011/65/EU, the WEEE Directive 2012/19/EU and carry the CE marking accordingly.

Standards with Which Our Products Comply

Safety

IEC 62368-1:2014Ed.2+C1

CB Scheme Certificate

Electromagnetic Emissions

CENELEC EN 55022:2010 +AC:2011

Electromagnetic Immunity

EN 55024:2011+A1

CENELEC EN 55032:2015

EN 61000-3-2:2000 Harmonics

EN 61000-3-3:2008 Flicker

EN 61000-4-2:2009 Electro-Static Discharge Test

EN 61000-4-3:2006 A1:2008, A2:2010 Radiated Immunity Field Test

EN 61000-4-4:2004 Electrical Fast Transient Test

EN 61000-4-5:2006 Power Supply Surge Test

EN 61000-4-6:2009 Conducted Immunity Test

EN 61000-4-11:2004 Voltage Dips & Interrupts Test

Supplementary Information

The following statements may be appropriate for certain geographical regions and might not apply to your location:

- This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. *Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.*
- This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective action.
- This equipment has been tested and found compliant with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications in which case the user may be required to make adequate corrective measures at their own expense.
- This Class A digital apparatus complies with Canadian ICES-003 and has been verified as compliant within the Class A limits of the FCC Radio Frequency Device Rules (FCC Title 47, Part 15, Subpart B CLASS A), measured to CISPR 22:1993 limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment.
- The user may notice degraded audio performance in the presence of electro-magnetic fields.

Product Serial Number

Thinklogical products have a unique serial number, which includes a date-code, printed on an adhesive label that is affixed to the unit. The format for the date-code is *2 digits for the month*, dash, *2 digits for the year*, plus *at least four digits for a unique unit number*. For example:

12-190348 indicates the unit was built in the **12th** month of **2019** and is unit number **348**.

Connection to the Product

Connections and installation hardware for our products use industry-standard devices and methods. All wiring connections to the customer equipment are designed to minimize proprietary or customized connectors and cabling. Power connections are made with regionally appropriate power cords and approved methods.

Thinklogical Support

Customer Support

Website: <https://www.thinklogical.com>

Check out our website for current products, support documents and useful information about all the products and services we offer, including:

- **Technical Specification Sheets**
- **Quick-Start Guides**
- **Product Manuals** (for viewing online or for download)
- **Chat live with a Technical Service Representative**

Email: <mailto:support@thinklogical.com>

For product support, technical issues or questions, product repairs and request for Return Merchandise Authorization.

Telephone: [1-203-647-8700](tel:1-203-647-8700)

Please contact our expert sales staff in Milford, CT **Monday - Friday from 8:30am to 5:00pm**, Eastern Time Zone. If leaving a voice message, please provide a preferred time to call back.

Fax: [1-203-783-9949](tel:1-203-783-9949)

Please indicate the nature of the fax on your cover sheet and provide contact information.

Product Support

Warranty

Thinklogical warrants this product against defects in materials and workmanship for a period of one year from the date of delivery, with longer terms available at time of purchase on most products. Thinklogical and its suppliers disclaim all other warranties. Please refer to your product invoice for the Warranty Terms & Conditions.

Defect remedy shall be the repair or replacement of the product, provided that the defective product is returned to the authorized dealer within a year from the date of delivery.

If you wish to return your device, contact the Thinklogical authorized dealer where you purchased the device, or if you purchased directly, call Thinklogical at **1-800-647-8700**.

Return Authorization

If you must return a product to Thinklogical directly, please contact us at **1-203-647-8700**. Customer Support will ask you to describe the problem and will issue you a **Return Merchandise Authorization number** (RMA#). Pack the device in its original box, if possible, and return it with the RMA# printed on the outside of the box. **DO NOT return a product to Thinklogical without a Return Merchandise Authorization.**

Our Address

If you have any product issues or questions or need technical assistance with your Thinklogical system, please call us at **1-203-647-8700** and let us help. If you need to write us or return a product, please use the following address:

Please include the Return Merchandise Authorization number: **Thinklogical, A BELDEN BRAND**
100 Washington Street
Milford, CT 06460 USA
Attn: RMA#

Appendix A: TLX CATx Video & KVM Quick Start Guide

QUICK START GUIDE

thinklogical's TLX CATx

With TLX CATx Video & KVM Transmitters & Receivers

VIDEO & KVM Extension System

Full 60Hz 4K Video and KVM Extension Solutions over two shielded CATx Cables

Complete Steps 1 through 6 to connect your TLX CATx Extenders:

STEP 1: Connect the TLX20 Transmitters to the TLX20 Receivers using shielded CATx cables. For one 4K @ 30Hz, HDMI 1.4 video and KMASS data, only one CATx cable is required (Port 1). For one 4K @ 60Hz DisplayPort or HDMI 2.0 video and KMASS data, two CATx cables are required (Ports 1 and 2).

STEPS 2: Connect the PWR-84 5VDC @ 7A Adapter to the Receiver's Power port. Be sure to secure the connection with the built-in screw lock.

STEP 3: Connect the HDMI 1.4 (for 4K @ 30Hz), HDMI 2.0 (for 4K @ 60Hz) or DisplayPort (for 4K @ 60Hz) Cable from the Receiver to the display device. (Use either HDMI or DisplayPort at both the Transmitter and Receiver.)

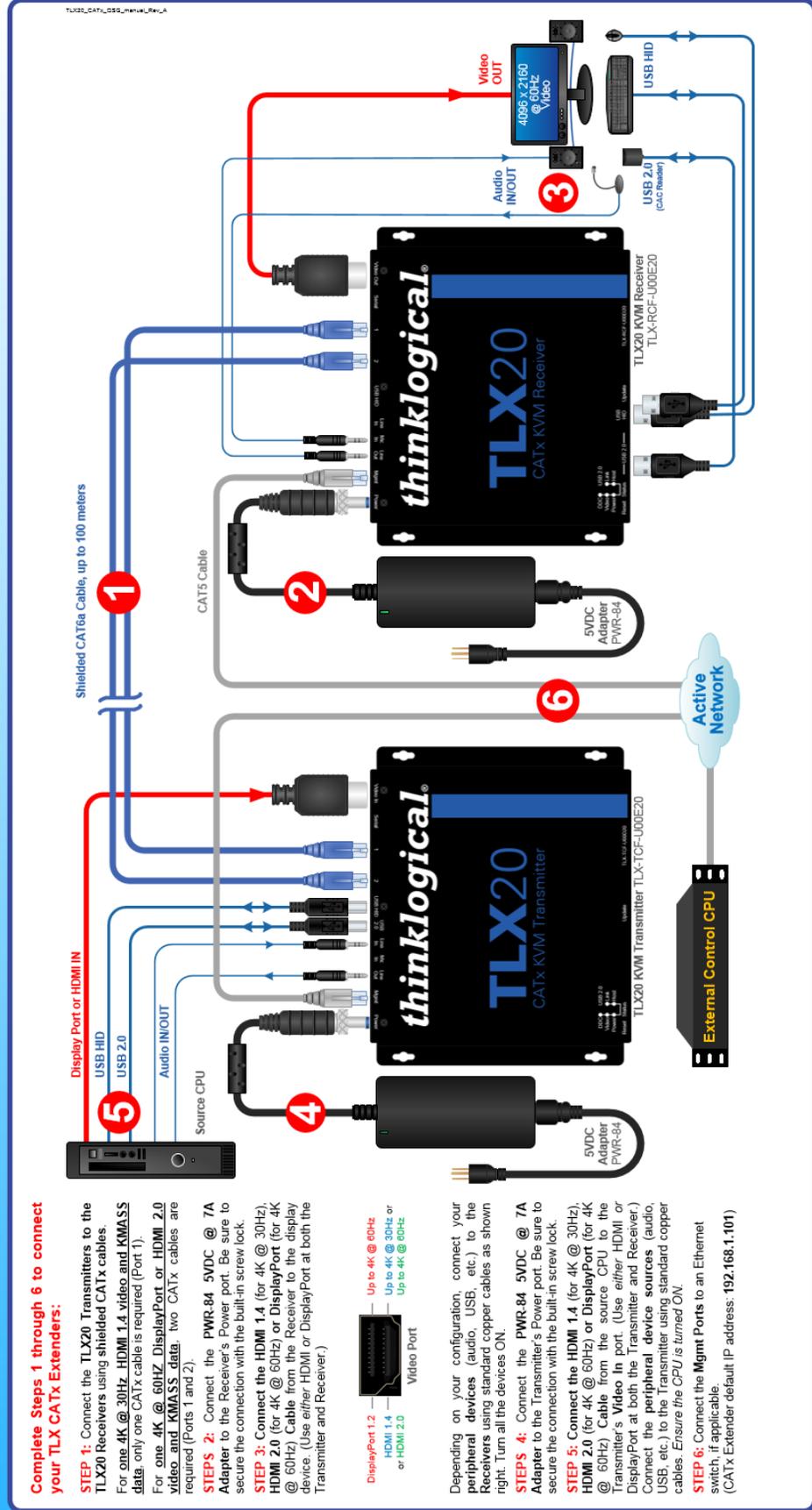


Depending on your configuration, connect your peripheral devices (audio, USB, etc.) to the Receiver using standard copper cables as shown right. Turn all the devices ON.

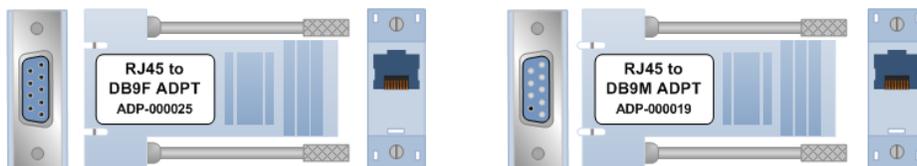
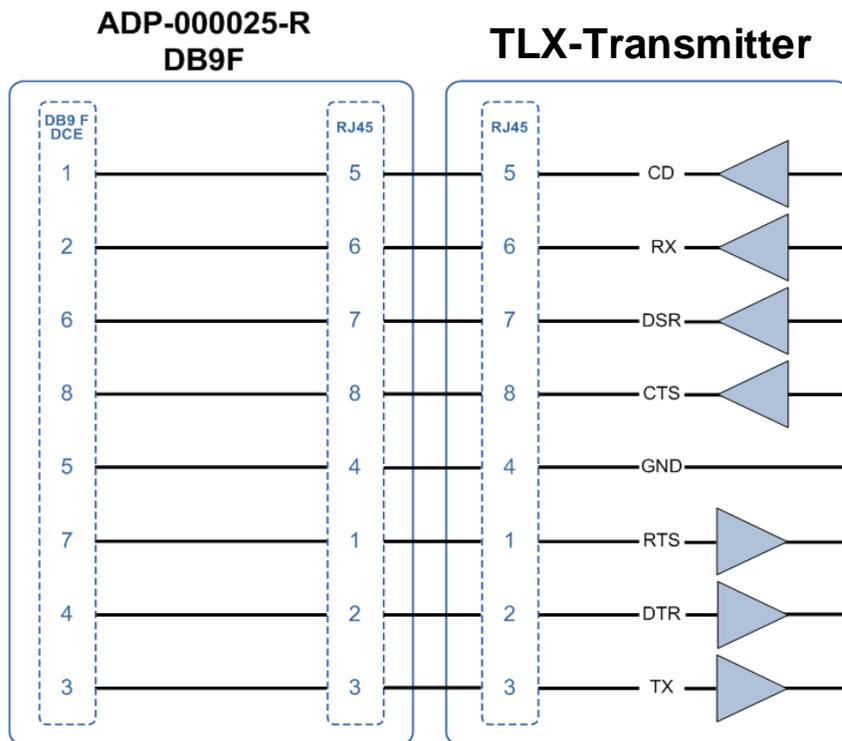
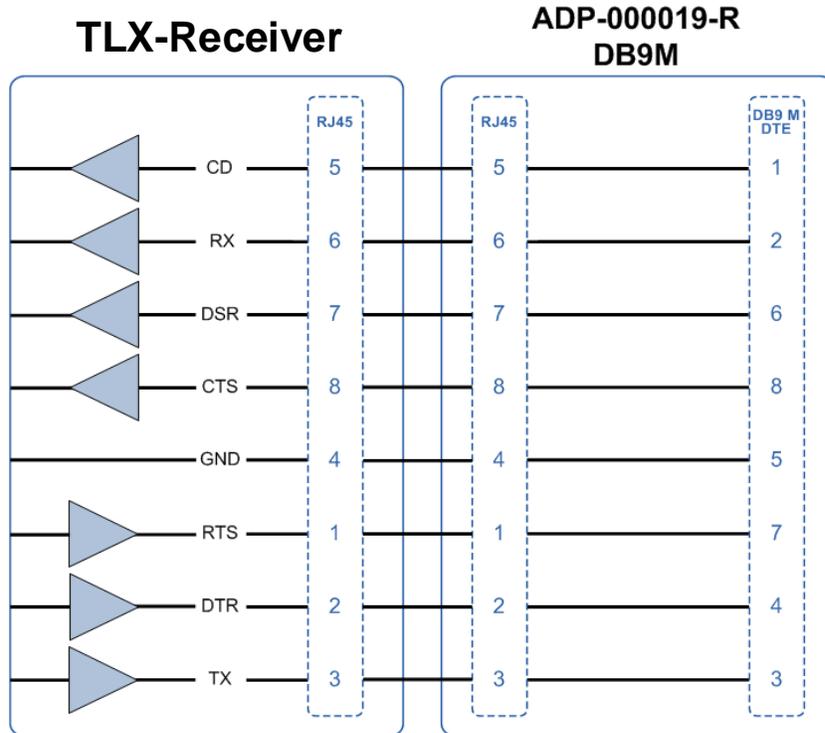
STEP 4: Connect the PWR-84 5VDC @ 7A Adapter to the Transmitter's Power port. Be sure to secure the connection with the built-in screw lock.

STEP 5: Connect the HDMI 1.4 (for 4K @ 30Hz), HDMI 2.0 (for 4K @ 60Hz) or DisplayPort (for 4K @ 60Hz) Cable from the source CPU to the Transmitter's Video In port. (Use either HDMI or DisplayPort at both the Transmitter and Receiver.) Connect the peripheral device sources (audio, USB, etc.) to the Transmitter using standard copper cables. Ensure the CPU is turned ON.

STEP 6: Connect the Mgmt Ports to an Ethernet switch, if applicable. (CATx Extender default IP address: 192.168.1.101)



Appendix B: RJ45 to DB9 Adapter Pin-outs

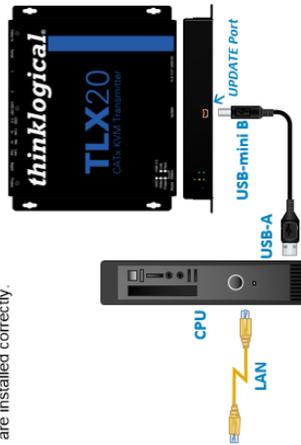


Appendix C: FPGA Program Code Update Procedure

thinklogical® TLX CATx Extender FPGA Program Code Update Procedure

The following procedure documents the process for updating the FPGA Program Code, using a Windows-based computer, for TLX10 and TLX20 CATx Extenders Modules

- 1 STEP 1:** FPGA Update Preparation: Please contact your *thinklogical* Sales Representative or Customer Service (1-203-647-8700) for access to the FPGA Download Update application and firmware.
- 2 STEP 2:** Install the provided FPGA Download Update application on the system's CPU.
- 3 STEP 3:** Save the FPGA program code update file provided by Thinklogical to a known location on the CPU. The program code update file will have a file extension of ".lbf". This is the file that will be retrieved in Step 9.
- 4 STEP 4:** Connect a USB mini-B cable from the Update Port of the TLX10 or TLX20 chassis to the CPU. (When connecting Thinklogical equipment to your PC for the first time, it may take a few moments for Windows to correctly install the required drivers.) Open the Windows Device Manager to check that all drivers are installed correctly.



STEP 5: This Device Manager window will appear. When completed successfully, The Universal Serial Bus controllers section will contain USB Serial Converter A and USB Serial Converter B at the bottom of the list.

STEP 6: Once the drivers are installed, go to the Start menu and choose: Start → All Programs → FPGA_Download → FPGA_Download. The window above will appear. Select *Identify Product*.

STEP 7: If you do not see CATX_TX, call Thinklogical for assistance. Otherwise, select *Open File*.

STEP 8: A window similar to this will open. As shown, there is only one firmware option for each of the CATX Extender Transmitters. To upgrade the Tx, select the file and click OK, as shown above.

STEP 9: A dialog box similar to this will appear. Navigate to the folder with the unzipped firmware files from Step 3 (i.e. catx_tx_fpga_sw.lbf). The dialog box will already be populated with the correct file name. Click *Open*. This will take approximately 10 minutes. The Upgrade window will open again.

STEP 10: Select *Open File* and repeat the previous steps to update the RX modules. Be sure to move the USB cable to the Receiver's Update Port.

STEP 11: To make the new firmware active, cycle power to the unit by momentarily removing and reinstalling the power cord.

If you have any problems or questions, please call **thinklogical** for help: 203-647-8700



Appendix D: EDID and DDC for TLX Modules

Extended Display Identification Data (EDID) is a data structure provided by a digital display to describe its identity (*manufacturer's name, product type, serial number, etc.*) and capabilities (*native timing, frequency range, video and audio formats, etc.*) to a video source.

EDID is what enables a modern personal computer to know what kind of monitor is connected.

With this information the CPU and video card can determine what resolutions the monitor is capable of. EDID is defined by a standard published by the Video Electronics Standards Association (VESA). The EDID also includes such information as the phosphor or filter type, timings supported by the display, display size, luminance data and pixel mapping data for digital displays.

Display Data Channel (DDC) is a VESA standard transport medium between a CPU's graphics adapter and monitor used to pass EDID.

Default DDC Modes:

Remote Dynamic Mode

The unit acts as a direct connection between the RX and TX. In this mode DDC data is read at the RX and sent to the TX. Once verified at the TX the information is written into a PROM on the TX and provided to the CPU video card. The RX will not send DDC data to the TX unless a different display is connected to the RX.

Advantage: Allows CPU video card to boot when there is no fiber connection to the RX.

Limitations: No communication link from the CPU to the display. Remote Dynamic prevents the use of HDCP or monitor configuration /color tuning.

Remote Static Mode

Remote Static Mode is a subset of Dynamic Mode in that once a transfer from the RX to the TX is completed successfully, no other transfer will be made unless specifically requested. The DDC data stored in the TX PROM will not change regardless of display changes.

Advantage: Allows the user to acquire and use an EDID table regardless of changes in connection at the RX.

Limitations: No communication link from the CPU to the display. Remote Static prevents the use of HDCP or monitor configuration/color tuning. This may result in no video if a display with lower resolution capability is subsequently connected.

Default EDID Table

Multiple EDID Tables are present to support most common default resolutions. i.e. 1920x1200, 3840x2160, etc..

Advantage: Sends a valid EDID table to the CPU to boot the graphics adapter.

Limitations: Default EDID table may not support required resolutions.



Note: Most graphics adapters will not boot if a valid EDID table is not received at power up.

TLX Modules EDID Table			
Feature	Remote Dynamic	Remote Static	Load Default
Supports HDCP	Yes	Yes	Yes
Supports Monitor calibration	No	No	No
Monitor on Rx side required to boot video	No	No	No
EDID table loaded from Rx	Yes	Yes	No
EDID table loaded from Tx	No	No	No
EDID table stored in non-volatile memory	Yes	Yes	Yes

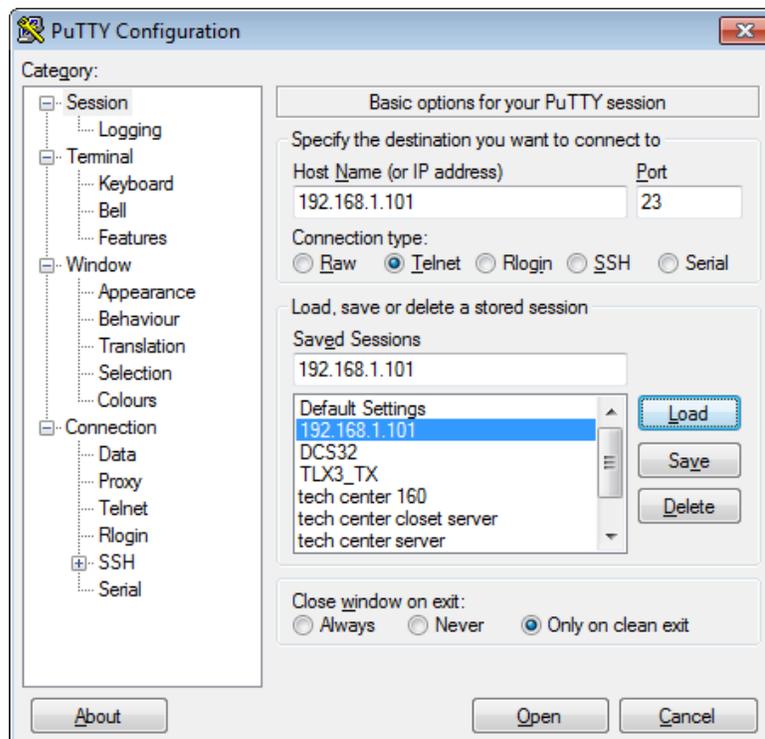
How to Change DDC Modes

The TLX10 and TLX20 have no LCD or Navigation buttons, therefore the MGMT Port must be used to change DDC modes.

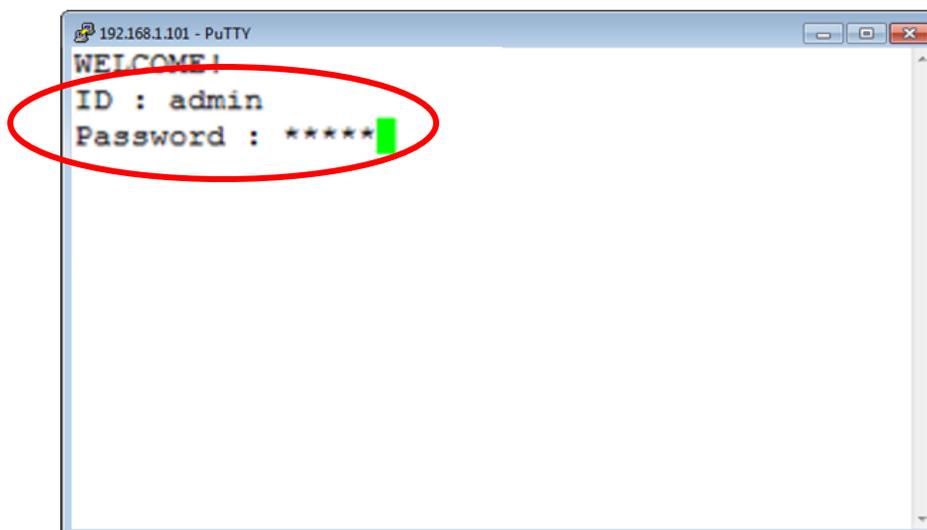
1. Connect an active Ethernet cable to the module's MGMT Port.



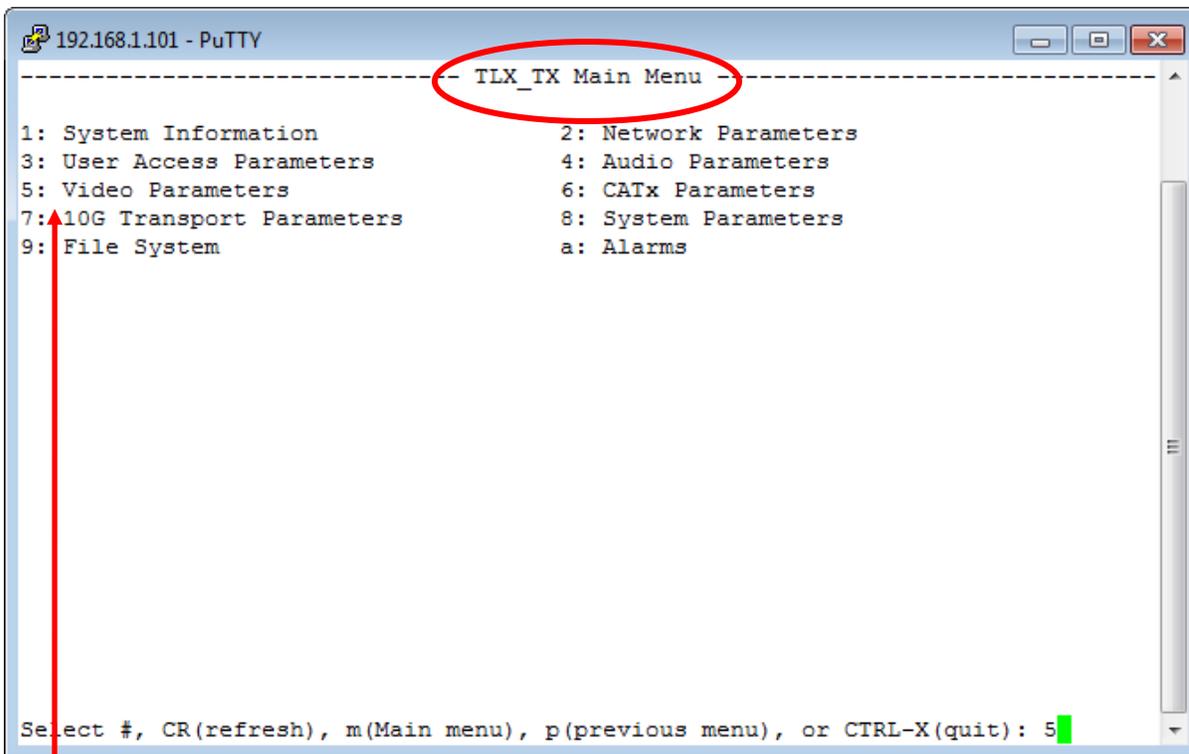
2. Open a Telnet session to the CATx Extender using PuTTY (an SSH and Telnet Client available for Linux and Windows). PuTTY is an open source program, downloaded for free at www.putty.org.



3. The login ID and Password are both **admin**



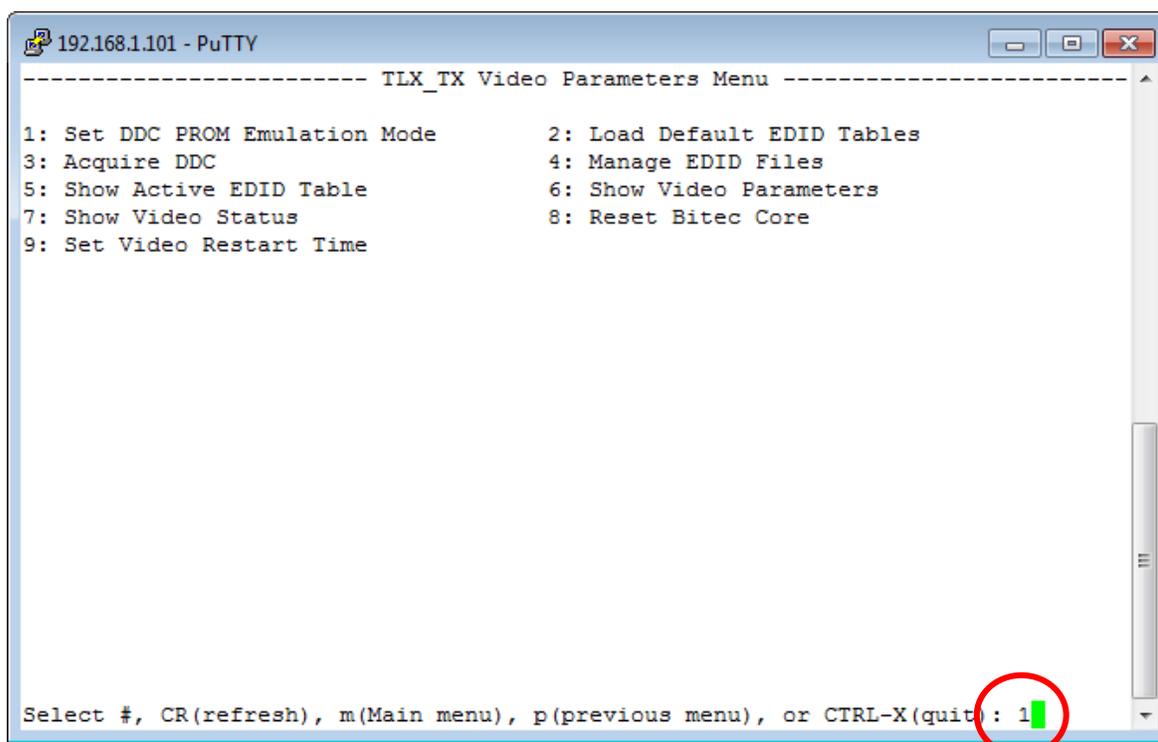
4. The **Main Menu** will appear.



```
192.168.1.101 - PuTTY
----- TLX_TX Main Menu -----
1: System Information          2: Network Parameters
3: User Access Parameters    4: Audio Parameters
5: Video Parameters          6: CATx Parameters
7: 10G Transport Parameters  8: System Parameters
9: File System               a: Alarms

Select #, CR(refresh), m(Main menu), p(previous menu), or CTRL-X(quit): 5
```

5. Type **5** and <ENTER> to access the **Video Parameters**



```
192.168.1.101 - PuTTY
----- TLX_TX Video Parameters Menu -----
1: Set DDC PROM Emulation Mode    2: Load Default EDID Tables
3: Acquire DDC                    4: Manage EDID Files
5: Show Active EDID Table         6: Show Video Parameters
7: Show Video Status             8: Reset Bitec Core
9: Set Video Restart Time

Select #, CR(refresh), m(Main menu), p(previous menu), or CTRL-X(quit): 1
```

6. The **Video Parameters** window will open (above). Select **1: Set DDC PROM Emulation Mode**.

```

----- TLX_TX Video Parameters Menu -----
1: Set DDC PROM Emulation Mode           2: Load Default EDID Tables
3: Acquire DDC                           4: Manage EDID Files
5: Show Active EDID Table                 6: Show Video Parameters
7: Show Video Status                      8: Reset Bitec Core
9: Set Video Restart Time

DDC PROM Emulation Mode is Dynamic Change? (Y/N): y

```

7. The default DDC Mode is **Dynamic**. To change modes, type **y** and <ENTER>.

```

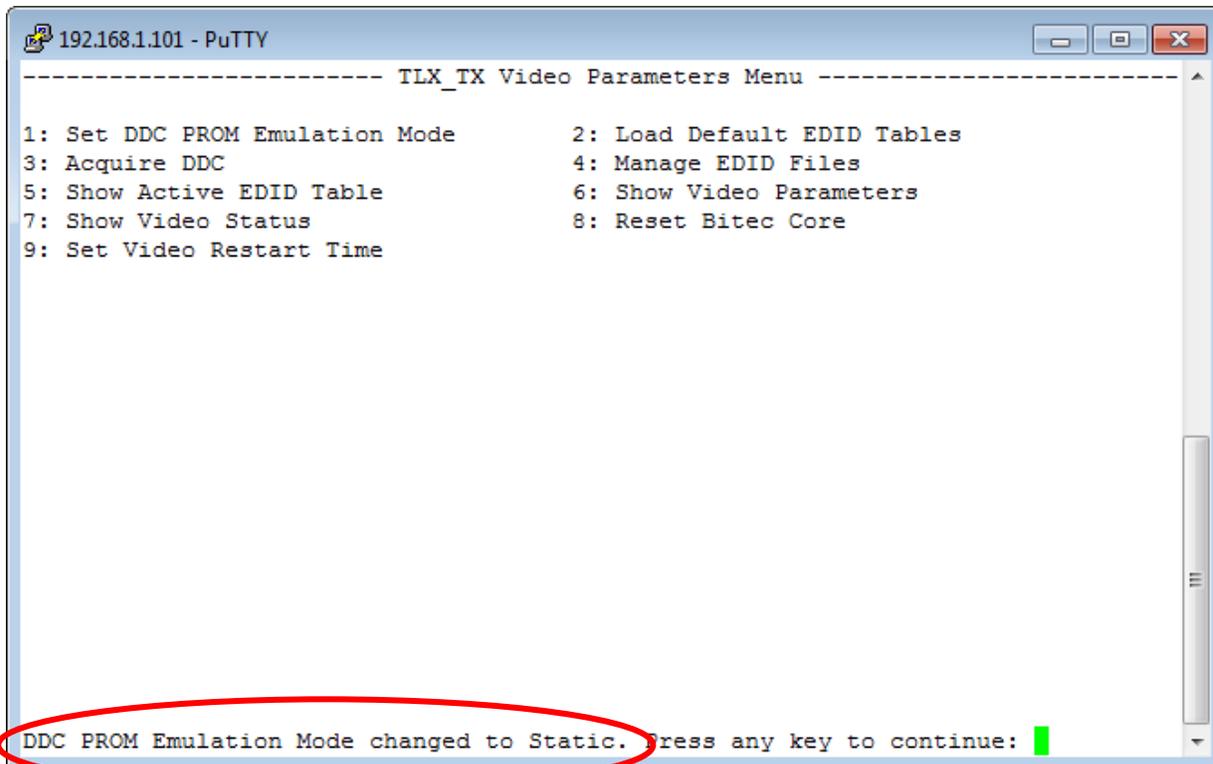
----- TLX_TX Video Parameters Menu -----
1: Set DDC PROM Emulation Mode           2: Load Default EDID Tables
3: Acquire DDC                           4: Manage EDID Files
5: Show Active EDID Table                 6: Show Video Parameters
7: Show Video Status                      8: Reset Bitec Core
9: Set Video Restart Time

Select <1> for Dynamic, <2> for Static, or <3> for Local Static: 2

```

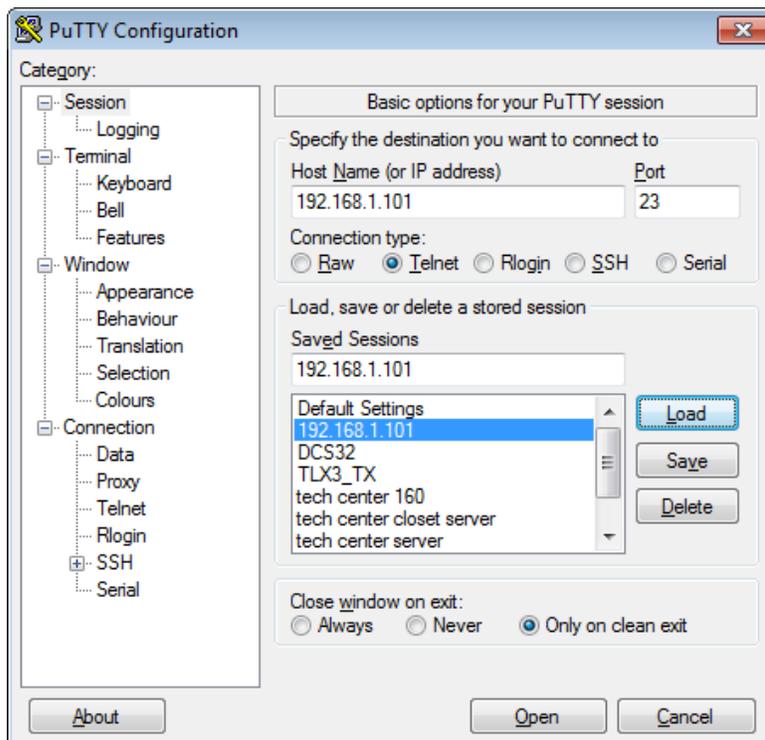
8. To change the DDC Mode to **Static**, for example, type **2**, then <ENTER>

9. The DDC Mode has now been changed to **Static**.

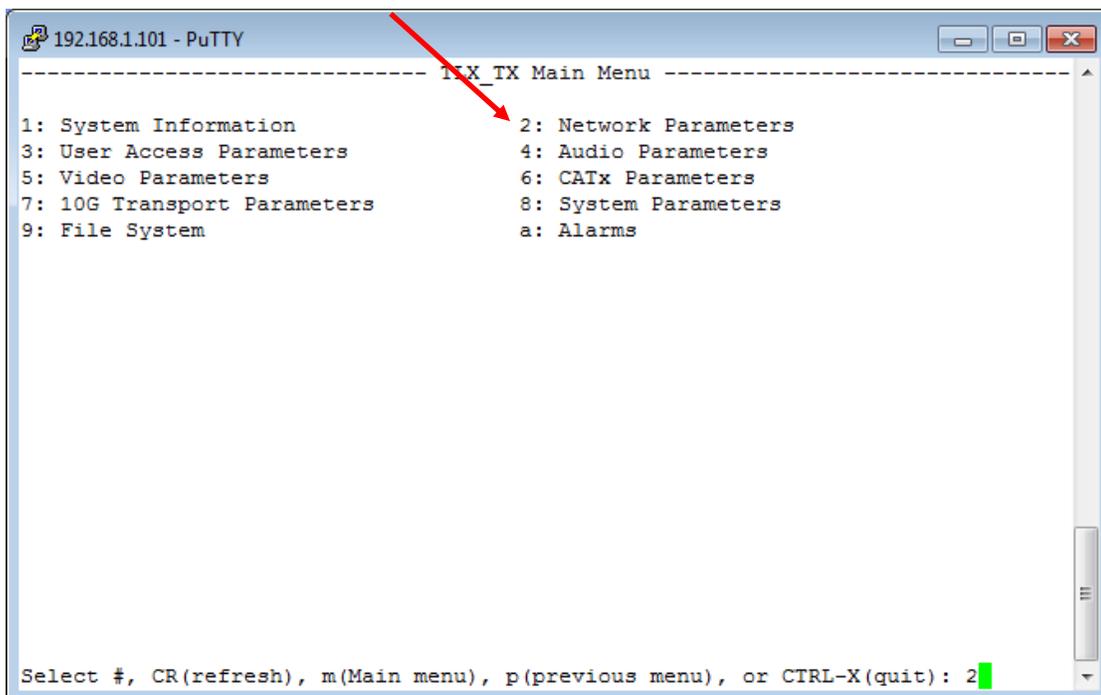


How to Change the IP Address of a CATX Extender

1. Connect an **Ethernet cable** to the module's **MGMT port**.
2. Open a Telnet session to the CATx Extender using **PuTTY** (an SSH and Telnet Client available for Linux and Windows). PuTTY is an open source program, downloaded for free at www.putty.org.



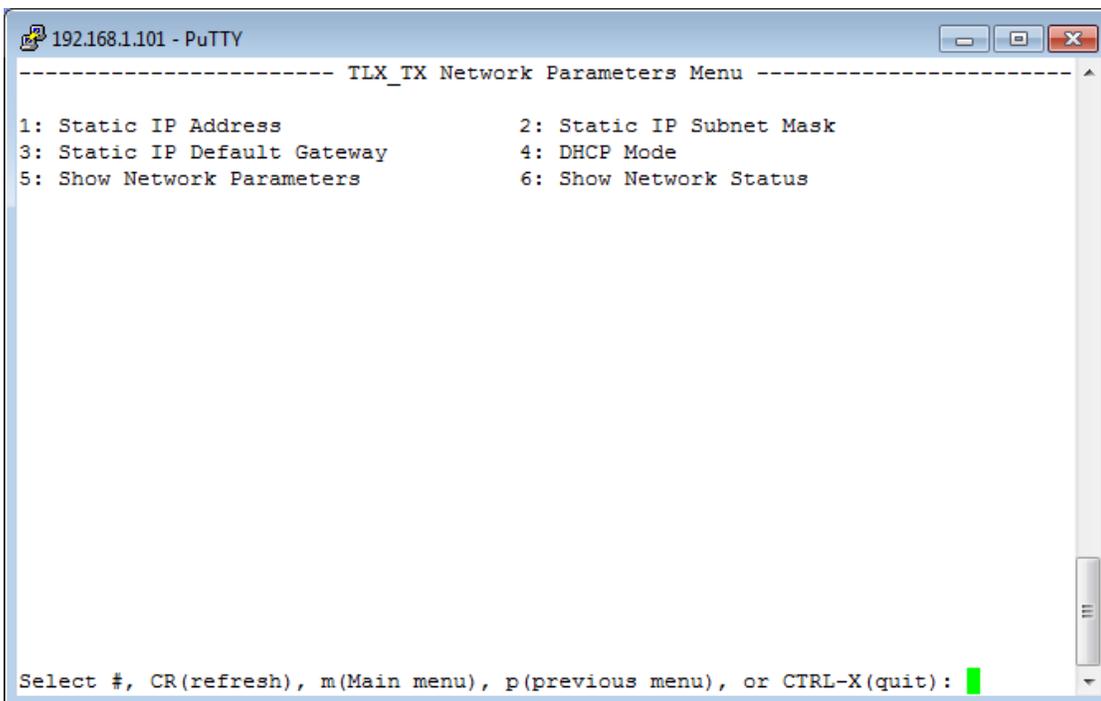
- Once connected via MGMT Port, the address can be changed to the user's preference using Option 2 (**2: Network Parameters**) on the Main Menu.



```
192.168.1.101 - PuTTY
----- TLX_TX Main Menu -----
1: System Information                2: Network Parameters
3: User Access Parameters            4: Audio Parameters
5: Video Parameters                 6: CATx Parameters
7: 10G Transport Parameters         8: System Parameters
9: File System                      a: Alarms

Select #, CR(refresh), m(Main menu), p(previous menu), or CTRL-X(quit): 2
```

- The extender can be configured with a new static IP address or configured using DHCP. **By default, the extender has a static IP address of 192.168.1.101.**

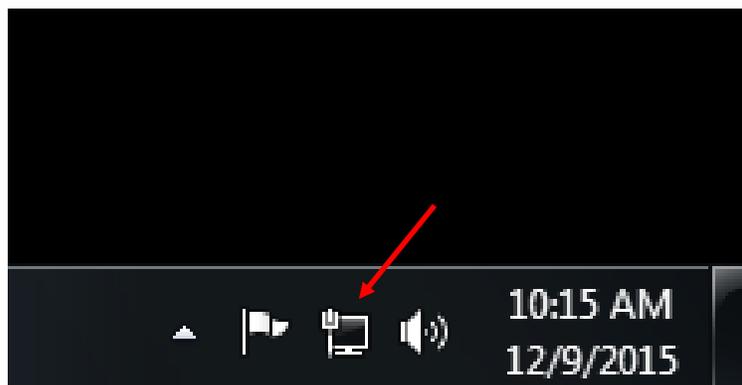


```
192.168.1.101 - PuTTY
----- TLX_TX Network Parameters Menu -----
1: Static IP Address                2: Static IP Subnet Mask
3: Static IP Default Gateway        4: DHCP Mode
5: Show Network Parameters          6: Show Network Status

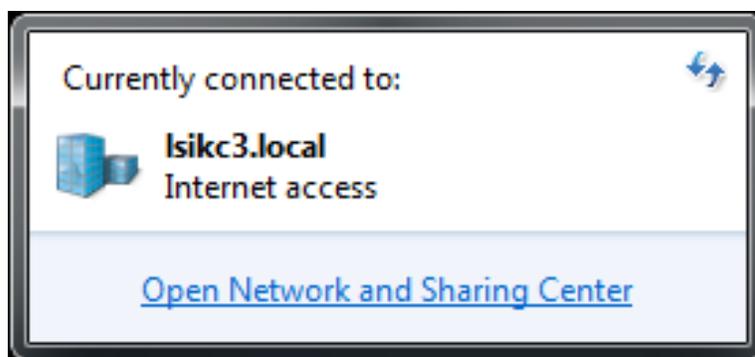
Select #, CR(refresh), m(Main menu), p(previous menu), or CTRL-X(quit):
```

How to Configure a PC with a Static IP Address

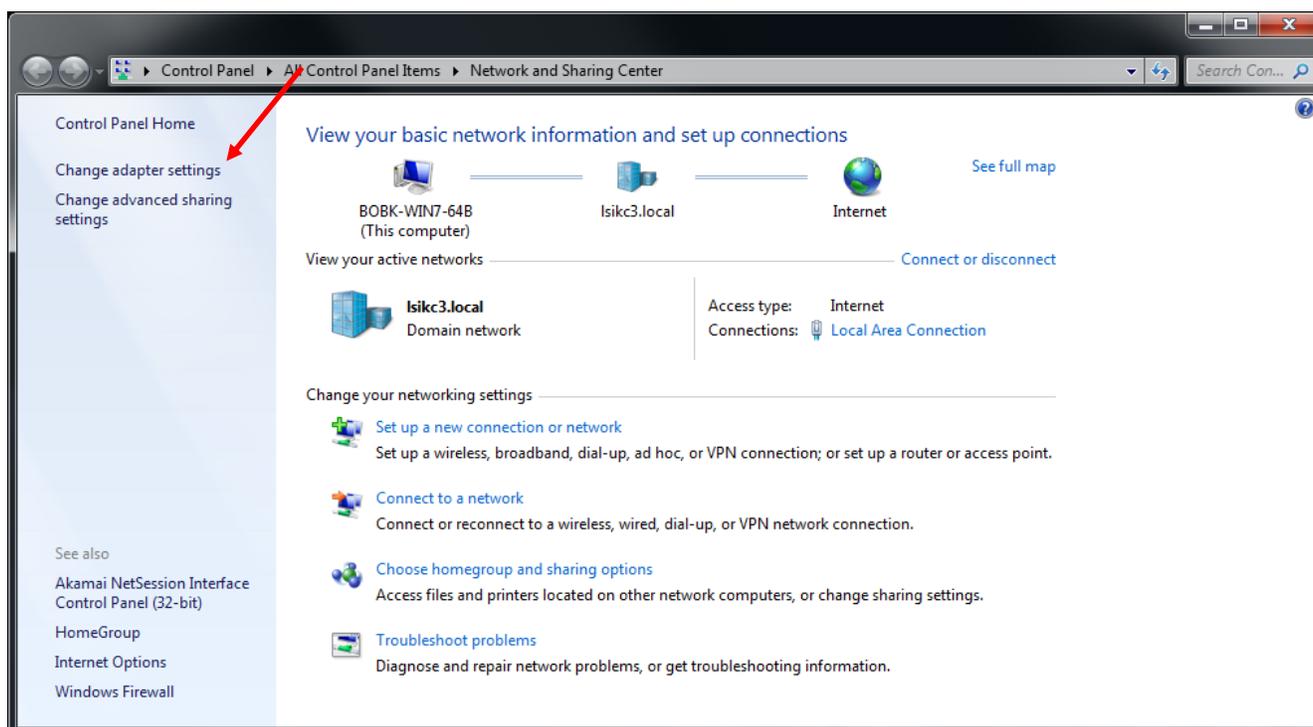
1. On the PC monitor's bottom tool bar, click on the Network icon (below).



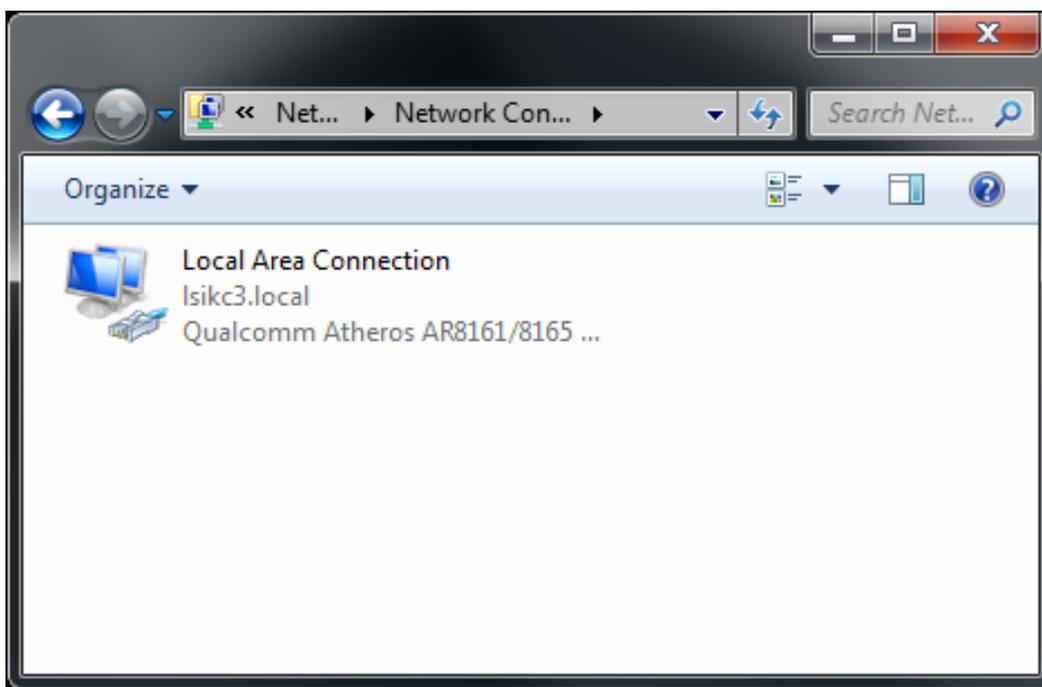
2. Click on [Open Network and Sharing Center](#) (below).



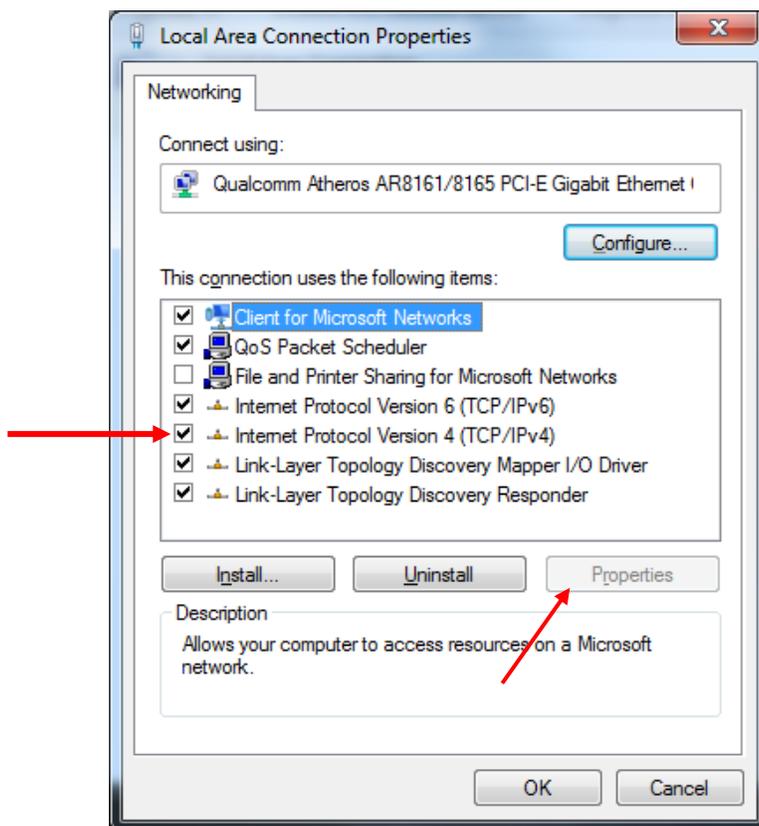
3. Click on **Change adapter settings**



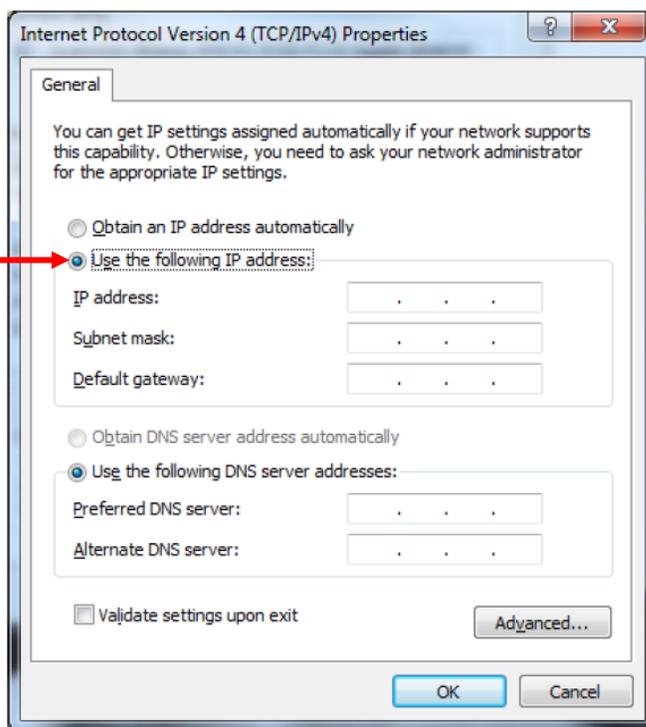
- Right click on the adapter to be configured (**Local Area Connection** in this example) and select **Properties**.



- Select **Internet Protocol Version 4 (TCP/IPv4)**, then click on **Properties**.



6. Click on the **Use the Following IP address** button.



7. Enter a **Network address** (192.168.1 in this example) and a **Host address** (43 in this example) in the **IP address:** box as shown below.
8. Click on **Subnet mask:** The default address will appear automatically.
9. Enter the **Default gateway address** (the Network address 192.168.75 and 1 for the Host address).
10. Click **OK** to complete the process.

