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Configuring the **TLX** ASCII Interface

How to configure the ASCII Interface
on a Thinklogical TLX KVM Matrix Switch

Rev. E, January 2019

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Subject: Configuring the TLX ASCII Interface Manual
Revision: E, January 2019



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PREFACE

About Thinklogical A BELDEN BRAND



Thinklogical, A BELDEN BRAND
100 Washington St.
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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.



JITC



NATO Information Assurance
Product Catalogue



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 www.thinklogical.com.

About this Manual

This manual lists the step-by-step instructions for configuring the ASCII Interface on a Thinklogical® TLX Series KVM Matrix Switch. The TLX KVM Matrix Switch is controlled via an ASCII interface.

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 or important** 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.

Font Conventions Used in this Document

The following fonts and colors are used throughout this document to help differentiate between file names, commands, outputs and document names (lower & upper-case letter **o** and **zero**, shown right):

Filenames	Font: Courier New - 35-35-22	o00
Linux Command Entered by the User	Font: Consolas - 196-89-17	o00
Output from a Command	Font: Consolas - 0-128-128	o00
Document_Name*	Font: Georgia - 83-129-53	o0o

* These and other documents may be found on our web site:

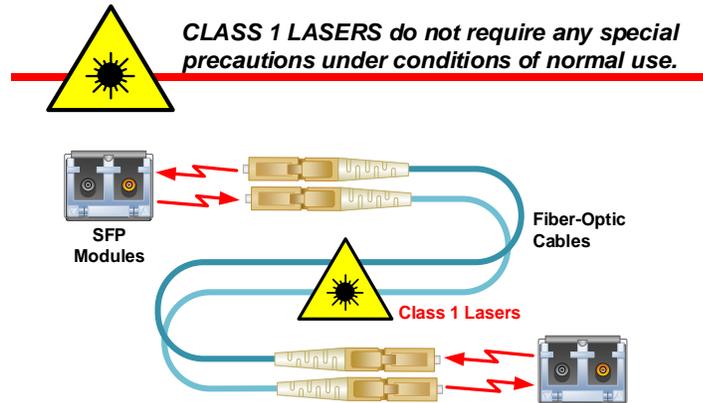
http://www.thinklogical.com/user_manuals

**BEFORE STARTING ANY PROCEDURE, IT IS RECOMMENDED
THAT YOU READ THE INSTRUCTIONS THOROUGHLY!**

Regulatory & Safety Requirements

Class 1 Laser Information

TLX Matrix Switches, like all Thinklogical® fiber-optic products, are designed and identified as **Class 1 LASER products**. This means the maximum permissible exposure (MPE) cannot be exceeded when viewing the laser with the naked eye or with the aid of typical magnifying optics (e.g. telescope or microscope).



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 markings 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
 EN61000-3-2:2000 Harmonics
 EN61000-3-3:2008 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
 EN61000-4-11:2004 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.

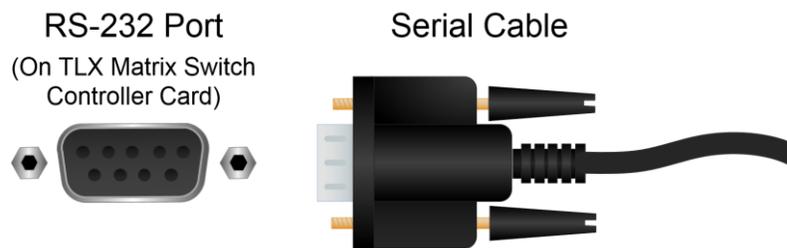
Configuring the TLX ASCII Interface

Accessing the ASCII Interface

The ASCII Interface is accessible via the serial RS-232 port located on the TLX Matrix Switch's Controller Card or over the network via a TCP connection. Both connections use the same syntax. The command syntax is defined in the document: [Matrix_Switch_ASCII_API](#).

The serial port is configured for 9600 baud, 1 stop bit, no parity, and software flow control. Each line contains only one command and must end with a carriage return (CR) and line feed (LF), or just a line feed (LF). The characters are not echoed.

The network interface listens on TCP port 17567. It accepts the same commands as the serial interface. You may use telnet to manually open a connection to control the Matrix Switch.



API Command Line Options

Each Matrix Switch model has its own API program. Examples are: **tlx48api**, **tlx320api** and **tlx640api**. The generic name that is used in place of the actual name is: **tlxapi**.

The interface program has several options to control its operation. These options can be listed by running the API program with the option '**--help**'. See the example below:

```
Version: V5.07.07 (build: 8)
Usage: tlx320api [options]

----- network options -----
-L|--listen[=]port      listen on this port, all addresses      (default: 17567)
-N|--connections[=]n    set the maximum number of open connections allowed      (default: 128)
  --mcast[=IP address]  replace broadcasts with multicast to this IP address      (default:
239.255.13.9)
  --noexternalapi       only listen on 'localhost' for API connections
  --noexternalbcast     send the port status only on 'localhost'
----- serial options -----
-S|--serial=device      use this serial device                      (default: /dev/ttymxcl)
  --serial=none         disables the API serial port /dev/ttymxcl
-B|--baud[=]speed      sets serial baud rate                      (default: 9600)
----- generic options -----
  --CR                 output CRLF instead of just LF (network connection only)
  --facility[=]name     syslog facility reporting level          (default is local4)
                      valid names: auth, daemon, user, local0 through local7
                      see the man page for rsyslog.conf for more information
-D|--debug             write debug messages to the log file (multiple options increase the debug
level)
  --api                write API messages received to the log file          (level: NOTICE)
  --avr                write control commands to the log file            (level: NOTICE)
  --clog               write connection status changes to the log file    (level: NOTICE)
  --log_ip             include the IP address with each API message that is logged (level:
NOTICE)
  --delay[=]delay     in ms, how long an output must remain off, default is 300 ms.
                      minimum is 50ms, maximum is 1000ms, 0 will disable the delay
-b|--bcast[=]period   in ms, how long between port status broadcasts, default is 4000 ms.
                      minimum is 500, maximum is 15000, 0 will disable the broadcast
                      if multicast is enabled, it will use this time setting
                      --bcast=0 will disable: broadcasts, multicasts, and the 'restore
connections' feature to disable network broadcasts but keep the 'restore'
feature, use the --noexternalbcast option
  --idle[=]seconds    network connections idle for at least these many seconds are candidates
                      to be forcibly closed when a new connection is made and there are no
                      available sockets.
                      Setting it to 0 will disable this feature. The default setting is 60
                      seconds.
-V|--verbose          enable error text in responses
-h|--help             display this help and exit
-v|--version          output version information and exit

Default (no options) is to listen on socket 17567 at all IP addresses
                      send to socket 27567 at 127.0.0.1
                      accept commands from the RS232 port
                      broadcast switch status every 4000 milliseconds on port 17564

signal SIGUSR1 will toggle api debug logging      (--api)
signal SIGUSR2 will toggle control debug logging  (--avr)
signal SIGHUP will force the API to reread the P2P csv files located in /var/local/router/p2p/
```

Changing the Command Line Options

The command line options are stored in the file: `/etc/default/tlxapi`.

The default file contents are:

```
# Defaults for tlxapi initscript
# sourced by /etc/init.d/tlxapi
# installed at /etc/default/tlxapi by the maintainer scripts

#
# This is a POSIX shell fragment
#

## set this to 'no' and the daemon will not run
APIRUN=yes

## some API command line options you might need to use...
##          ---- network options ----
##      -N|--connections[=]n    set the maximum number of open connections allowed (default:
1024)
##      --noexternalapi        only listen on 'localhost' for API connections
##          ---- serial options ----
##      --serial=none          disables the API serial port /dev/ttymxcl
##      -B|--baud[=]speed      sets serial baud rate (default: 9600)
##          ---- generic options ----
##      --CR                   output CRLF instead of just LF (network connection only)
##      --api                   write API messages received to the log file (level: NOTICE)
##      --clog                  write connection status changes to the log file (level: NOTICE)
##      --log_ip                include the IP address with each API message that is logged (level:
NOTICE)
##      --delay[=]delay        in ms, how long an output must remain off, default is 300 ms.
##                               minimum is 50ms, maximum is 1000ms, 0 will disable the delay
##      -b|--bcast[=]period    in ms, how long between port status broadcasts, default is 4000 ms.
##                               minimum is 500, maximum is 15000, 0 will disable the broadcast
##                               if multicast is enabled, it will use this time setting
##                               --bcast=0 will disable BOTH broadcasts and multicasts
##      --idle[=]seconds       network connections idle for at least these many seconds are
candidates to be forcibly closed when a new connection is made and there are no available sockets.
##                               Setting it to 0 will disable this feature. The default setting is 60
seconds.

# Command line options that are passed to tlxapi.
TLXAPI_ARGS="--verbose --api"
```

Command line options are added to the `TLXAPI_ARGS` line.

For example, to change the serial port baud rate to 115200 and send a CRLF at the end of each line, the `TLXAPI_ARGS` line will be: `TLXAPI_ARGS="--verbose --api --baud=115200 --CR"`

After the file is modified and saved, the following command will restart the API with the new settings:
`service tlxapi restart`



Note: Any changes you make to the switch firmware will be lost if you install a new SD card from Thinklogical.

Debugging Aids

The API program has several options to aid in setup and debugging. These include logging the incoming ASCII commands, logging the communications to the internal control process (aka AVR or Control) and appending a comment to the response message that is returned after each command. This comment will contain details about any errors.

These messages are written to the system log file: `/var/log/api` located on the Switch's internal SD card.

Command line options to enable the API debug aids:

- `--debug` log extensive detailed data
- `--api` log the API commands received
- `--avr` log the commands to the internal control process
- `--clog` log connection make/break status
- `--verbose` append a comment to each command response
- `--log_ip` include the IP address with each API message that is logged

The '`--api`' and '`--avr`' settings may be toggled by sending a system signal to the running API program. As shown in the *help* text on pg. 6 (near the bottom of the page), **SIGUSR1** will toggle the 'api' setting and **SIGUSR2** will toggle the 'avr' setting. (See the example below for the syntax of the 'killall' command.)

You may use the `killall` command to send a signal to a running program. The syntax is:

```
killall -USR1 tlxapi
```

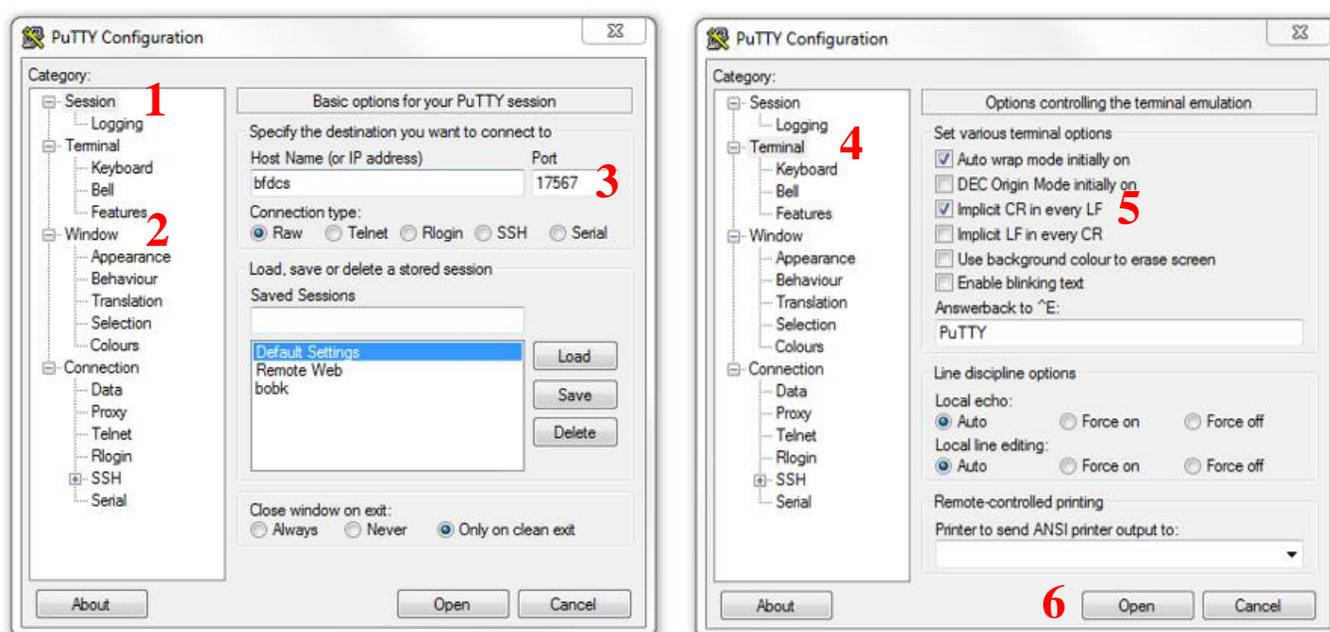
or

```
killall -USR2 tlxapi
```

Using 'PuTTY' to Communicate to the API

Upon opening PuTTY (a Windows communication program) to communicate to a switch, you must first set the following:

1. Under **Category:**, click on **Session**
2. Under **Connection type:**, select **Raw mode**
3. Change the port to **17567**
4. Under **Category:**, click on **Terminal**
5. Under **Options controlling the terminal emulation**, check **Implicit CR in every LF**
6. Click **Open**.



You may also use telnet to access the ASCII control port. The command syntax is:

```
telnet IPaddress 17567
```

Replace **IPaddress** with the actual IP address of the switch.

Log File Debugging Entries

When **debugging** is turned on, several types of messages are written to the system log file: `/var/log/api`.

For example, below are listed five commands that were sent to a TLX320 Matrix Switch. Below those commands is a snippet of the log file showing the corresponding log entries. The first line in the log file records the event that enabled logging.

`Ci0150o0151`

`Si0150`

`So0151`

`Do0151`

`Ci0312o0001`

```
imxs tlxapi[1851]: caught signal SIGUSR1 (10), turn on api debugging
imxs tlxapi[1851]: command: Ci0150o0151      response: R00000K#Ci0150o0151
imxs tlxapi[1851]: command: Si0150           response: R00000KI015000151#Si0150
imxs tlxapi[1851]: command: So0151           response: R00000KI015000151#So0151
imxs tlxapi[1851]: command: Do0151           response: R00000K#Do0151
imxs tlxapi[1851]: command: Ci0312o0001     response: R00000K#Ci0312o0001
```

These log entries list the command that was received and the response that was sent back to the sender.

The log files contain other system related messages and are a valuable aid in troubleshooting. Linux offers the means to send these log file entries over the network to another system. Further information may be found in the document: [Matrix_Switch_Interfaces](#).



A Note to Telnet Users:

By default, **tlxapi** does not send a CR on each line. This is inherent in the Windows telnet client software. The API, however, has a command to enable the sending of CR's. This command is **XCRON**.

If your telnet output from tlxapi is displayed incorrectly on the screen, Thinklogical recommends using the XCRON command.

Disabling 'Broadcast' on Switch Input Ports

The API may be configured so that input ports are restricted to one output port at a time. If input X is first connected to output A, then connected to output B, X will be disconnected from A and moved to B. This mode is referred to as Point-to-Point mode, or P2P for short.

The P2P definitions are stored on the Controller SD card in the following file:

```
/var/local/router/p2p/upstream.csv
```

P2P mode is disabled when the definition file does not exist. By default, when there is no file, input ports may connect simultaneously to any number of output ports. All Matrix Switches are shipped without a P2P file.

These files are in the form of a comma separated value (csv) file. Each entry in the file is the input port to be restricted to P2P mode. There may be one or more entries per line in the file. The only characters allowed in the file are the digits 0 thru 9, commas, and spaces. Blank lines are allowed.

An example that set ports 1, 2, 3, 4, 9, 11 and 15 to P2P mode is:

```
1,2,3,4
9
11, 15
```

As a shortcut, you may use the value 9999 to indicate ALL input ports.

If you make changes to either of these files, you can force the API to reread them by issuing the command:

```
killall -HUP tlxapi
```

If P2P files are found at startup, the API will log this to the file: `/var/log/api`.

An example is shown below.

```
imxs tlxapi[9389]: parsing P2P csv file /var/local/router/p2p/upstream.csv
imxs tlxapi[9389]: parse_api_csv_file.c@133: line 1 of csv file /var/local/router/p2p/upstream.csv '1,2,3,4#012'
imxs tlxapi[9389]: parse_api_csv_file.c@133: line 2 of csv file /var/local/router/p2p/upstream.csv '9#012'
imxs tlxapi[9389]: parse_api_csv_file.c@133: line 3 of csv file /var/local/router/p2p/upstream.csv '11, 15#012'
imxs tlxapi[9389]: point-to-point mode enabled
```

Using 'Multicast' to Send Switch Status Instead of 'Broadcast'

The API has a command line option for using a network *multicast* address instead of a *broadcast* address to deliver switch status messages. The default mode of the API will broadcast its status over the network. **The use of a multicast address allows these messages to be routed to other network segments.**

The command line option to enable multicast is `--mcast`. Without additional options, it will enable multicast using the default IP address of **239.255.13.9**. When multicasting is enabled, the API will create a log entry showing the IP address it is using.

```
imxs tlxapi[9389]: Using multicast IP address 239.255.13.9
imxs tlxapi[9389]: multicast mode enabled
```

If broadcast is in effect, the log file will record that information.

```
imxs tlxapi[9389]: Using broadcast IP address 192.168.13.255
```

If you prefer to not use the default multicast address, you can specify the preferred address on the command line by adding an equal sign '=' and the IP address to the `--mcast` option. For example: `--mcast=239.255.13.105`

 **Warning!** The selection of a multicast address is beyond the scope of this document, in which case, you may need to contact your IT / Networking department. The address you use may have some effect on your network infrastructure, so be sure to contact the appropriate, qualified personnel.

The API will attempt to use the specified multicast IP address. If it cannot connect to that address, the API will fall back to using broadcast. This is also logged.

The example below shows an attempt to use the IP address of 1.2.3.4. The API was not able to connect to that address, so it went back to using broadcast.

```
imxs tlxapi[9389]: broadcast_setup() vxASCIIapi.c@5193: Error: (Cannot assign requested address)
      in bind [IP address = 1.2.3.4], switching to broadcast
imxs tlxapi[9389]: Using broadcast IP address 192.168.13.255
```

Both broadcast and multicast will use UDP port **17564** to transmit the status.

ASCII API (selected) Command Line Options

`--connections=n`

This option controls the maximum number of network connections allowed. Once the maximum is reached, no more connections will be made until an existing connection is closed. The default maximum is set at 128. The maximum may range from 9 to 2048.

Typically, connections are created, used and then closed. However, if the system connecting to the API crashes, or is somehow physically disconnected from the Switch without closing the connection, the API keeps this connection in place. This is a good thing if, for example, the network cable is disconnected for a time and then reconnected. Both systems pick up where they left off. But, if while the cable is disconnected, the other system crashes, restarts or is turned off, the API does not know this and patiently waits for it to return.

This half-open connection will eventually time out, but this takes almost 2 hours to occur. This timeout is a standard network feature called TCP_KEEPAIVE.

--idle=n

This option is used in conjunction with `--connections` and sets a minimum connection idle time. When all available connections are used, the API looks for an existing connection that has been idle for at least this minimum number of seconds. It will look for the connection that has been idle the longest and terminate it. This makes a connection available for the latest request. If no connection has been idle for the minimum time, then the new connection is refused.

The default idle time is set to 60 seconds. The maximum setting is 1800 seconds. Setting it to zero will disable this feature and connections will stay in place until closed by the other side.

--noexternalapi

This option restricts network access to the API at the internal IP address of 127.0.0.1 (also known as *localhost*). This option is typically used with the port redirection feature of SSH to create a secure, encrypted tunnel between the API and the outside world. *SSH port redirection is beyond the scope of this document.*

The Controller Card Serial Port is not affected by this option and may still be used, unless disabled with the `--serial=none` command line option.

--noexternalbroadcast

Normally, the TLX Switch broadcasts status messages on (UDP) port 17564 on the network broadcast address of 192.168.13.255*. This option restricts the status broadcast to only 127.0.0.1 (localhost).

**This is the default network address. If the end user changes the network settings, this address may change.*

--log_ip

Useful when debugging network connection errors, this option turns on some debugging messages in the API log file (`/var/log/api`). It logs when connections are opened and closed, the number of active connections and the IP address of the connection request. It also adds the IP address of the system that sent a command to the command log file entry, as noted below (←).

Sample API log file

```
Jun 16 12:17:52 imxs tlxapi[2880]: maximum open connections set to 200
Jun 16 12:17:52 imxs tlxapi[2880]: idle connection timeout is set to 30
Jun 16 12:17:52 imxs tlxapi[2880]: starting ASCII API Version: V5.07.02 (build: 11)
Jun 16 12:17:52 imxs tlxapi[2882]: Using broadcast IP address 192.168.13.255
Jun 16 12:17:52 imxs tlxapi[2882]: Using keepalive parameter (/proc/sys/net/ipv4/tcp_keepalive_time) 1200
Jun 16 12:17:52 imxs tlxapi[2882]: Using keepalive parameter (/proc/sys/net/ipv4/tcp_keepalive_intvl) 10
Jun 16 12:17:52 imxs tlxapi[2882]: Using keepalive parameter (/proc/sys/net/ipv4/tcp_keepalive_probes) 5
Jun 16 12:17:52 imxs tlxapi[2882]: waiting for CPU to become active
Jun 16 12:17:52 imxs tlxapi[2882]: CPU is active
Jun 16 12:17:52 imxs tlxapi[2882]: waiting for control process
Jun 16 12:17:52 imxs tlxapi[2882]: connected to control
Jun 16 12:17:52 imxs tlxapi[2882]: accepting API commands on port 17567, all network ports
Jun 16 12:19:47 imxs tlxapi[2882]: server.c@0386 accepted a connection request from 192.168.13.3 fd= 9 # current
network connections= 1
Jun 16 12:24:51 imxs tlxapi[2882]: server.c@0347 shut_down_network_connection(): close network connection fd= 9
#connections= 0
Jun 16 12:40:42 imxswitch tlxapi[2882]: server.c@0386 accepted a connection request from 127.0.0.1 fd= 9 # current
network connections= 1
Jun 16 12:40:46 imxswitch tlxapi[2882]: command from 127.0.0.1 : xget response:
R0000KI001000470048I00120015I00250033I00410003
Jun 16 12:41:01 imxswitch tlxapi[2882]: command from 127.0.0.1 : D0011 response: R0000K#D0011 ←
Jun 16 12:41:04 imxswitch tlxapi[2882]: command from 127.0.0.1 : xquit response: R0000K#xquit
Jun 16 12:41:04 imxswitch tlxapi[2882]: server.c@0347 shut_down_network_connection(): close network connection fd= 9
#connections= 0
```

Sample API log file, showing settings modified via the command line and a connection being opened and closed. The command line options used in this example are:

```
--verbose --api --connections=200 --idle=30 --log_ip
```

Thinklogical Support

Customer Support

Thinklogical® is an engineering company and we offer the best customer support available. You can count on our most knowledgeable engineers to assist you with any questions or problems. We won't be satisfied until *you* are satisfied.

Thank you for choosing Thinklogical® products for your application.

We appreciate your business and are dedicated to helping you successfully use our products.

thinklogical® is always here to help you.

To contact us, please use the following telephone numbers and internet-based methods:

Website

Check out our website at www.thinklogical.com for current products, support documents and useful information about all the products and services we offer, including technical specification sheets, quick-start guides and product manuals (for viewing online or for download).

Most online documents are stored as Adobe Acrobat "PDF" files. If you do not have the Adobe Acrobat reader needed to view PDF files, visit www.adobe.com for a download.

Email

Thinklogical is staffed **Monday through Friday from 8:30am to 5:00pm**, Eastern Time Zone. We will do our best to respond to your email inquiries promptly. Please use the following email addresses:

info@thinklogical.com – Information on Thinklogical and our products.

sales@thinklogical.com – Sales Department - orders, questions or issues.

support@thinklogical.com – Product support, technical issues or questions, product repairs and request for Return Merchandise Authorization.

Telephone

Thinklogical Operator: 1-203-647-8700

Product & Customer Support: 1-203-647-8798

Please contact our expert sales staff in Milford, CT. We are here Monday through Friday from 8:30am to 5:00pm, Eastern Time Zone. We'll provide a representative's direct dial phone number when you call.

If leaving a voice message, please provide a preferred time to call back so we may reach you at your convenience.

Our switchboard attendant will direct your call during regular business hours. We have an automated attendant answering our main telephone switchboard after regular business hours and on holidays. Please leave a voice message at any time.

Fax

Our company facsimile number is **1-203-783-9949**. Please indicate the nature of the fax on your cover sheet and provide return contact information.

Product Support

Thinklogical's support personnel are available **Monday through Friday, from 8:30am to 5:00pm**, Eastern Time Zone. If your application requires assistance at some time outside of our normal business hours, please contact us beforehand, if possible, and we will have someone available to assist you.

Warranty

Thinklogical warrants this product against defects in materials and workmanship for a period of one year from the date of delivery, with longer term 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 **1-800-291-3211** (USA).

Return Authorization

If you need to return your Thinklogical® product to us for any reason, please get a **Return Merchandise Authorization Number (RMA#)** from Thinklogical's **Product Support Department (1-203-647-8700)** before sending the unit in.

If you must return a product to Thinklogical directly, please contact us at **1-800-291-3211** or **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.



Note: DO NOT return a product to Thinklogical without a *Return Merchandise Authorization*.

Our Addresses

If you have any product issues or questions or need technical assistance with your Thinklogical system, please call us at **1-800-291-3211 (USA only)** or **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#



Website: www.thinklogical.com
 Facebook: www.facebook.com/ThinklogicalUSA
 LinkedIn: www.linkedin.com/company/thinklogical
 Google+: <http://plus.google.com/u/0/109273605590791763795/about>
 YouTube: www.youtube.com/user/thinklogicalNA
 Twitter: @thinklogical