

Reference Manual

O ET 5501

1Gbit Ethernet to Fiber Transceiver

Revision 1.0 – May 2015

This Manual Supports Device Revisions:	
O ET 5501 Firmware Revision	667
Control System GUI Release	8.3.0

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Warranty

LYNX Technik AG warrants that the product will be free from defects in materials and workmanship for a period of two (3) years from the date of shipment. If this product proves defective during the warranty period, LYNX Technik AG at its option will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, customer must notify LYNX Technik of the defect before expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by LYNX Technik, with shipping charges prepaid. LYNX Technik shall pay for the return of the product to the customer if the shipment is within the country which the LYNX Technik service center is located. Customer shall be responsible for payment of all shipping charges, duties, taxes and any other charges for products returned to any other locations.


This warranty shall not apply to any defect, failure, or damage caused by improper use or improper or inadequate maintenance and care. LYNX Technik shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than LYNX Technik representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non LYNX Technik supplies; or d) to service a product which has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty servicing the product.

THIS WARRANTY IS GIVEN BY LYNX TECHNIK WITH RESPECT TO THIS PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. LYNX TECHNIK AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. LYNX TECHNIK'S RESPONSIBILITY TO REPAIR AND REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. LYNX TECHNIK AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER LYNX TECHNIK OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Regulatory information

Europe

Declaration of Conformity

We	LYNX Technik AG Brunnenweg 3 D-64331 Weiterstadt Germany
<i>Declare under our sole responsibility that the product</i>	
TYPE: O ET 5501	
<i>To which this declaration relates is in conformity with the following standards (environments E1-E3):</i>	
EN 55103-1 /1996	
EN 55103-2 /1996	
EN 60950-1 /2006	
<i>Following the provisions of 89/336/EEC and 73/23/EEC directives.</i>	
	Winfried Deckelmann
Weiterstadt, May 2015	
<i>Place and date of issue</i>	<i>Legal Signature</i>

USA

FCC 47 Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Getting Started

Most CardModules are installed into the rack frames and system tested in the factory. If this is an upgrade part or service exchange item then the module is supplied in a padded cardboard carton which includes the CardModule, rear connection plate and mounting screws.

Packaging

The shipping carton and packaging materials provide protection for the module during transit. Please retain the shipping cartons in case subsequent shipping of the product becomes necessary. Do not remove the module from its protective static bag unless observing adequate ESD precautions. Please see below.

ESD Warning



This product is static sensitive. Please use caution and use preventative measures to prevent static discharge or damage could result to module.

Preventing ESD Damage

Electrostatic discharge (ESD) damage occurs when electronic assemblies or the components are improperly handled and can result in complete or intermittent failure.

Do not handle the module unless using an ESD-preventative wrist strap and ensure that it makes good skin contact. Connect the strap to any solid grounding source such as any exposed metal on the rack chassis or any other unpainted metal surface.

Caution

Periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 Megohms.

Product Description

The OET 5501 is a 3 port Ethernet switch designed to extend the reach of electrical Ethernet signals over long distances using a constant (fixed) high speed 1Gbit optical connection.

The OET 5501 can be paired with another OET 5501, the yellobrik OET 1510 or any other IEEE compliant Ethernet switch with a fiber interface. When paired with one of these devices using two fiber cables, the OET 5501 will provide a stable, high speed 1Gbit error free optical connection between distant locations.

The OET 5501 has two standard RJ45 electrical Ethernet ports plus fiber I/O and functions as a 3 port Ethernet switch. For legacy system use; each electrical Ethernet port can be set for automatic speed detection (10/100/1000) or forced to 10Mbit. Each port can also use automatic crossover detection or be forced manually if needed. These functions are available via the APPolo control system.

A variety of optional SFP fiber sub modules are available (including singlemode and multimode fiber plus CWDM fiber with 18 wavelength selections) this allows the module to be used in multiple applications.

Full remote control and status monitoring, (including the available optical input budget) are possible when using the APPolo control system.

Functional Diagram

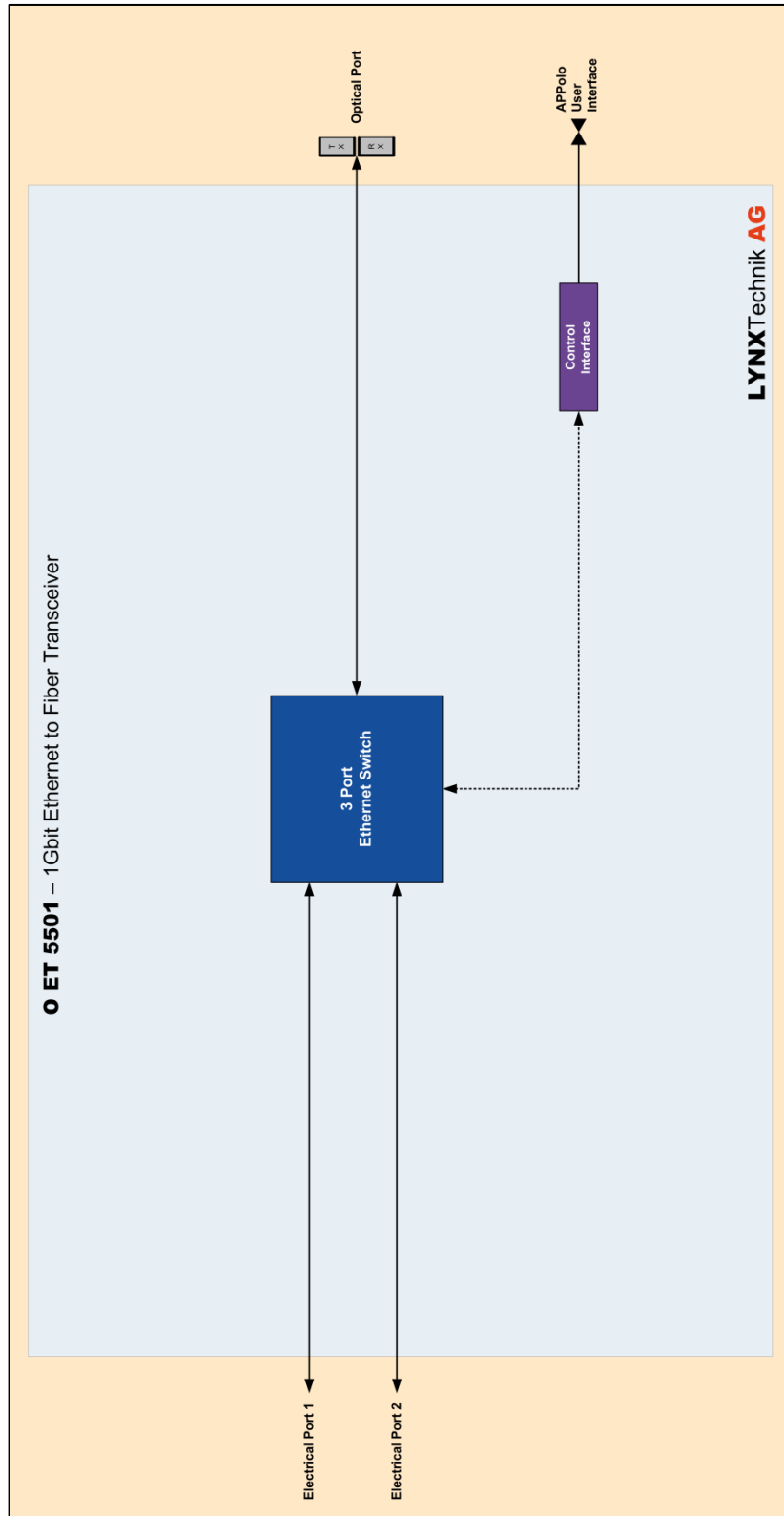


Figure 1: Functional Diagram

Connection Panel and Module Layout

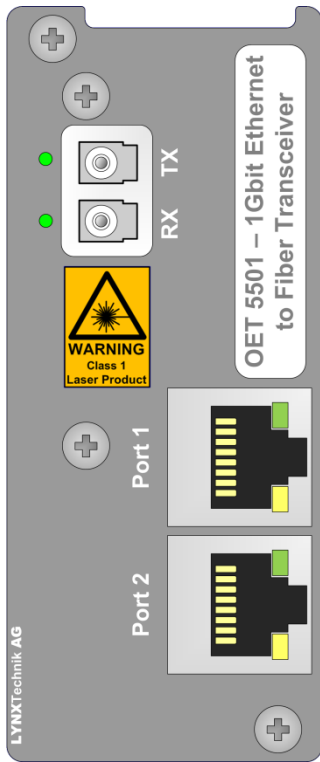


Figure 3: Connections

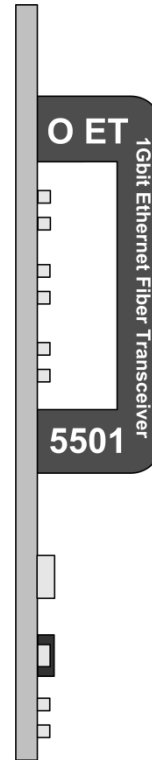


Figure 2: Board Edge

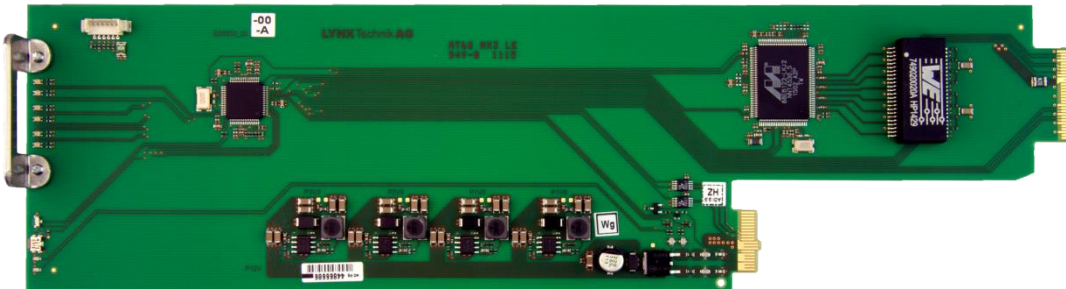


Figure 4: Board

Installation

If this module was supplied as part of a system it is already installed in the rack enclosure. If the module was supplied as a field upgrade please follow the installation procedure below.



NOTE Observe static precautions when handling card.
Please see ESD warnings on Page 6.

This module has a single width rear connection panel. Up to ten O ET 5501 modules can be accommodated in a single Series 5000 2RU rack frame.

Each Card Module is supplied with a rear connection panel and mounting screws. Please follow the procedure below for the installation of the card module into the Series 5000 Card Frame.

We recommend you power the rack down before installing any additional modules into an existing card frame.

1. Select a free slot space in the card frame where the CardModule will be located.
2. Remove the blank connection panels from the rear of the rack (if fitted)
3. Install the rear connection panel using the screws supplied. Do not tighten the screws fully
4. Slide the card module into the card frame and carefully check the CardModule connects to the rear connection plate. The card should fit easily and should not require excessive force to insert - if you feel any resistance, there could be something wrong with the rear connection panel location. **Do not** try and force the connection this may damage the connectors. Remove the rear connection panel and check alignment with the CardModule.
5. Insert and remove the CardModule a few times to ensure correct alignment and then tighten the two screws to secure the rear connection plate.
6. Power up the rack and check the module LED's. Check the module is automatically logged into the control system device tree. *(It may take a few seconds for the control system to "discover" the new module)*

Local Control and LEDs

The O ET 5501 module doesn't have any local control. All settings are available via the APPolo control software. However, the module has a factory reset button which when pressed and held for 3 second will reset the module's settings to the factory default.

Once set, all settings are automatically saved in non-volatile internal memory. (Flash RAM) The module will always recall the last used settings.

Alarm/LED Status Indicators

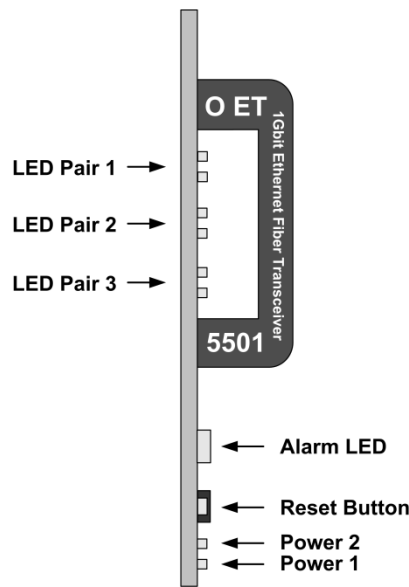


Figure 5: Board Edge

LED Pair 1: Fiber Port Status

LED Color (Top)	Indication
Green ●	Optical output active (TX)
OFF ●	No optical output
LED Color (Bottom)	Indication
Green ●	Optical input signal detected (RX)
OFF ●	No optical input signal

LED Pair 2: Electrical Port 1 Status

LED Color (Top)	Indication
Green ●	Ethernet link established
OFF ●	No Ethernet link
LED Color (Bottom)	Indication
Yellow flashing ●	Link activity
OFF ●	No link activity

LED Pair 3: Electrical Port 2 Status

LED Color (Top)	Indication
Green ●	Ethernet link established
OFF ●	No Ethernet link
LED Color (Bottom)	Indication
Yellow flashing ●●	Link activity
OFF ●	No link activity

Alarm LED

The Alarm LED is visible through the RackFrame's front cover.

LED Color	Indication
Green ●	Normal Operation .
Yellow flashing ●●	"Locate Device" activated from Control System
triple yellow flash ●●●	Saving current configuration to local flash-RAM
Red ●	No SFP sub-module detected

Power LEDs

Power 1	Indication
Green ●	Power from Main PSU ok
Off ●	No power from Main Power Supply
Power 2	Indication
Green ●	Power from Redundant PSU ok
Off ●	No power from Redundant PSU

NOTE: If one of the Power LEDs should be OFF while the corresponding PSU is working correctly, then please contact technical support for a verification of the board's power input fuse.

Control System GUI

All LYNX CardModules support a computer interface which allows setting the modules parameters using the simple APPolo control software GUI interface. Access to all standard features *and in some cases* extended features is possible using this interface.

NOTE: Any settings made using the control system overrides any local settings made on the module. All settings are stored in internal flash ram and will survive power cycles and long term storage.

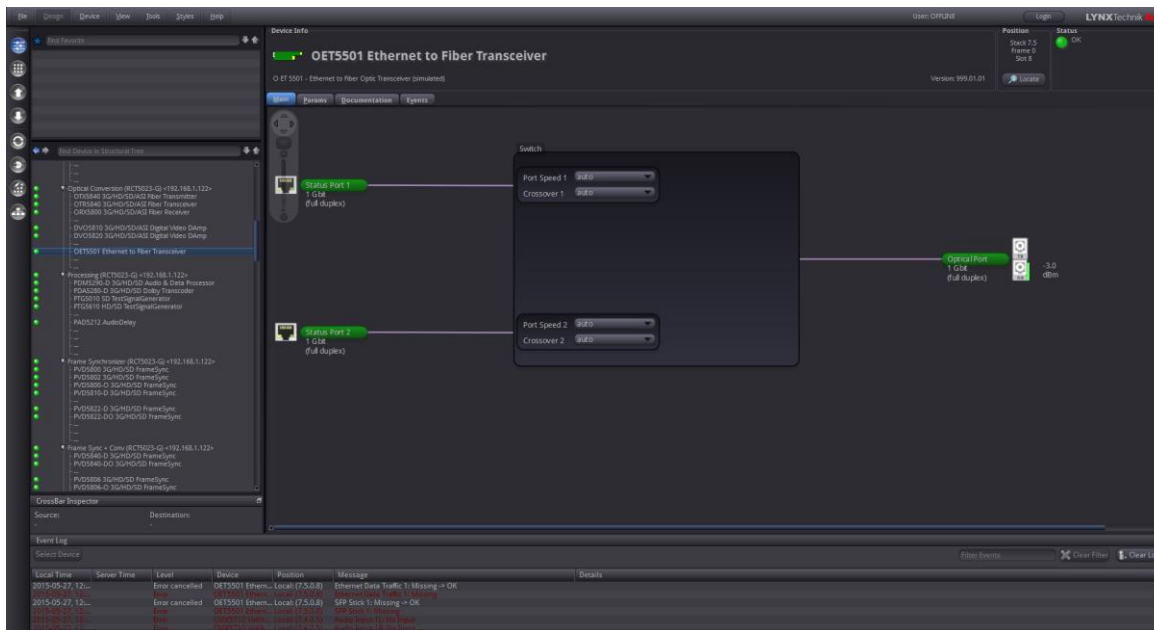


Figure 6: O ET 5501 in APPolo GUI

Figure 6 shows the complete module GUI. The “Device Info” area across the top contains information about the module including name and firmware revision. The “Position” area displays the modules position and physical location. This is useful if the device is installed as part of a larger installation.

NOTE: The Locate button (in the “Position” area) is a useful tool to quickly identify a module in larger systems. Activating “Locate” will flash the module’s alarm LED in yellow color (this does not affect the module’s operation in anyway). This function will be stopped automatically (timeout).

The “Error Log” at the bottom of the screen displays an individual time stamped message for any error or warning condition in the system. The same information can always be found in the APPolo Control System’s textual logfiles.

Overview

The MAIN Tab (Figure 7) visualizes the module's functionality. The signals are presented flowing from left to right. Selections are made using onscreen sliders, radio buttons, drop down selections and/or checkboxes. The screen can be zoomed in/out using the mouse-wheel or the navigation tool in the top left corner of the screen. When zooming closer, the contents of the individual boxes will become visible.



Figure 7: O ET 5501 MAIN Tab

Port Configuration

Each electrical port of the O ET 5501 can be configured via the APPolo control software. The available settings are:

Port Speed

- auto
Port speed will be auto negotiated
- force 10 Mbit
The speed of the electrical port will be forced to 10 Mbit for legacy equipment.

Crossover

- auto
Automatic crossover
- on
Manual crossover activated
- off
Manual crossover deactivated

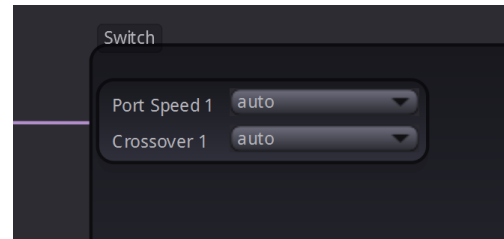


Figure 8: Port Configuration

Device Event Tab

The Events Tab is where the module alarming and error notifications are configured for the module. Any of the possible Events that the device can generate can be disabled here, which will declare such Events as irrelevant. Once an Event has been disabled in this Events-Tab, the Event will not be reported to the APPolo control system, it will not be logged in the logfiles, and it will not even influence the local LEDs of the device.

For all Events that are enabled (which is the default): as soon as the monitored condition becomes critical (e.g. input signal lost), the Event becomes ACTIVE. This change of state generates a message in the APPolo Control System. This message is stored in the APPolo Server logfile. Later, when the condition is not critical anymore (e.g. input signal present again), another message is logged in the APPolo Event System, and also saved in the logfile.

Additionally, these messages can be displayed in the APPolo GUI's Event Log (bottom part of the APPolo GUI, enabled from the "View" menu). This can, however be disabled by removing the checkboxes from the "Log in GUI" columns (separately for "Event becomes Active" and "Event not active anymore" messages).

Similarly, an SNMP trap can be generated from the APPolo Server for any message in the APPolo Event System. Refer to the LYNX Remote Control Guide for more information on SNMP (available from <http://appolo.lynx-technik.com>)

Parameters

The "Params" tab lists all available control parameters of the complete device. Every switch and function in any other part of the GUI is actually just a graphical control of a parameter listed on this page. There are, however, a number of parameters for more detailed control that are only accessible in this list of parameters on the "Params" tab.

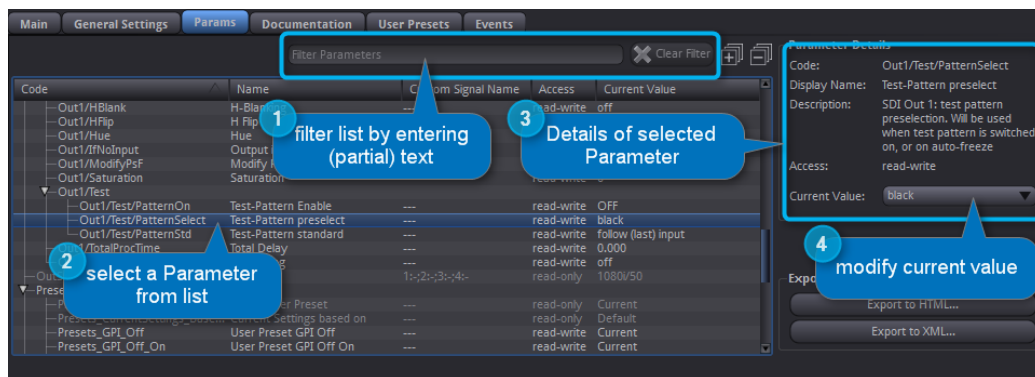


Figure 9: Param Tab

All parameters are defined by the following aspects:

- **Code:** This is a unique code to identify the parameter. The Code can contain the slash-character '/', to provide some structure to the total collection of parameters. The Parameter Code is always to be specified as the complete text string (i.e. including all slashes).
- **Name:** a human readable short parameter name, which is used as the default text label in most parts of the GUI, as well as in any CustomControl Panel.
- **Access:** read-write or read-only accessibility. Note that for some parameters, the accessibility status may potentially change, depending on the current value of other parameters. E.g. the value of parameter A might be controlled automatically by default, so the accessibility of A will be displayed as "read-only". But a boolean parameter B might be provided to switch off the automatic behavior. So when parameter B is set to MANUAL, then parameter A would dynamically change to "read-write".
- **Current Value:** This is the current value of the parameter. If Accessibility is "read-write" (see above), then the Current Value can be modified.
- **Description:** a textual explanation of the behavior of the individual parameter.

You can use the "Filter" function (located above the actual list of parameters) to show only a subset of the complete list, based on textual filtering. The filter will actually search in any part of the parameter definition, including the parameter code, the textual description and even the Current Value.

NOTE: *In theory, it would be possible to manage and monitor the complete functionality of the module by accessing the relevant parameters on this tab only. All the other tabs in the GUI are only provided to provide better explanations and overview.*

Parameters control everything

As stated in the previous chapter, the complete behavior of any LYNX Device can be controlled and monitored with the parameters listed on the "Params" tab. All other parts of the LYNX APPolo Control System use exactly the same parameters access and control the devices.

- The LYNX CustomControl feature connects the individual elements of a custom-made Design to real device parameters by their Code. See <http://appolo.lynx-technik.com/> -> CustomControl for details.
- The LYNX AutoControl automation rules access the individual Parameters (for both Conditions and Actions) by their Code. See <http://appolo.lynx-technik.com/> -> AutoControl for details.

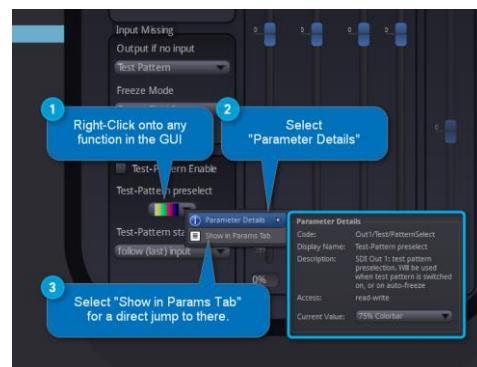


Figure 10: Parameter Details from GUI

- The LYNX RemoteIF API addresses individual Parameters by Code. See <http://appolo.lynx-technik.com/> -> RemoteControl for details.
- The LYNX SNMP Control provides one OID (numerical address in the MIB) per individual Parameters. The exact mapping of Parameter Code to OID is provided in the MIB files. See <http://appolo.lynx-technik.com/> -> RemoteControl for details.

Finding the Parameter Code name for a given Parameter in the graphical GUI is made easy by clicking the Right-Mouse-Button onto the graphical control anywhere in the GUI and then selecting the “Parameter Details” option (see Figure 10).

General GUI functions

There are a number of functions and commands of the LYNX APPolo Control System which are common for all LYNX devices.

A click with the Right-Mouse-Button on any module in the DeviceTree will generate the same menu that is available from the “Device” menu. This menu provides the following options:

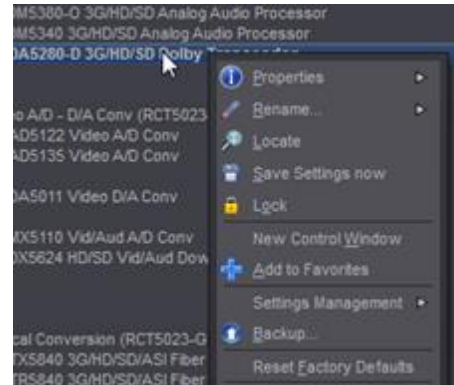


Figure 11: Device Menu from Tree

Device Properties

The first entry in the Device menu opens a sub-menu page which shows device specific properties about the selected module.

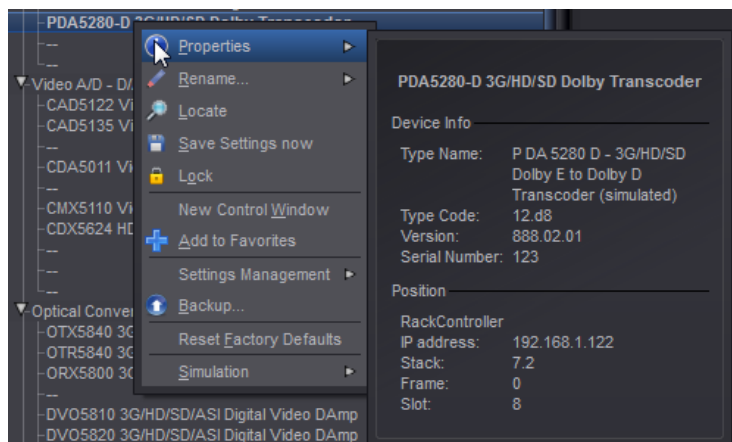


Figure 13: Device Properties Menu

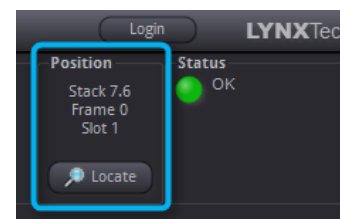


Figure 12: Locate Position

Locate

This function is useful if you need to physically locate a module in a larger system quickly (for removal or maintenance purposes) When Locate selected this will flash the module alarm LED yellow. This function does not impact normal module operation and will timeout after a short time period.

New Control Window

Selecting this option will open up a separate GUI window showing just the controls for the current module. This new window can be used to arrange multiple devices on your desktop or similar.

Rename

It is possible to rename individual items (RackFrames and individual devices) in the APPolo Device Tree. The default name of a device is the LYNX product name. This name can be modified at any time. The original (default) name can be restored by simply removing the custom name from that renaming-field (save this as an empty name).

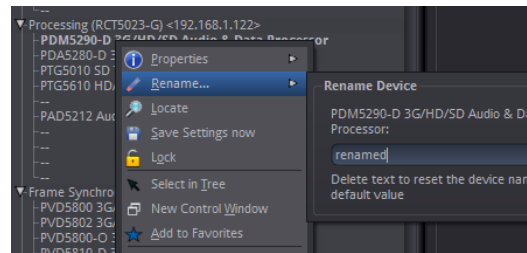


Figure 14: Rename Device

NOTE: The names are stored inside the flash memory of a LYNX server (if installed) or the hard disk of the connected Computer respectively.

Save Settings Now

Any modification to any parameter of a device is immediately propagated from the APPolo GUI to the hardware device (card) and made effective. The current settings are saved in a local FlashRAM of the device, so that the device will continue to work in the exact same configuration after a power-cycle. But in order to reduce the number of write-operations on the physical FlashRAM, the actual storage of a modified configuration into the FlashRAM is only executed approximately 10 seconds after the last change to any setting in the whole card. This operation is visualized on the board by all local LEDs flashing three times in yellow color.

Consequently, if you remove a card from a system BEFORE the last changes have been saved to FlashRAM, those last changes will not be available on the next power-up.

The “Save Settings Now” operation in this menu can force the current configuration of this device to be stored to the local FlashRAM now. If in doubt, this function should be executed before a device is physically removed from the system, or before electrical power is shut down.

Lock

Selecting this will lock the device to prevent from any accidental changes being made to the modules settings. The module status can be seen but all the controls will be grayed out. To unlock simply deselect the lock control from the menu.

Reset Factory Defaults

Executing this function will reset all the individual settings of all parameters of the device back to the predefined state that has been defined by the manufacturer. All custom adaptations will be lost. This operation cannot be undone.

Settings Management

The complete current configuration of one device can be copied into an internal “clipboard” and pasted onto a different device of the same type. Alternatively, the complete current configuration can be stored to a local file (as a very simple single-device backup).

Specifications

Ethernet (electrical)	
Signal Type	10 BaseTUTP category 3, 4 or 5 cable up to 328ft/100m (2 pairs) 100 BaseTUTP category 5 cable up to 328ft/100m (2 pairs) 1000 BaseTUTP category 5 cable up to 328ft/100m (4 pairs)
Number of ports	2
Connector	RJ45
Bit Rates	Auto detect bit rate (10/100/1000), or force to 10Mbit for each port (selectable)
Crossover	Automatic crossover detection or force manually for each port (selectable)
Indicators	Port activity LED indication next to Ethernet port and on board edge
Optical I/O	
Inputs / Ouputs	1x fiber optic input (RX) 1x fiber optic output (TX)
Connection	LC connector (Duplex)
Compatibility	IEEE 802.3z 1000BASE-X Gbit/s Ethernet over Fiber at 1 Gbit/s (125 Mb/s)
Indicators	Fiber TX active and RX active LEDs next to fiber connections and on board edge
Fiber Options	Refer to table

Fiber Options	
OH-TR-51	Singlemode non CWDM: Optical Ethernet Transceiver. TX wavelength 1310nm, power -3dBm. RX input range 1260nm to 1620nm, sensitivity -3dBm to -21 dBm Max distance 10km (6.2 miles)
OH-TR-50-850-MM	Multimode non CWDM: Optical Ethernet Transceiver. TX wavelength 850nm, power -2dBm to -7dBm RX input 850nm, sensitivity 0dBm to -15 dBm Max distance 550m (1804 feet)
OH-TR-54-XXXX	Singlemode CWDM: Optical Ethernet Transceiver. XXXX designates wavelength. Select from 1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm. TX power -1dBm. RX input range 1260nm to 1620nm, sensitivity 0dBm to -21 dBm Max distance 40km (12.4 miles)
OH-TR-58-XXXX	Singlemode CWDM: Optical Ethernet Transceiver. XXXX designates wavelength. Select from 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm. TX power -1dBm. RX input range 1260nm to 1620nm, sensitivity 0dBm to -24 dBm Max distance 80km (24.8 miles)

Electrical Specifications	
Operating Voltage	12 VDC
Power Consumption	5.4 W
Safety	IEC 60950/ EN 60950/ VDE 0805
Mechanical	
Size	283mm x 78mm (11.14" x 3.07")
Weight	Each CardModule 120g, (4.2oz) connector plate 80g (1.8oz)
Ambient	
Temperature	5°C to 40°C (41°F to 104°F) Maintaining specifications
Humidity	90% Max non condensing

Service

Parts List

Due to the very dense design and high level of integration there the module is not user serviceable. Please contact LYNX for repairs or to request an exchange unit. There is one consumable part used on this module which is the cooling fan. A service kit is available to exchange the fan. Ordering information below.

Technical Support

If you are experiencing problems, or have questions please contact your local distributor for further assistance.

Technical support is also available from our website:

<http://support.lynx-technik.com/support/home>

Please do not return products to LYNX without an RMA. Please contact your authorized dealer or reseller for more details.

More detailed product information and product updates may be available on our web site:

www.lynx-technik.com

Contact Information

Please contact your local distributor; this is your local and fastest method for obtaining support and sales information.

LYNX Technik can be contacted directly using the information below.

Address	LYNX Technik AG Brunnenweg 3 D-64331 Weiterstadt Germany
Website	www.lynx-technik.com
E-Mail	info@lynx-technik.com

LYNX Technik manufactures a complete range of high quality modular products for broadcast and Professional markets, please contact your local representative or visit our web site for more product information.

LYNXTechnik **AG**
Broadcast Television Equipment