



A **BELDEN** BRAND

TLX

Matrix Switch ASCII API V5

A Full Description of the Command Set Used to Control
Thinklogical's TLX Series of KVM Matrix Switches

TLX12
TLX24
TLX48
TLX80
TLX160
TLX320
TLX640
TLX1280

Rev. I, January 2019



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Subject: Product Manual: TLX Matrix Switch ASCII API V5
Revision: I, January 2019



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Table of Contents

PREFACE	1
About Thinklogical®	1
About This Manual	2
Note and Warning Symbols	2
Font Conventions Used in this Manual	2
REGULATORY & SAFETY REQUIREMENTS	3
Symbols Found on Our Products	3
Regulatory Compliance	3
North America	3
Australia & New Zealand	4
European Union	4
Declaration of Conformity	4
Standards with Which Our Products Comply	4
Supplementary Information	4
OVERVIEW	5
API Version 4 Commands That Were Modified in Version 5	5
Uni-directional vs. Bi-directional	5
CONVERSIONS	5
Port Numbers	5
Results	6
COMMANDS	6
➤ CONNECTION COMMANDS	6
Connect	6
Disconnect	7
Macro	7
XPUT	8
➤ STATUS COMMANDS	8
STATUS	8
XSTATUSIO and XSTATUSOI	9
XGET	9
➤ SYSTEM INFORMATION COMMANDS	9
XVERSION	9
XINSTALLED	10
XMAXCARDS*	10
Table 1: XMAXCARDS Return Values	10
XMAXPORTS	10
XCTIME	11
XTYPE**	11
XLASTEVENT	12
XPORTCONFIG	12
XRESET	12
XALARM	12
XQUIT	12
XCRON and XCROFF	12
XOPTIONS	13
XHELP	14

* Modified from Version 4

** New to Version 5

➤ DIAGNOSTIC COMMANDS	15
XTEST1.....	15
XTEST2.....	15
XTEST3.....	15
TLX MATRIX SWITCH PORT NUMBERING	16
The TLX12.....	16
The TLX24.....	16
The TLX48	16
The TLX80	17
The TLX160	17
The TLX320	17
The TLX640	18
The TLX1280	19
Error and Status Codes.....	20
Product Serial Number.....	20
Connection to the Product.....	20
THINKLOGICAL® SUPPORT	21
CUSTOMER SUPPORT	21
Website	21
Email	21
Telephone	21
Fax	21
PRODUCT SUPPORT	22
Warranty.....	22
Return Authorization.....	22
Our Addresses	22
APPENDIX A: Switch Status Broadcast	23
APPENDIX B: Sample Commands	23
APPENDIX C: Connecting Extenders	24
APPENDIX D: Point-to-Point Connection Mode	26



Preface

About Thinklogical A BELDEN BRAND



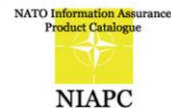
Thinklogical, A BELDEN BRAND
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Thinklogical, A BELDEN BRAND, is the leading manufacturer and provider of fiber-optic and CATx video, KVM, audio, and peripheral extension and switching solutions used in video-rich, big-data computing environments.

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



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 document describes the command set used to control Thinklogical's TLX series of Matrix Switches. The TLX Matrix Switch API commands are based on the command set used by our VX Matrix Switches and are detailed in the document: [Matrix_Switch_ASCII_API](#).

- 5.00-A Initial release (created from the VX Matrix Switch version of this manual: V4.5-1 Rev E)

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 Manual

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	oOo

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

<ftp://ftp.thinklogical.com/TLxSwitch/Documentation/>

or on our web site:

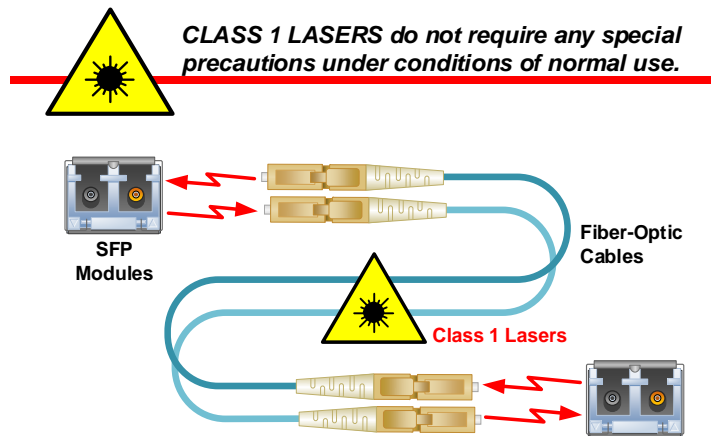
http://www.thinklogical.com/user_manuels

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

Regulatory & Safety Compliance

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.

Overview

This document describes the command set used to control Thinklogical's TLX series of Matrix Switches. The commands are all ASCII based and are terminated with either a linefeed character or a carriage-return/linefeed pair. Port numbers are all 4 digits in length and filled with leading zeros (Example: port 12 is encoded as 0012).

The TLX Matrix Switch API commands are based on the command set used by our VX Matrix Switch product line and detailed in the document: [Matrix_Switch_ASCII_API](#).

API Version 4 Commands That Were Modified in Version 5


The following commands were modified in Version 5 of the API.

- **XDCSTYPE** Renamed **XTYPE**
- **XMAXCARDS** Returns the maximum number of I/O cards, not half the maximum.

Uni-directional vs. Bi-directional

As used in this document, **uni-directional** is a connection that is made in only one direction, **from an input to an output**. Note that an input may be directed to multiple outputs at one time. The direction refers to data flow between a transmitter and a receiver or between a receiver and a transmitter (a backchannel).

Some of our VX Matrix Switches have the capability to create two connections at one time, creating a bi-directional connection. Bi-directional connections are still possible with TLX Series Matrix Switches (and in most cases necessary for the correct operation of the switch) but must be created by issuing two uni-directional commands. The TLX Series Matrix Switches are considered unidirectional devices.

 **Note:** API commands shown in this manual are depicted in UPPER-CASE. This is for clarity purposes only. The latest API allows commands to be in upper or lower case. Bit 2 (0x04) of the XOPTIONS status result is set to a 1 if the Switch requires upper-case commands. This bit is there for the instances where a control system must interface with different models and vintages of our Switches.

This manual reflects version V5.07.02 of the ASCII API.

Conventions

Port Numbers

- All port numbers are four places long, begin with 1 and have leading zeros. For example, port 15 is encoded as 0015.
- A port number of 4 zeros is used in response to a status command to signify that no port is in use. A "zero" port number is not valid in a command string.
- A port number of four 9s (9999) is used to signify ALL ports. It is not valid in a response. For example, to encode all output ports, use: 09999
- In the following sections, **xxxx** is used as a generic input port place holder; **yyyy** is used as the output port place holder.

 **Note:** Do not use xxxx or yyyy in a command! Replace each with the appropriate input or output port number.

Results

Results from commands are ASCII strings terminated with a newline (linefeed). The first character is an 'R', followed by a 4 digit, zero-filled length. The length includes the trailing newline. Following the length will be either 'OK', or 'ERnnnn'. OK signifies the command was successful, while ERnnnn is an error code. After the OK or ERnnnn, a comment may appear giving more detailed information.

In the case of a status command, the OK is followed by the status response.



Note: Users must wait for a result response before sending another command.

There are several command line options to available control the output from the API. These options are described in detail in the document:

[Manual_Configuring_the_TLX_ASCII_Interface.](#)

Two of the commonly used options are:

1. `[--CR]` Include a carriage return on each line output. (Useful for Windows)
2. `[--verbose]` Append a comment to each response with more information about an error code or repeat the successful command. Comments will start with the '#' character.

Examples of Verbose Output

Command: `CI00040007`
 Normal: `R00030K`
 Verbose: `R00150K#CI00040007`

Command: `CI000400087`
 Normal: `R0007ER0007`
 Verbose: `R0072ER0007#Output port number 87 is out of range (1 thru 80):
 'CI000400087'`

Commands

➤ Connection Commands

Connect

Connect one input port to one or more output ports. Connections are additive.

For example, connecting input 5 to output 7 will result in 7 being added to any existing connections to input 5. The 'i' and 'o' may be of either case.

Format: `Cixxxx0yyyy0...`

- xxxx of all 9's is illegal.
- yyyy of all 9's will connect xxxx to all outputs.
- Connections will be made in the order specified.

Example Results: `R00030K` or `R0007ERnnnn`



Warning! When switching keyboard/mouse channels it is now possible to connect one keyboard/mouse to multiple computers. *Unless the appropriate video connections are also made, you will be sending commands to computers that you are not currently viewing.* **This could have disastrous results!**

Disconnect

Disconnect one or more input or output ports. Disconnecting an output will only affect that port, but disconnecting an input will affect every output connected to that input. The 'i' and 'o' may be of either case.

Format: `Dixxxx...` or `Doyyyy...`

- This will disconnect all outputs connected to input port xxxx or will disconnect output port yyyy only.
- `DI9999` or `DO9999` will disconnect all the Upstream/Upper ports.
- It is not an error to disconnect a port that is not connected.

Example Results: `R0003OK` or `R0007ERnnnn`



Note: To disconnect ALL the ports, you may also use the XPUT (pg. 6) command without listing any ports.

Macro

Sends a sequence of connect and disconnect commands as one command line. The syntax of this command is different from the other commands. Unlike the *connect* and *disconnect* commands, there is no **I** or **O** character to distinguish input part numbers from output part numbers. This command combines *connects* and *disconnects* in one string. The command may end with a semi-colon.

Format: `Miiii0000iiii0000...[;]`

- `iiii` - Input port number
- `oooo` - Output port number
- An input number of `0000` (all zeros) will disconnect the listed output port (same as the **DO** command)
- An output number of `0000` (all zeros) will disconnect the listed input port from all connected outputs (same as the **DI** command)
- An output number of `9999` will broadcast the input port to all outputs
- Unlike the **XPUT** command, the switch is not reset before the command is executed

To turn off all the ports, set the input to all zeros and the output to 9999.

An 'M' without inputs or outputs is valid. This allows external systems to determine if the API version supports the macro command.

Example: `M00000001101230000`

disconnect output 11

disconnect input 123

Example: `M00009999`

disconnect all ports

Example Results: `R0003OK` or `R0007ERnnnn`

XPUT

Restore the entire switch connection state. The output from **XGET** (pg. 7) is used by this command.

Format: **XPUTstr**

- The XPUT command will turn off all outputs and then make the connections that are listed in 'str', which is the response that was returned from a XGET command.
- XPUT without any ports is valid and is interpreted as a command to disconnect all ports.

Example: **XPUTI00010003I00020004I0010001000110012**

Example Results: **R00030K** or **R0007ERnnnn**

► Status Commands

Status

Return the connection status of an input or output port.

Format: **Sixxxx**

- Return the list of output ports that are connected to input port xxxx.
- If nothing is connected to port xxxx, **0000** will be returned.

Format: **Soyyyy**

- Return the input port number that is connected to output port yyyy.
- If nothing is connected to port xxxx, **0000** will be returned.

Example Results (SI):

- **RnnnnOKIxxxxOyyyyOyyyyOyyy . . .** or **R0007ERnnnn**
- xxxx is connected to output(s) yyyy.
- 0000 means not connected.

Example Results (SO):

RnnnnOKIxxxxOyyy or R0007ERnnnn

- xxxx is connected to output yyyy.
- 0000 means not connected.

XSTATUSIO and XSTATUSOI

These commands return the current switch connection state. The switch state is returned as pairs of ports: *input port and output port* for the 'IO' command and *output port and input port* for the 'OI' command. A data pair is returned for each active connection. The semi-colon is always present in an 'OK' response.

These commands use four-digit, zero-filled decimal values. For example: the value 12 is encoded as: 0012. There is only one 'I' or 'O' in the response. It is immediately after the 'OK' and is there to identify which port (input or output) appears first in the data pair. The order in which the ports are listed is not defined.

Format: XSTATUSIO

Format: XSTATUSOI

This will return a (very) long string listing every connection. The connection list consists of pairs of port numbers.

Example Results:

- XSTATUSIO: R00270KI0010012300120015;
- XSTATUSOI: R00270K00015001201230010;
- XSTATUSOI: R00110KO;
- XSTATUSOI: R00190K00015001201230010;
- R00050KI;
- R00050KO;
- R0007ERnnnn

XGET

Like the XSTATUSIO and XSTATUSOI commands, this command returns the entire switch connection state. The output from this command is used by the XPUT command (see pg. 6).

Format: XGET

- This will return a (very) long string listing every connection. The connection list consists of a series of input port numbers, followed by output port numbers.
- The XPUT command requires all the characters from the response that come after the 'OK'.

Example Results:

- R00390KI00010003I00020004I00100010I00110012
- R00300KI00010003I00100010I00110012
- R00120KI01230145
- R00030K or R0007ERnnnn

► System Information Commands

XVERSION

Returns the API program version number.

Format: XVERSION

Example Results: R00090KV5.00

XINSTALLED

Returns an inventory of installed I/O cards. A zero means the card is not installed and a one means the card is installed. The number of cards determines the number of zeros and ones returned and the number of cards varies for each TLX model. The cards are listed from left to right, with the leftmost digit used for the card that has port 1.

Format: XINSTALLED

Example Results: R00060K111 TLX48
R00230K0000000000100000000 TLX320

XMAXCARDS (Modified from Version 4)

Returns the maximum number of I/O cards in the switch.

This is a change from V4 of the API. V4 returned half the number of I/O cards, except for the MX48 which returned 3 (the actual number of cards).

Bit 3 of **XOPTIONS** may be used to determine if **XMAXCARDS** returns half the number of cards or the actual number of cards (the default). See **XOPTIONS**, pg. 10.

Model	Upstream Cards	Downstream Cards	Total Cards	Returned Value	XOPTIONS bit 3
TLX12	1	0	1	1	1
TLX24	1	0	1	1	1
MX48	3	0	3	3	1
TLX48	3	0	3	3	1
TLX80	16	0	16	16	1
TLX160	16	0	16	16	1
VX320-Video	20	0	20	10	0
TLX320	20	0	20	20	1
VX640	32	0	32	16	0
TLX640	32	0	32	32	1

Table 1: XMAXCARDS Return Values

The TLX48 example below shows the message returned when the 'verbose' API command line option is enabled. Here, the API command is returned at the end of the response message.

Format: XMAXCARDS

Example Results: R00170K0003#XMAXCARDS TLX48
R00070K0020 TLX320
R00070K0032 TLX640

XMAXPORTS

Returns the maximum number of non-blocking ports in the switch. This may also be interpreted as the maximum port number allowed in a command.

Format: XMAXPORTS

Example Results: R00070K0048 TLX48
R00070K0320 TLX320
R00070K0640 TLX640

XCTIME

The latest API now collects data on how long a port is connected. This is a cumulative amount, not how long the current connection has been in place. It is kept for both the input and output sides of a connection. For example, if the only input port ever used was port 1, then it would have a non-zero total, while all other input port totals would be zero. If input port 1 was only connected to output ports 3, 5 and 7, then those three ports would have non-zero totals and all other output port totals would be zero.

Format: `XCTIMEEnnnn`

Example Results:

```
xget
R00120KI00010001
xctime0001
R00320K0001,612817,612817#xctime0001
xctime0001
R00320K0001,612837,612837#xctime0001
xctime0001
R00320K0001,612841,612841#xctime0001
xctime0001
R00320K0001,612849,612849#xctime0001
xput
R00080K#xput
xctime0001
R00320K0001,614003,614003#xctime0001
xctime0001
R00320K0001,614003,614003#xctime0001
ci000100002
R00150K#cI000100002
xctime0001
R00320K0001,614007,614003#xctime0001
xctime0001
R00320K0001,614011,614003#xctime0001
```

Input 1 is connected to output 1 in this example (see XGET output). Each time the XCTIME command is sent, the connection times are increasing. Then the ports are disconnected (XPUT). As can be seen, the connection times stay the same. Finally input 1 is connected to port 2. As shown, input 1 times are increasing, but output port 1 times do not change.

XTYPE (New to Version 5)

Returns a string containing the TLX model. This was formerly the command XDCSTYPE but has been renamed. The old name will still work.

Format: `XTYPE`

Example Results:

```
R00140KTLX48Switch
R00150KTLX320Switch
R00150KTLX640Switch
```

XLASTEVENT

Returns a time-stamp string that was set the last time a connection was made or broken. This can be used to determine if the switch status has changed since the last XLASTEVENT command was issued.

Format: XLASTEVENT

Example Results:

- R00270KThu Jul 1 11:23:52 2010

XPORTCONFIG

Returns a comma delimited list of three numbers: NU, NB, OFF.

The first number (NU) is the maximum number of uni-directional paths in the system. The second (NB) is the maximum number of bi-directional paths and the third is currently defined as zero. Note: TLX switches are uni-directional.

Format: XPORTCONFIG

Example Results:

- R00170K0048,0000,0000 TLX48
- R00170K0320,0000,0000 TLX320
- R00170K0640,0000,0000 TLX640

XRESET

Resets the internal switch hardware to its power on state.

Format: XRESET

Example Results: R00030K or R0007ERnnnn

XALARM

Returns the Matrix Switch hardware alarm status.

The return value is a decimal number that represents a bit-map of the actual alarm bits. For example, if 19 is returned, the binary format will be: 10011. This shows that 3 alarms are active (3 bits are '1'). The leftmost bit in the example is bit 4, followed by bits 3, 2, 1 and 0 (the rightmost bit). Bit 0 corresponds to alarm 1, bit 1 to alarm 2, etc.

The alarm bits are defined in the TLX Matrix Switch manual and vary depending on the model.

Format: XALARM

Example Results: R00070K0522 TLX320

Decimal 522 is 1000001010 in binary (bits 9, 3 and 1 are 'on')

XQUIT

Ends the network connection.

XCRON and XCROFF

Enables or disables sending CR's on each line. XCRON is typically used when a (Windows) telnet client connecting to the switch requires each line to end with a CR/LF pair.

Format: XCRON or XCROFF

Example Results: R00030K

XOPTIONS

This command returns a numeric response that is a bit map of options available in the version of the API. The value returned is a four-digit decimal number of the binary bit map. For example, if the value returned was 0015, then bits 0, 1, 2, and 3 would be on (bit 0 is the lsb).

The following bits are defined:

- 0:** Reserved for HDX Matrix Switches.
- 1:** XTEST2 command is allowed. This is set for the TLX320 and TLX640.
- 2:** Only UPPER-CASE commands are allowed.
- 3:** XMAXCARDS returns the total number of cards allowed in the Matrix Switch (not half the number as it formerly did).
- 4:** Switch supports point-to-point connection mode.
- 5:** If set, the Switch may send status updates using a Multicast IP address instead of a broadcast IP address.
- 6:** If set, the Switch supports collection on port connection durations. (see the XCTIME command on pg. 8)

Format: XOPTIONS

Example Results: R00070K0007

Sample response:

R00620K0120#xoptions:Actual_Card_Count P2P Multicast Connect_Time

XHELP

Print a list of valid commands. This is a multi-line response that does NOT start with OK or ER or end with a length. **It is intended as a debugging aid and not for use in a production environment.** It does not follow the format rules for command responses. **Format:** XHELP

Sample response:

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
  --noexternalbroadcast 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 --noexternalbroadcast 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/

► Diagnostic Commands

These commands are used to test the ability of the switch to make connections. They will connect each of the input ports to each of the output ports in one of three ways, as described below.

XTEST1

Connects all the ports on the Matrix Switch (n to n).

Connects input 1 to output 1, input 2 to output 2, ...input n to output n ...

Format: XTEST1
Example Result: R00030K

XTEST2

Connects all the ports on the TLX320 and TLX640 Matrix Switches.

This test is only available on the TLX320 and TLX640, due to their underlying hardware design and will activate a set of hardware paths that do not exist on the other TLX models.

On the TLX320, it connects:

input 1 to output 161, input 2 to output 162, ...input 160 to output 320...
 input 161 to output 1, input 162 to output 2, ...input 320 to output 160...

On the TLX640, it connects:

input 1 to output 640, input 2 to output 639, ...input 640 to output 1...


Format: XTEST2
Example Result: R00030K

XTEST3

Connects all the ports on the Matrix Switch for testing CATx Extenders.

Connects input 1 to output 2, input 2 to output 1, ...input $n-1$ to output n , output n to input $n-1$...

Format: XTEST1
Example Result: R00030K

 **Note:** If you want to verify that all the outputs on the switch are working, the command Cixxxxo9999 will connect input xxxx to ALL the output ports. The XTEST commands require an input signal on ALL inputs, whereas the Cixxxxo9999 only requires a signal on input xxxx.

TLX Matrix Switch Port Numbering

When making or breaking connections on a TLX Matrix Switch, it is important to identify the 'direction' of the connection. In this context, connection direction refers to data flow from the extender transmitter to the extender receiver, or receiver to transmitter.

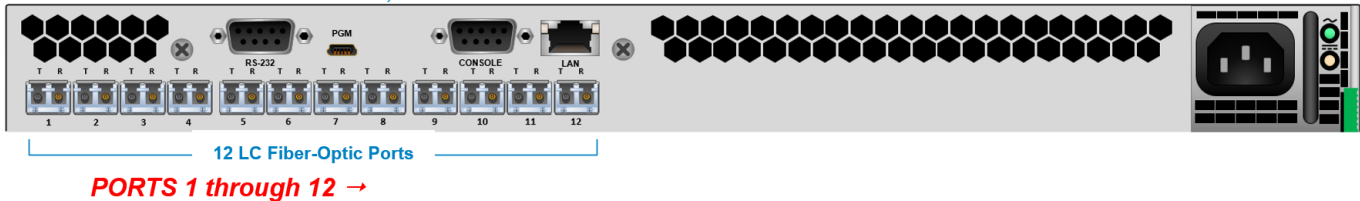
- **Transmitter to Receiver** data flow is called an '*upstream to downstream*' connection.
- **Receiver to Transmitter** data flow is a '*downstream to upstream*' connection (sometimes referred to as the '*backchannel*').

The port numbering schemes for each of the TLX Matrix Switch models are shown below.

TLX12, TLX24, TLX48, TLX80, TLX160, TLX320, TLX640 and TLX1280 connections can be made between any ports on any card.

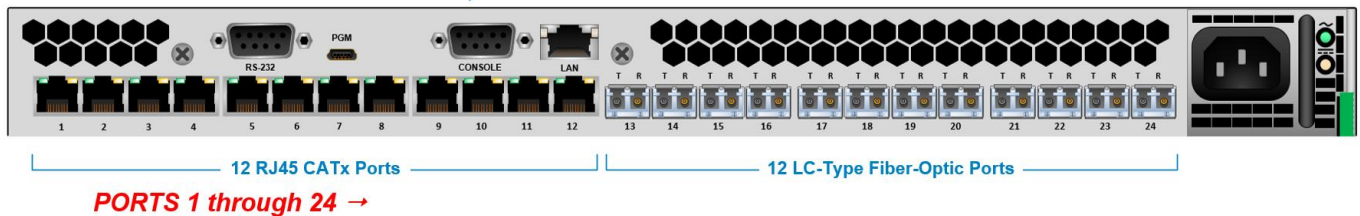
The TLX12

SFP PORT LABELS: T=Transmit, R=Receive



The TLX24

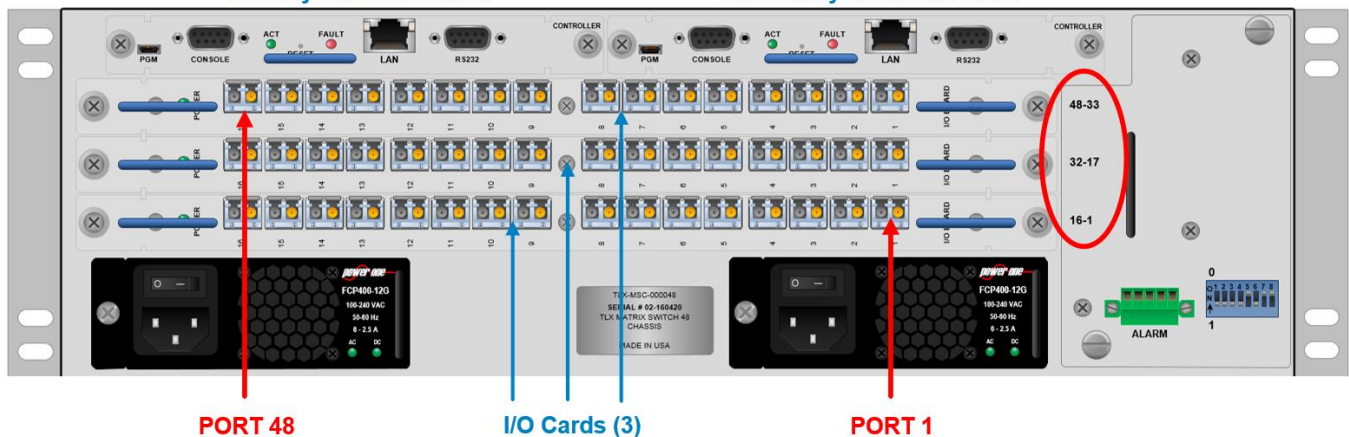
SFP PORT LABELS: T=Transmit, R=Receive



The TLX48

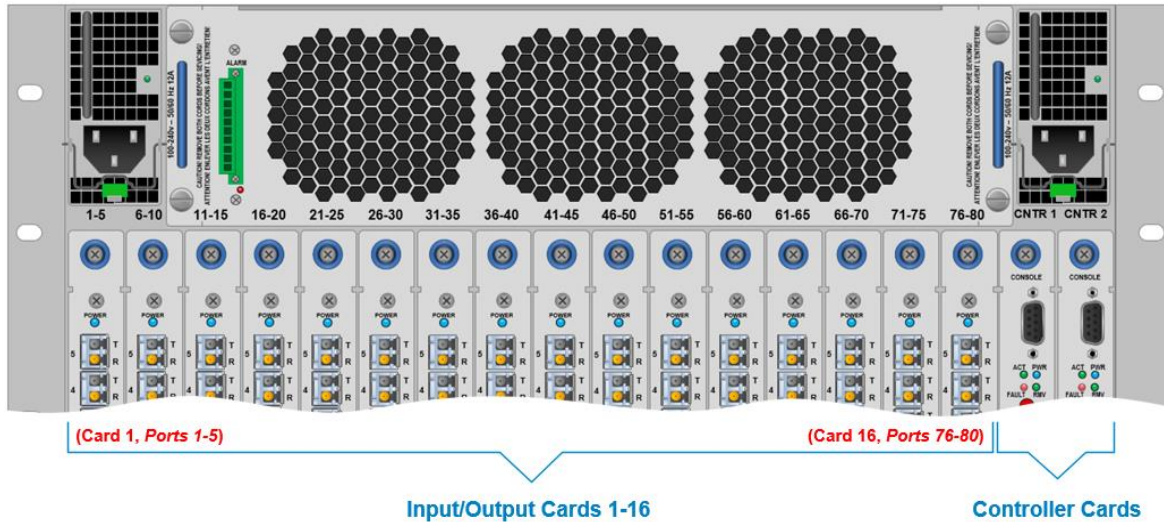
Primary Controller Card

Secondary Controller Card



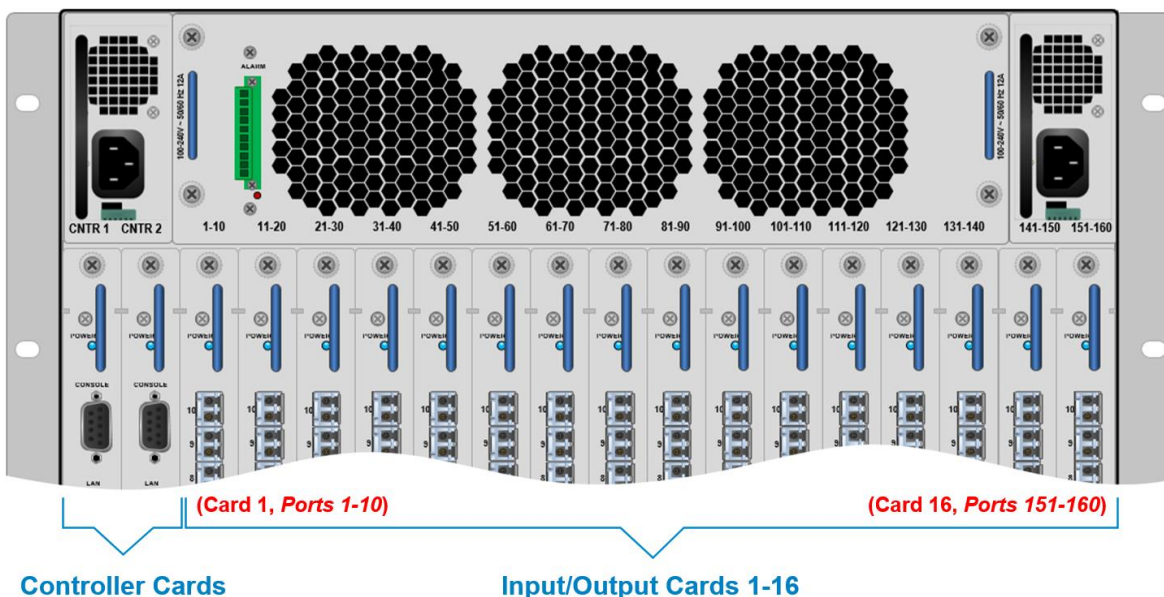
TLX48 I/O Cards are verticle cards mounted horizontally.
Port numbers begin at the bottom card and start from the right side.

The TLX80



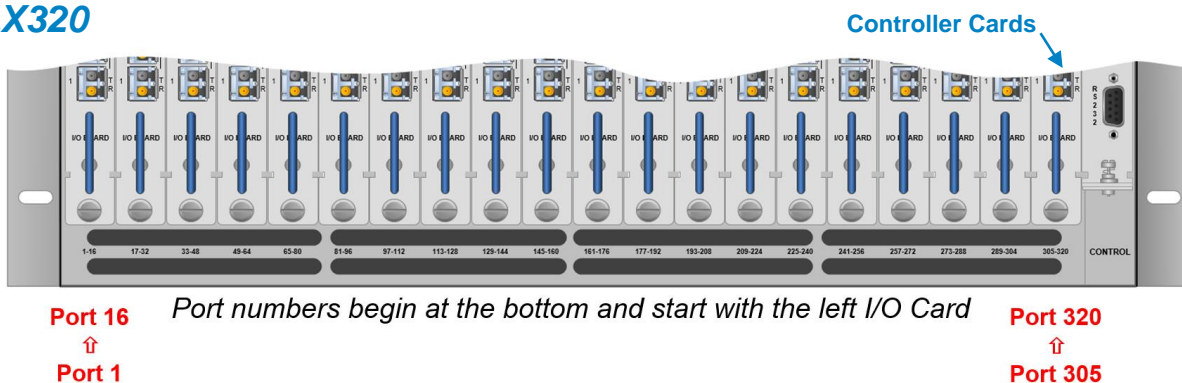
TLX80 Port numbers begin at the bottom and start with the left I/O Card.

The TLX160



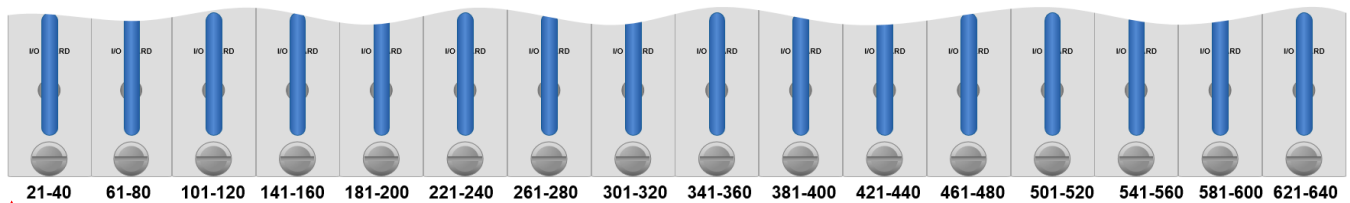
TLX160 Port numbers begin at the bottom and start with the left I/O Card.

The TLX320

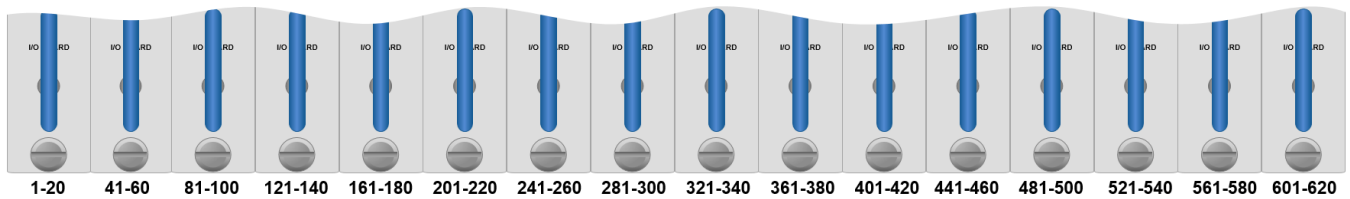


The TLX640

Upper Card Cage I/O Card Numbering

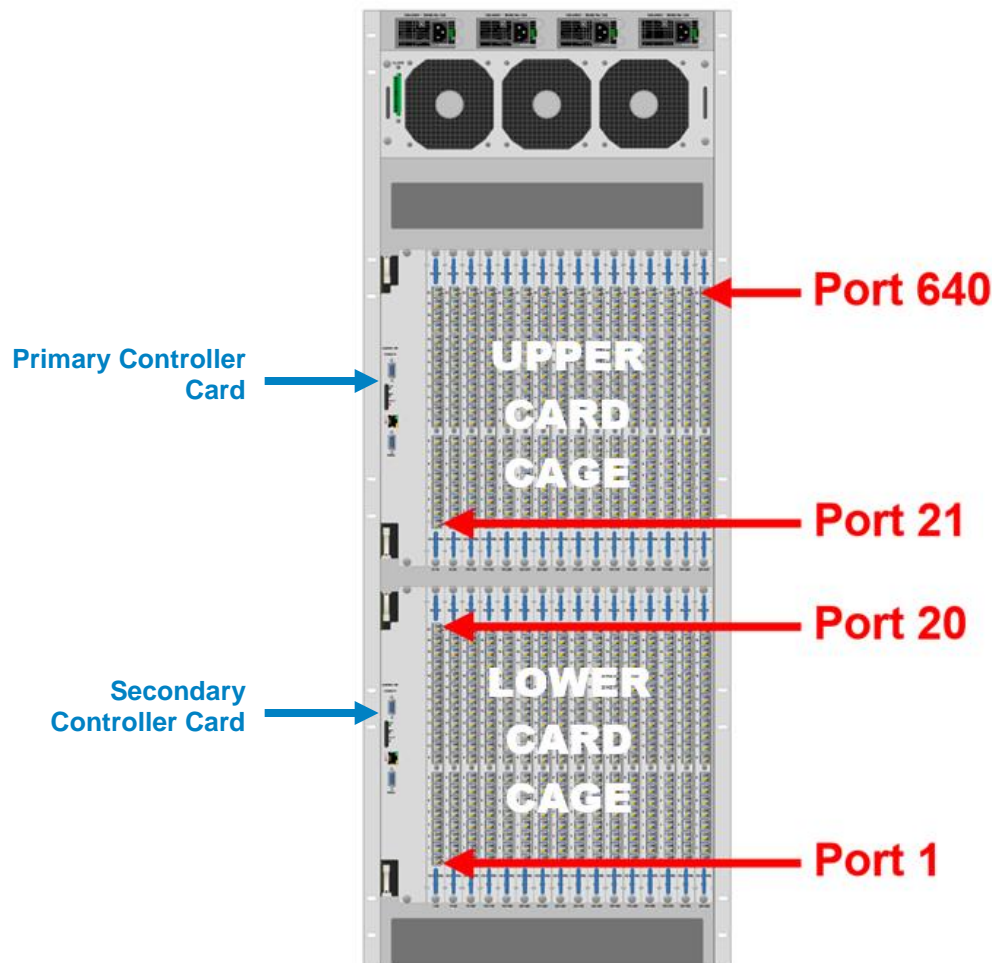


Lower Card Cage I/O Card Numbering



TLX640 Port numbers begin at the Lower Card Cage and start with the left I/O Card (Ports 1-20), proceeding up to the Upper Card Cage's left I/O Card (Ports 21-40).

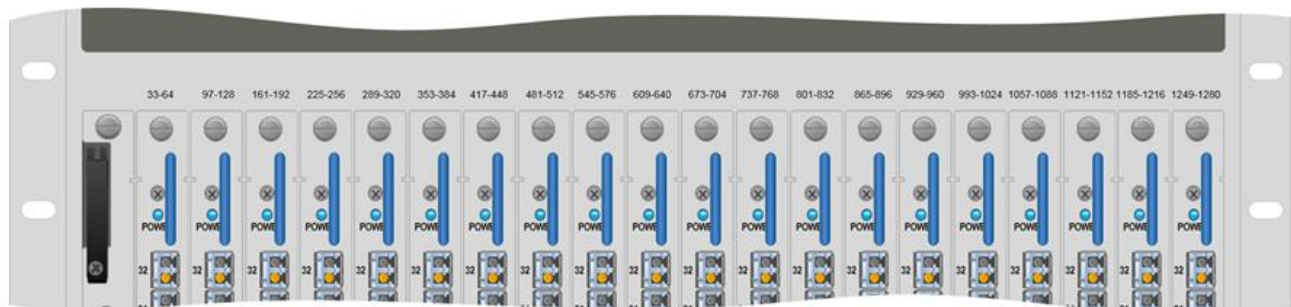
Port numbers then move to the second I/O Card on the Lower Card Cage (Ports 41-60) and proceed up to the second I/O Card on the Upper Card Cage (61-80), etc.



The TLX1280

Port numbering begins at the bottom of the TLX1280's chassis and starts with Card 1, the leftmost I/O card of the Lower Card Cage. Card 2 is directly above Card 1 in the Upper Card Cage. When installing fewer than 40 I/O Cards, cards slots may be chosen at the user's discretion. Each card slot has a **port number designation printed above the card** for easy reference.

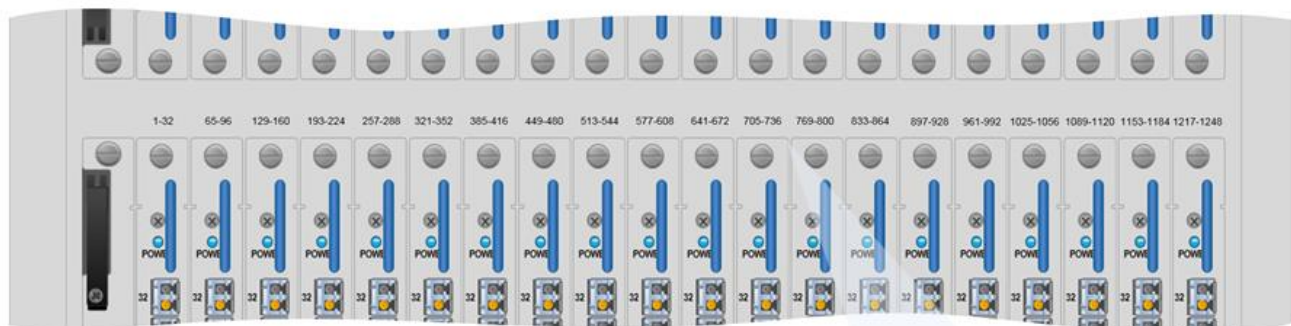
Port numbers begin at the bottom and start with the left I/O Card



Port 64
↑
Port 33

Upper Card Cage

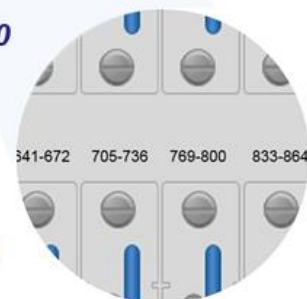
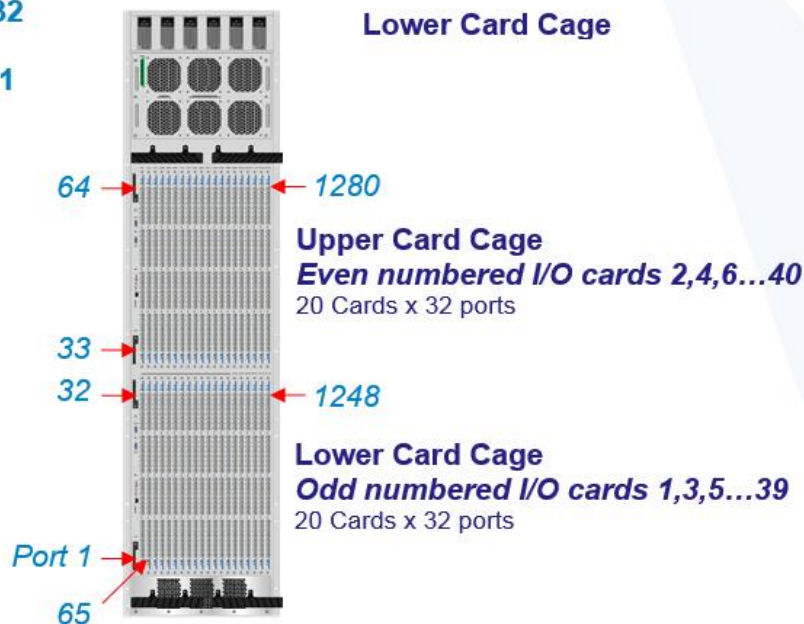
Port 1280
↑
Port 1249



Port 32
↑
Port 1

Lower Card Cage

Port 1248
↑
Port 1217



Error and Status Codes

- 1.1 0001 – Syntax error.
- 1.2 0002 – The command is missing an input port field.
- 1.3 0003 – The command is missing an output port field.
- 1.4 0004 – The command has multiple input fields, but only 1 is allowed.
- 1.5 0005 – The command has multiple output fields, but only 1 is allowed.
- 1.6 0006 – The input port value is out of range.
- 1.7 0007 – The output port value is out of range.
- 1.8 0008 – The command contains an invalid character.
- 1.9 0009 – A port value of 9999 is not allowed in this command.
- 1.10 0010 – A SNMP error occurred (only a DCS switch will generate this error).
- 1.11 0011 – An error occurred while attempting an internal fork command.
- 1.12 0012 – API received a command that is not allowed.
- 1.13 0013 – Not enough memory to process the command
- 1.14 0014 – File I/O error; an error occurred while reading or writing a file.
- 1.15 0015 – The switch control process is not responding.
- 1.16 0016 – The command references multiple chassis, but the Switch only has one.
- 1.17 0017 – A macro was sent with a semi-colon (;) but the switch is unidirectional.
Unidirectional switches do not allow port numbers after a semi-colon.
- 1.18 0018 – Partition or Restrictive port failure.
- 1.18.1 0019 – The connection cannot be made because of a blocking condition in the
internal switch matrix.

Error 10: This error code is no longer in use.

Error 11, 13, 14, 15: Internal program error: Contact Thinklogical® if you get this message.

Error 12: API V5 does not use this error code.

Product Serial Number (MM-YY1234)

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:

05-170129 indicates the unit was built in the 5th month of 2017 and is unit number 129.

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

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

Appendix A: Switch Status Broadcast

The API program will periodically broadcast the current switch connection map over the network. This data may be used to keep external systems in sync with the switch. Previously, either the XGET or XSAVE command was needed to obtain the connection map. In systems with many external controls trying to stay synchronized to the Matrix Switch, the switch would spend a lot of its resources trying to answer these status requests.

It is now possible to replace the use of 'broadcast' with the use of 'multicast'. **The advantage of using multicast over broadcast is that multicast packets will be routed past the local subnet, whereas broadcast packets are not routed.**

You may configure the frequency of these messages or disable them altogether.

More information about this feature can be found in the manuals [Matrix_Switch_Interfaces](#) and [Manual_Configuring_the_TLX_ASCII_Interface](#).

Appendix B: Sample Commands

CI0005o0010	Connect Input 5 to Output 10
Si0004	Get the connection status of Input 4
xputI00010003I00020004	Turn off all outputs. Connect Input 1 to Output 3 and connect Input 2 to Output 4

Appendix C: Connecting Extenders

The following are sample commands needed to connect selected transmitters and receivers through a TLX Matrix Switch. These examples will reference the appropriate Quick Start Guide.

A) VEL-24 through a TLX320

Quick Start Guide: [VX320Video_VEL-24_VEL-38_QSG](#)

Number of fibers: **3**: L1, L2, L3

Backchannel fiber: L2 (data from receiver to transmitter)

Tx24 fiber connections Rx24 fiber connections

- | | |
|-------------|-----------|
| • L1 -> 14R | L1 -> 15T |
| • L3 -> 16R | L3 -> 16T |
| • L2 -> 14T | L2 -> 15R |

Commands: (all upper case)

- | | |
|--------------------|---|
| CI001400015 | Connects L1 video to RX L1 |
| CI001600016 | Connects L3 video to RX L3 |
| CI001500014 | Connects L2 data to RX L2 (backchannel) |

Assume a second receiver is now connected as follows:

- L1 -> 25T
- L3 -> 26T
- L2 -> 25R

The commands to connect this receiver to the transmitter are:

- | | |
|--------------------|----------------------------|
| CI001400025 | Connects L1 video to RX L1 |
| CI001600026 | Connects L3 video to RX L3 |

Note: Receiver 2 (L2 backchannel data) is **NOT** connected.

- Receiver 1 has full keyboard/mouse/USB/speaker access.
- Receiver 2 has sound (speakers) but no keyboard/mouse/USB.

To move the keyboard/mouse/USB from Rx 1 to Rx 2, issue the following commands:

- | | |
|--------------------|---|
| DI0015 | Disconnects RX 1 L2 (backchannel) |
| DI0025 | Disconnects RX 2 L2 (backchannel) |
| CI002500014 | Connects RX 2 L2 data to TX 1 (backchannel) |

or

- | | |
|----------------------------------|--|
| M001500000015000000150014 | Macro command that combines all three commands |
|----------------------------------|--|

The two 'DI' commands are sent to insure the keyboard/mouse data only goes to a single transmitter. If you are certain that there are no other L2 connections in place, you may eliminate them.



Warning! Eliminating the 'DI' commands will open the possibility of sending keystrokes and/or mouse commands to multiple servers at the same time – a situation that will lead to disaster! Always ensure that no other L2 backchannel connections are in place before eliminating the 'DI' commands!

B) VEL-38 through a TLX320

Quick Start Guide: VX320Video_VEL-24_VEL-38_QSG

Number of fibers: 5, L1, L2, L3, L4, L5

Backchannel fiber: L2 (data flows from receiver to transmitter)

Tx38 fiber connections

- L1 -> 8R
- L3 -> 10R
- L4 -> 11R
- L5 -> 12R
- L2 -> 8T

Rx38 fiber connections

- L1 -> 9T
- L3 -> 10T
- L4 -> 11T
- L5 -> 12T
- L2 -> 9R

Commands: (all upper case)

CI000800009	Connects L1 video to RX38 L1
CI001000010	Connects L3 video to RX38 L3
CI001100011	Connects L4 video to RX38 L4
CI001200012	Connects L5 video to RX38 L5
CI000900008	Connects L2 data to TX38 L2 (backchannel)

Now connect the TX24 to the RX38:

DI0009	Disconnects RX38 L2 (backchannel)
D00010	Disconnects RX38 L3 (unused)
D00012	Disconnects RX38 L5 (unused)
CI001400009	Connects TX24 L1 video to RX38 L1
CI001600011	Connects TX24 L3 video to RX38 L4

or

M0009000000100000001200000014000900160011 Macro command that combines all three commands

Appendix D: Point-to-Point Connection Mode

Version 5.0 of 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 definition file is stored on the Controller 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 TLX Matrix Switches are shipped without a P2P file.

This file is in the form of a comma separated value (csv) file. Each entry in the file is the input port that you want to restrict to P2P mode. You may have one or more entries per line in the file. The only characters allowed in the file are the digits 0 through 9, commas, and spaces. Blank lines are allowed.

An example that set ports 1, 2, 3, 4, 9, 11, 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 this file, you may 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.

```
imx tlxapi[17151]: parsing P2P csv file /var/local/router/p2p/upstream.csv
imx tlxapi[17151]: parse_api_csv_file.c@133: line 1 of csv file /var/local/router/p2p/upstream.csv '1,2,3,4#012'
imx tlxapi[17151]: parse_api_csv_file.c@133: line 2 of csv file /var/local/router/p2p/upstream.csv '9#012'
imx tlxapi[17151]: parse_api_csv_file.c@133: line 3 of csv file /var/local/router/p2p/upstream.csv '11, 15#012'
imx tlxapi[17151]: point-to-point mode enabled
```