Occitaline
Automation Driven

Oxtopus

User Manual

Installation – Router setting

This manual describe the wiring and setting to operate the multi-protocol Oxtopus router EIA-709 and Modbus

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This manual is organized in different chapter. Each can be read independently. The annexes are supplements to use routers in their environment.

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Terminology

Lon	Name usually given to the protocol or component working in EIA-709.1.
LonWorks®	Name given to the communication system developed by Echelon Corp under denomination EIA-709.1 or ISO-14908.1.
Modbus	Protocol used in building automation and industry for exchange data between two devices.
TP / FT10	Name given to the medium “Twisted Pair Free Topology” and operating at 78125 bits / s.
EIA-709.1	Generic identification for the protocol used between nodes on a network.
Node	Common name given to device exchanging data with protocol EIA-709.1.
EIA-852	Generic name for transport protocol EIA-709.1 over IP.
Config Server	Virtual administrator for “IP Channel" (EIA-852).
Channel IP	Virtual LAN that will be seen in the administrative tools as a communication medium just like a twisted pair.
Modbus	Modbus frames NAT routing function for address translation.
Echelon	Company that created the LonWorks® technology and has deposited the brand Echelon, LonWorks, LNS®, Neuron Chip®.
BACnet®	Protocol defined by ASHRAE SPC 135 and ISO-16484.5 normalised. This protocol includes power full objects for the Building Automation.
BACnet Object	An object is made by several properties representing the itself object values and exposed onto the network.
BACnet Property	BACnet properties are the values that make up a BACnet Object.
Network Number	It's a unique number per channel. Each router has both network number and port : IP and MS/TP Port.

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1 Introduction

1.2 Range of Oxtopus routers

Oxtopus routers are available in several product references.

	Part-Number	Sched	Port Ethernet	Wifi	Port TP/FT10 EIA-709	Port EIA-485 Modbus	Port BACnet MS/TP
LonWorks Only	Ox-1Lo	No	2 en Switch	No	1		
	Ox-1Lo-Sc	Yes	2 en Switch	No	1		
	Ox-1Lo-Wi	No	2 en Switch	Yes	1		
	Ox-1Lo-Sc-Wi	Yes	2 en Switch	Yes	1		
	Ox-2Lo	No	2 en Switch	No	2		
	Ox-2Lo-Sc	Yes	2 en Switch	No	2		
	Ox-2Lo-Wi	No	2 en Switch	Yes	2		
	Ox-2Lo-Sc-Wi	No	2 en Switch	Yes	2		
	Ox-3Lo	No	2 en Switch	No	3		
	Ox-3Lo-Sc	Yes	2 en Switch	No	3		
	Ox-3Lo-Wi	No	2 en Switch	Yes	3		
	Ox-3Lo-Sc-Wi	Yes	2 en Switch	Yes	3		
	Ox-4Lo	No	2 en Switch	No	4		
	Ox-4Lo-Sc	Yes	2 en Switch	No	4		
	Ox-4Lo-Wi	No	2 en Switch	Yes	4		
	Ox-4Lo-Sc-Wi	Yes	2 en Switch	Yes	4		
Modbus Only	Ox-1Mo	n/a	2 en Switch	No		1	
	Ox-1Mo-Wi	n/a	2 en Switch	Yes		1	
	Ox-2Mo	n/a	2 en Switch	No		2	
	Ox-2Mo-Wi	n/a	2 en Switch	Yes		2	
	Ox-3Mo	n/a	2 en Switch	No		3	
	Ox-3Mo-Wi	n/a	2 en Switch	Yes		3	
	Ox-4Mo	n/a	2 en Switch	No		4	
	Ox-4Mo-Wi	n/a	2 en Switch	Yes		4	
Mixed EIA-709 + Modbus	Ox-1Lo-1Mo	No	2 en Switch	No	1	1	
	Ox-1Lo-1Mo-Sc	Yes	2 en Switch	No	1	1	
	Ox-1Lo-1Mo-Wi	No	2 en Switch	Yes	1	1	
	Ox-1Lo-1Mo-Sc-Wi	Yes	2 en Switch	Yes	1	1	
	Ox-1Lo-2Mo	No	2 en Switch	No	1	2	
	Ox-1Lo-2Mo-Sc	Yes	2 en Switch	No	1	2	
	Ox-1Lo-2Mo-Wi	No	2 en Switch	Yes	1	2	
	Ox-1Lo-2Mo-Sc-Wi	Yes	2 en Switch	Yes	1	2	
	Ox-1Lo-3Mo	No	2 en Switch	No	1	3	
	Ox-1Lo-3Mo-Sc	Yes	2 en Switch	No	1	3	
	Ox-1Lo-3Mo-Wi	No	2 en Switch	Yes	1	3	
	Ox-1Lo-3Mo-Sc-Wi	Yes	2 en Switch	Yes	1	3	
	Ox-2Lo-1Mo	No	2 en Switch	No	2	1	
	Ox-2Lo-1Mo-Sc	Yes	2 en Switch	No	2	1	
	Ox-2Lo-1Mo-Wi	No	2 en Switch	Yes	2	1	
	Ox-2Lo-1Mo-Sc-Wi	Yes	2 en Switch	Yes	2	1	
	Ox-2Lo-2Mo	No	2 en Switch	No	2	2	
	Ox-2Lo-2Mo-Sc	Yes	2 en Switch	No	2	2	
	Ox-2Lo-2Mo-Wi	No	2 en Switch	Yes	2	2	
	Ox-2Lo-2Mo-Sc-Wi	Yes	2 en Switch	Yes	2	2	

	Ox-3Lo-1Mo	No	2 en Switch	No	3	1	
	Ox-3Lo-1Mo-Sc	Yes	2 en Switch	No	3	1	
	Ox-3Lo-1Mo-Wi	No	2 en Switch	Yes	3	1	
	Ox-3Lo-1Mo-Sc-Wi	Yes	2 en Switch	Yes	3	1	
BACnet® Only	Ox-1Ba	No	2 en Switch	No			1
	Ox-1Ba-Wi	No	2 en Switch	Yes			1
	Ox-2Ba	No	2 en Switch	No			2
	Ox-2Ba-Wi	No	2 en Switch	Yes			2
	Ox-3Ba	No	2 en Switch	No			3
	Ox-3Ba-Wi	No	2 en Switch	Yes			3
	Ox-4Ba	No	2 en Switch	No			4
	Ox-4Ba-1Wi	No	2 en Switch	Yes			4
Mixed BACnet® + Modbus	Ox-1Ba-1Mo	No	2 en Switch	No		1	1
	Ox-1Ba-1Mo-Wi	No	2 en Switch	Yes		1	1
	Ox-1Ba-2Mo	No	2 en Switch	No		2	1
	Ox-1Ba-2Mo-Wi	No	2 en Switch	Yes		2	1
	Ox-1Ba-3Mo	No	2 en Switch	No		3	1
	Ox-1Ba-3Mo-Wi	No	2 en Switch	Yes		3	1
	Ox-2Ba-1Mo	No	2 en Switch	No		1	2
	Ox-2Ba-1Mo-Wi	No	2 en Switch	Yes		1	2
	Ox-2Ba-2Mo	No	2 en Switch	No		2	2
	Ox-2Ba-2Mo-Wi	No	2 en Switch	Yes		2	2
	Ox-3Ba-1Mo	No	2 en Switch	No		1	3
	Ox-3Ba-1Mo-Wi	No	2 en Switch	Yes		1	3

☞ **« -Sc** » for **« LON Scheduler »**. Regardless of the product reference containing the LonWorks protocol you can add the LON Scheduler. The operation of the scheduler is described in 1.5.4, its configuration is described in chapter5.

Figure 1
Front view of Oxtopus router

1.3 Ethernet connection

All references are equipped with two RJ45 connectors. Communication can be done independently on both sides with network.

Figure 2
Ethernet Connectors Eth0 and Eth1

☞ The two RJ45 Ethernet connectors are configured in factory as Ethernet switch. The main connector is the left ETH0. The Computer must be primarily connected to this port.

In this configuration, the router has only one IP address for all its functions.

1.4 Wifi Connection – Ethernet

The Wifi option proposed in Oxtopus references allows access to Ethernet RJ45.

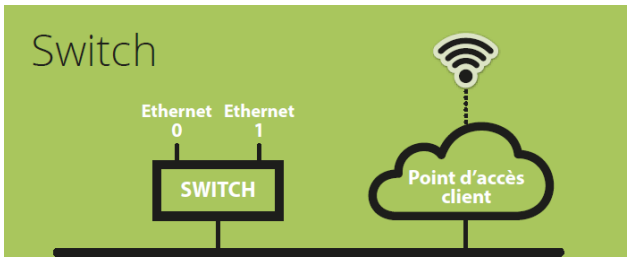


Figure 3
Architecture Ethernet IP

A computer can connect over WiFi Oxtopus to reach other Oxtopus or other equipment as the LNS server.

If a DHCP server provides an IP address on Ethernet, the computer do not need a fixed IP address, its Wi-Fi connection will assign a network address automatically.

1.5 Automation protocols supported

The EIA-709.1 and Modbus protocols are supported on Oxtopus router and run on IP separately.

1.5.1 Router EIA-709.1

In Oxtopus routers, the EIA-709.1 protocol is available either on twisted pair or over IP. In order to pass from one media to another, it is implemented in a router function. This is conforms to the EIA-709.1 protocol and ensures the traffic filtering.

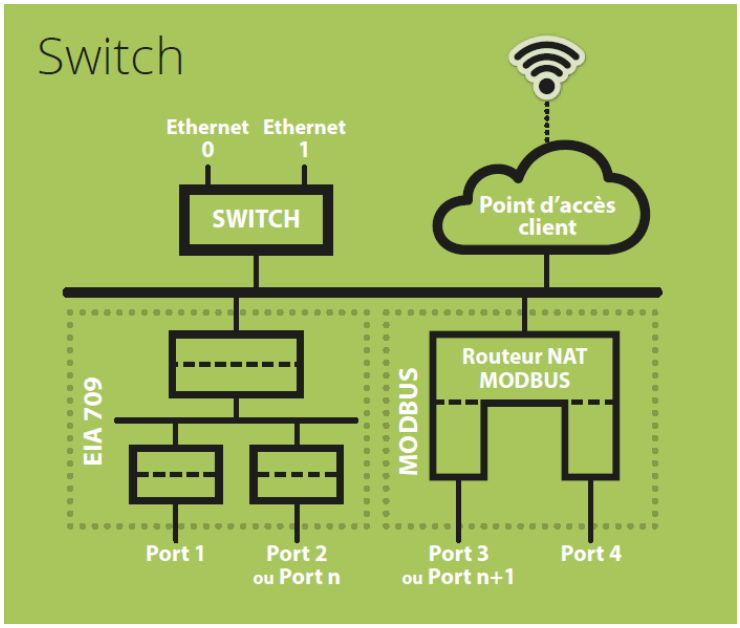


Figure 4
Architecture of Oxtopus router

To connect 2 media, a simple router is enough. To connect more than 2 medias a Virtual Media is introduced into the router to follow the installation and operate procedures of the EIA-709.1 networks.

1.5.1.1 "LON Switch" mode

From version x.x.1.41, the Oxtopus router supports the « LON Switch » mode. The router can be configured to act as an EIA-709 network learning switch. In this operating mode, the router learns the network topology and decides if a message must be forwarded or not, based on the subnet/node destination address.

Advantage of this operating mode is that only plug&play and no router configuration nor installation is needed. Disadvantage is that this operating mode uses a lot of bandwidth and is not recommended for large network.

See **6 LON Switch mode** for more explanation about this mode.

1.5.2 BACnet IP/MSTP router

Oxtopus Ox-xBa routers allow you to connect your BACnet / IP network to your BACnet MS / TP network. The routing function ensures the passage of a media to another while filtering the traffic.

Up to four opto-isolated MSTP ports are available on a router.

1.5.3 NAT Modbus router

The Modbus protocol cannot be a router function. It was implemented a frame redirection by changing the slave address. Hence the term NAT Router (Address Translation Router). Depending on the number of EIA-485 Modbus port available on the reference, Modbus master address requests on IP, the request will be redirected to the desired port with a new slave address.

Each EIA-485 port can only support 31 Modbus slaves. The Modbus address space is limited to 247 members. Within the maximum terms it is possible to send 31 * 4 = 124 Modbus slaves on EIA-485.

Configuration example:

Slave source address	Port EIA-485	Slave destination address
10	Port 3	1
11	Port 3	2
20	Port 4	1
21	Port 4	2

1.5.4 LON Scheduler

The LonWorks scheduler associates a BACnet schedulers to a LON / IP node, both integrated into the Oxtopus router. The configuration interface via the embedded website allows the user to define, for a given value of "Present_Value", the values of the set of associated variables. For each event defined in the BACnet Scheduler the LonWorks variables will be propagated.

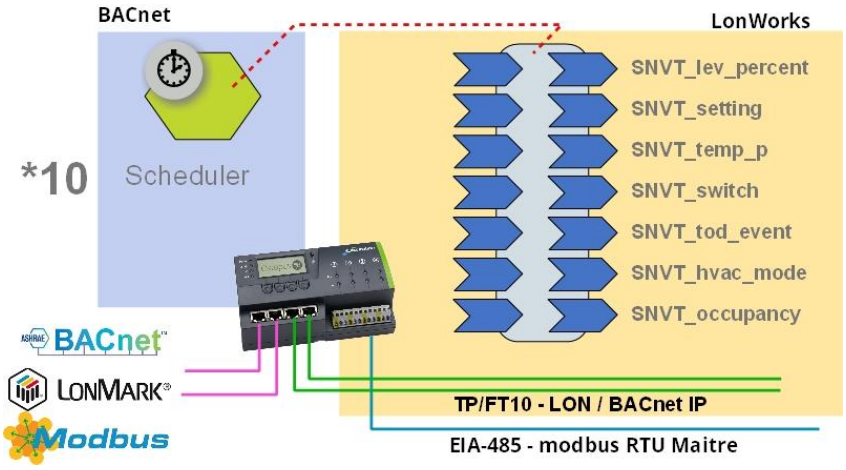


Figure 5 LON Scheduler architecture

On the LonWorks side, there are 10 functional blocks. Each function block has 14 network variables (7 nvi and 7 nvo). Each nviXX can force the value of the nvoXX. Then nvoXX value will be propagated according to your bindings.

Figure 6
Scheduler Functional blocks

This LON node is internally linked to *schedule* BACnet objets. You can handle your times slots and exceptions using standard BACnet tools.
Internal link is based on enumeration values: for each *Present Value* of the *schedule* object you will associate values for the 7nvo.
The configuration of enumeration will be done using the router embedded website. You have a maximum of 5 values for each NVO.

When the Present Value change, all the 7 nvo associated will take your configured values and will be propagated according to your LON bindings.

1.6 Other protocols supported

1.6.1 EIA-852 Device

This protocol is transparent for the installer and operator of the router. It is used for exchanges between members of a Channel IP.

1.6.2 EIA-852 Config Server

It is the virtual administrator of a Channel IP. All nodes or routers members of this channel are declared in a list ("channel list") and may share data.

If a member is forgotten it cannot share with others.

☞ The « Config Server » router must be declared in the channel list as member.

☞ A router cannot belong on two channel lists member.

1.6.3 Web

An embedded Web server provides the router setup and provides a view of the general state of the router. It is accessible via its IP address with a browser like Firefox, Chrome or Internet Explorer. You can also access via WiFi with a tablet or smartphone. Web pages are automatically resized according to your device.

The configuration pages are protected by password.

Login : « **admin** », Password: « **oxpass** »

1.6.4 Disk space embedded in FTP

A user disk space is available to store your files or documentation. This space is limited access via FTP with login and password.

Login : « **ftp** », Password: « **ftp** ».

2 Connection and Material

2.1 Ethernet

The cables used should not exceed 90 meters. The left connector Eth0 must be privileged.

The default address is **192.168.1.254**.

2.2 Wifi

The connection can support multiple devices. It can be enabled or disabled on the router with buttons and the LCD display or on the Web page

2.3 Power

The material feed may be made in DC voltage or AC voltage.

Figure 7
The rear power connector

The power connector is a clips connector. Wire is inserted using a screwdriver 2.5mm or a suitable tool.

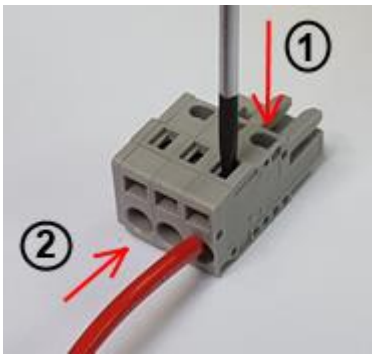


Figure 8
Insert wire in power connector

2.4 Wiring

According to the reference with 1, 2, 3 or 4 EIA-709 ports, ports are used, starting with the left.

According to reference product 1, 2, 3 or 4 EIA-485 ports, the ports are used starting from left or following EIA-709.

Reference	Port 1	Port 2	Port 3	Port 4
Ox-1Lo-1Mo	TP/FT10 EIA-709.1	EIA-485 Modbus		
Ox-1Lo-2Mo	TP/FT10 EIA-709.1	EIA-485 Modbus	EIA-485 Modbus	
Ox-2Lo-1Mo	TP/FT10 EIA-709.1	TP/FT10 EIA-709.1	EIA-485 Modbus	

2.5 Wired network EIA-709.1 / EIA-485 Modbus

The EIA-709 protocol is not polarized; the front connectors are identified in groups by three, left to right: Earth Net A and B.

Modbus over EIA-485 is polarized. Be careful, you must connect the + of all equipment on the right terminal and the - pole on the left terminal.

☞ When the devices are powered by different sources, the third connector must be connected to the reference.

Figure 9
Wired connection TP/FT10
CEA_709.1

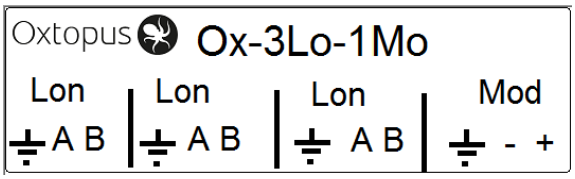


Figure 10
Stick network connector TP/FT10 and EIA-485

☞ A polarity inversion does not damage device, but the communication does not works.

2.6 LED signalization

2.6.1 Power LED

The **POWER** LED is ON in Green at the beginning of power on. A red color indicates a fault on the router.

2.6.2 Wifi LED

For Oxtopus routers with wifi option, **WIFI** LED will be green to indicate that wifi is active; the red color indicates that the wifi is inactive.

For routers that do not have wifi, this LED is off.

2.6.3 IP1/IP2 LED

IP LEDs indicates the status of each port and architecture

LED	Ethernet architecture
LED IP1 ON	IP Ports works in **« switch »** mode
LED IP2 ON	Ports are configured in **« double IP »**

Regardless of the architecture, the color of the LED indicates the operation of the connection.

A green LED indicates that the Ethernet connection is working properly.

A red LED indicates that the Ethernet connection is not working. This may be due to the inability to retrieve an IP address via DHCP for example.

Finally, an orange LED indicates that the Ethernet connection is working, but a fault has been detected during startup. Services such as CNIP (LON 852) Config Server and Modbus do not work. This may be due to, for example, significant time between the router startup and recovery of an IP address via DHCP. In this case the DHCP worked but the address was acquired too late, the services were launched without IP.

2.6.4 LED Activity (« Act. »)

2.6.4.1 LON FT/TP-10

EIA 709 Port of Oxtopus router has a bicolor LED:

Behavior	Description	Comment
GREEN blinking	Traffic	Receiving or sending frame
GREEN blinking at 1HZ	Port Not configured	
RED blinking	Errors on medium	Lost frame due to: - CRC Error - Most important Traffic

2.6.4.2 Modbus RS485

A Modbus-RS485 port of Oxtopus router has a bicolor LED:

Behavior	Description	Comment
GREEN blinking	Traffic	Receiving or sending frame
RED blinking	Errors on medium	Lost frame due to: - CRC Error

2.6.5 LED Z

It is used to view the state of the line impedance: fault if line break or termination not connected et each ends.

LED in GREEN indicates that impedance is good.

LED in RED indicates that impedance is fault.

2.7 Screen

The Oxtopus Router has a LCD screen in front. When the router starts, the screen displays the logo "Occitaline" and the name of the router.

Figure 11 : Home screen

The buttons below the display are used to navigate in the menu.

Press one of the buttons to access the menu which indicates the router configuration and bandwidth usage in real time to the ports LON FT / TP10.

Figure 12 : First page menu

Buttons below the arrows are used to select the port. Once selected, press the button under the symbol "**SP**" (Service Pin) to send a service pin of the Neuron Chip of that port.

Whatever the selected port, the button under the symbol "**GSP**" allows you to send a service pin of each external Neuron Chip on router.

Finally, the page after Ports show you the IP address of the router.

Figure 13 : IP page

3 Easy and fast setting

3.1 Wizard for configuration

A wizard has been developed to simplify the configuration of Oxtopus router.

Questions are asked in specific order. At the end of the sequence, the reboot of the router places it in the desired configuration.

The steps are:

1. System
2. Configure Wifi
3. EIA-709 Configuration
4. Modbus configuration
5. Reboot

When the reference does not have Wifi, EIA-709 or Modbus, the corresponding step is simply skipped (not showed) from the wizard.

All changes in the configuration Wizard will be saved at the last step. You can redo the Wizard as many times as you like without saving. All temporary values are stored until the backup or closing your session with the browser.

3.2 Starting wizard on home page

The actions menu is on the left. The user identification is at the top right of the page.

The home page shows the status of the router. (For more details see chapter 0)

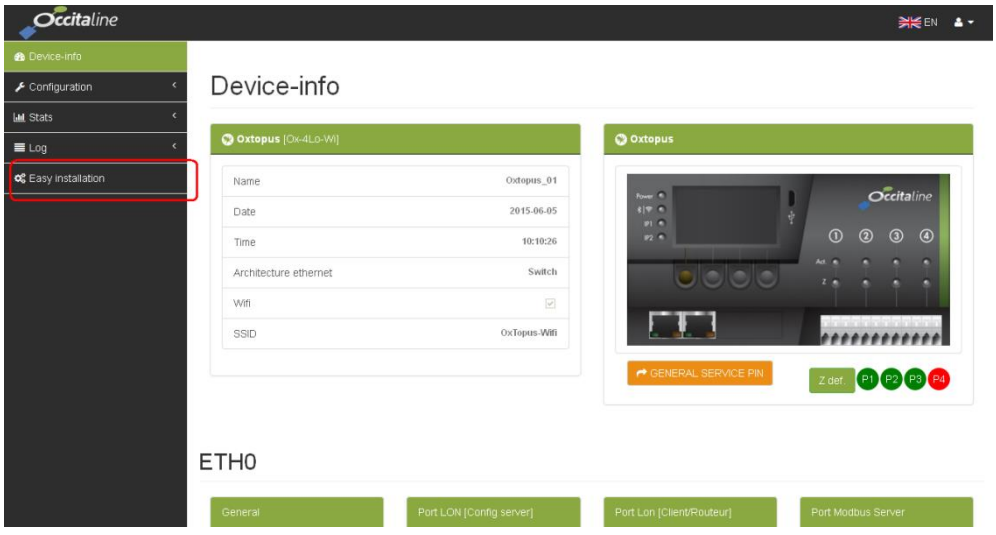


Figure 14
Home page and Easy installation menu

3.3 Login page

When access to a configuration page, if the user is not logged, the login page is proposed. (See Chapter 3.3)

The account is "**admin**", password is "**oxpass**".

3.4 Name of router

The name will be visible on the LCD screen and in the members list of the Channel IP.

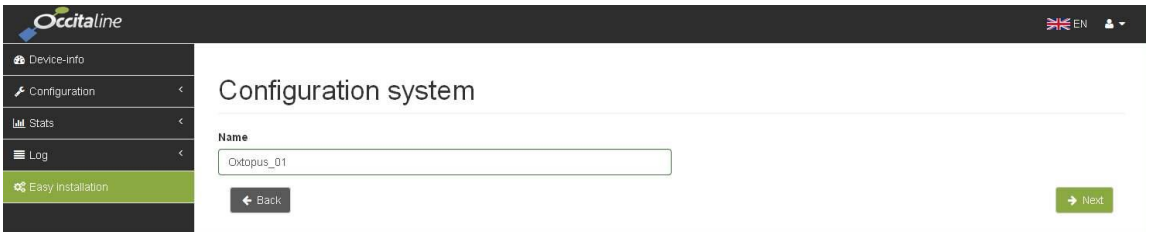


Figure 15
Define router name

3.5 IP address

The router can obtain an IP address by DHCP server or you can define a fixed IP address.

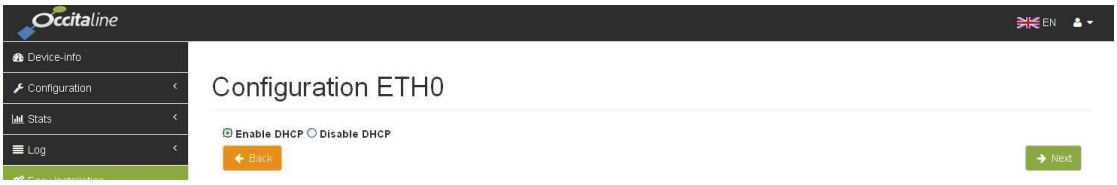


Figure 16
Router with dynamic IP address

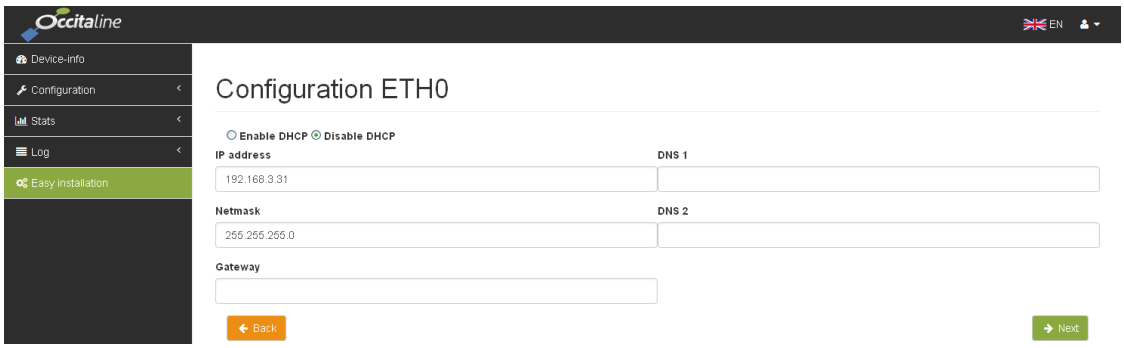


Figure 17
Router with fixed IP address

3.6 Wifi configuration

This page allows you to enable or disable the Wifi as well and set the access parameters.

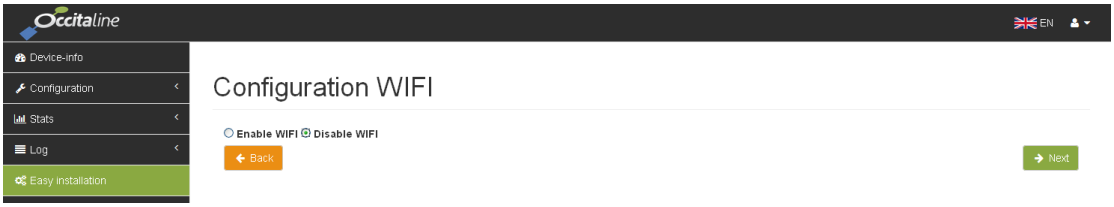


Figure 18
Disabling Wifi option

If WiFi is activated from the LCD screen, the values stored in the configuration will be used. By enabling WiFi by the Web, you can change its setting.

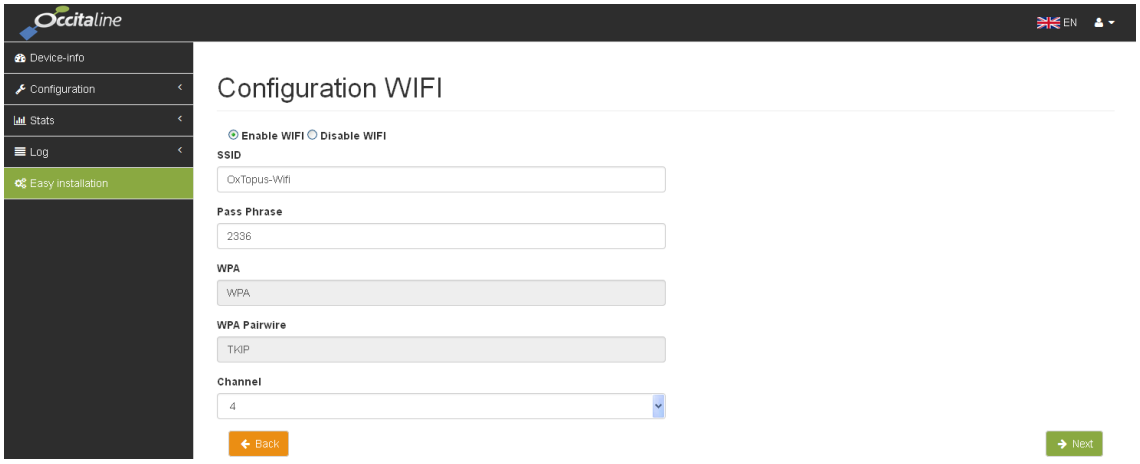


Figure 19
Wifi setting

SSID	It defines the visible name usable by your PC, tablet or smart phone.
Pass Phrase	This is the passcode to enter to validate the connection.
WPA	This is the security mode Wifi access.
WPA Pairwire	This is the encryption connection.
Channel	This is the channel frequency for wireless connection.

3.7 EIA-852 configuration

The router side IP must be a member of an IP Channel. The router can handle this task with its "Server Config".

Default routers come with the "config server" disabled.

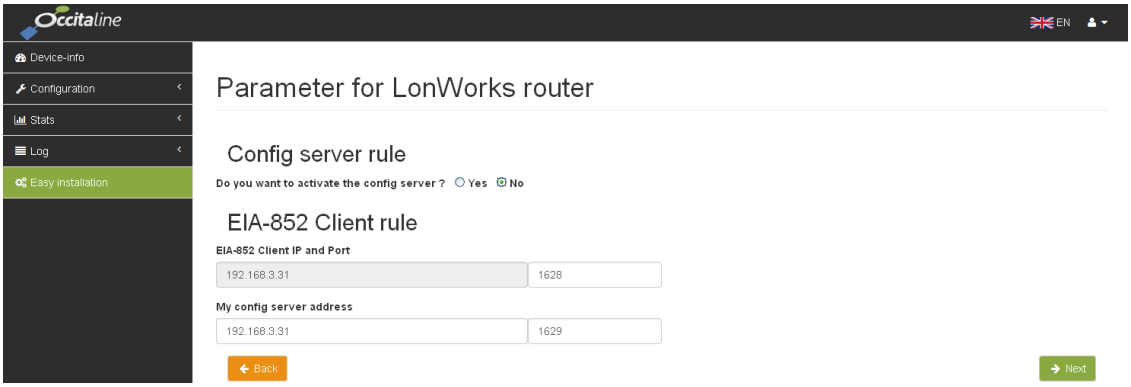


Figure 20
EIA-852 setting without Config Server

In case of the "config server" is on another device, you must define the IP address of it and the port (default 1629).

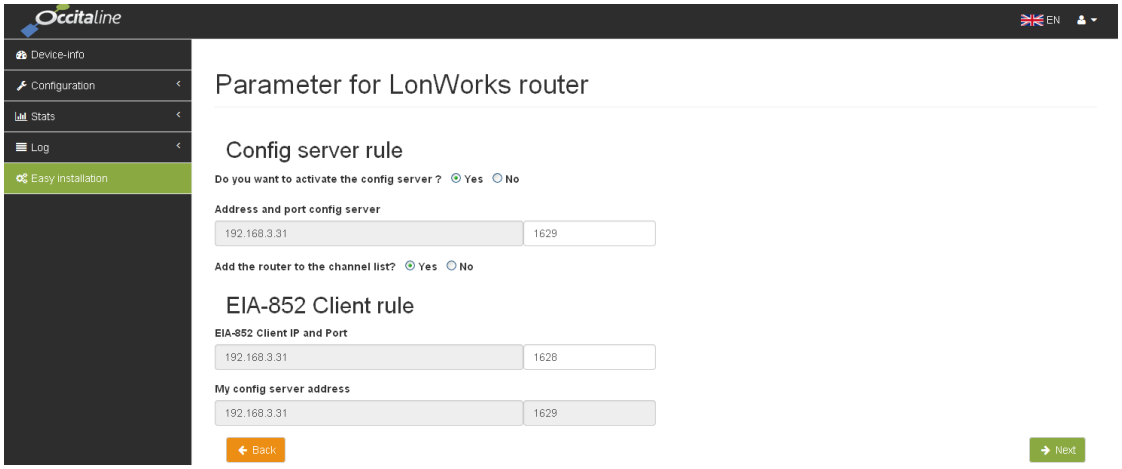


Figure 21
EIA-852 setting with Config Server and adding router to the Channel IP

In case of "Config Server" enabled, the router can automatically be added to its list of members and you can no longer enter the address of the "Config Server".

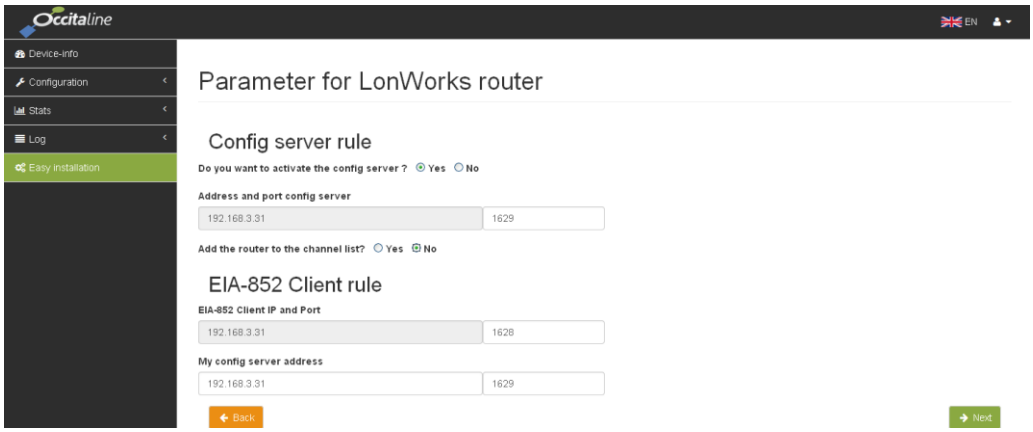


Figure 22
EIA-852 setting with Config Server WITOUT adding router to the Channel IP

If you do not want to add the router to the members of Channel IP managed by this router, you must enter the address of its "Server Config".

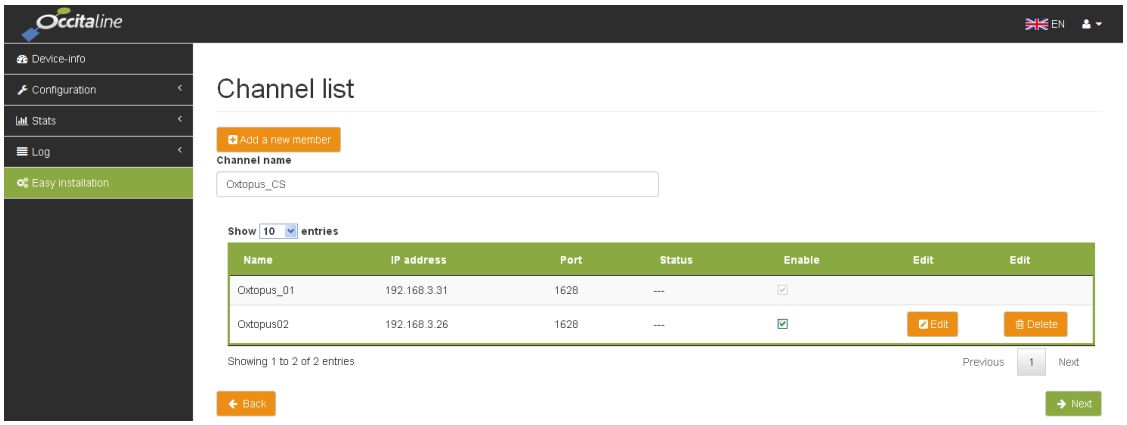


Figure 23
Member list of the Channel IP

On the first time on this page, if you have checked the checkbox "Adding the router to the members", only the router is added. In this case, the first line shows the router's name and IP address. The edit and delete buttons are not available.

3.8 Modbus configuration

This page defines the communication port used by the Modbus IP Server (default 502). The protocol is TCP / IP.

A field also sets a rerouted slave address to get Modbus ports and EIA-709.1 statistics of routers's Neuron Chip.

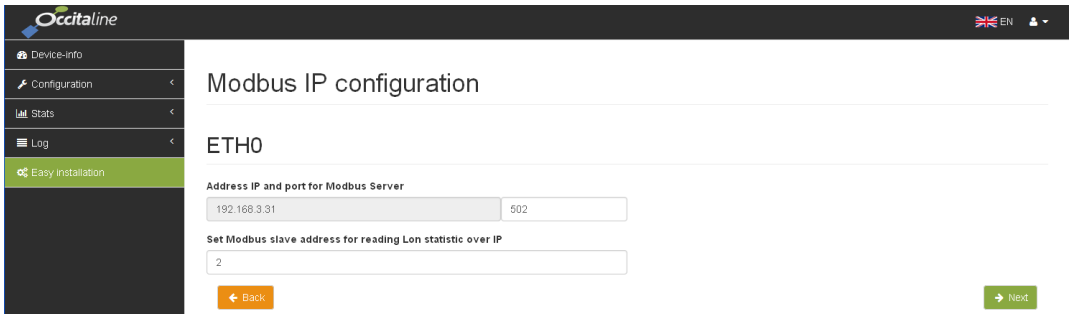


Figure 24
Server Modbus IP setting

If the router is equipped with EIA-485 port for Modbus, for each port you can configure speed, parity, stop bits and size.

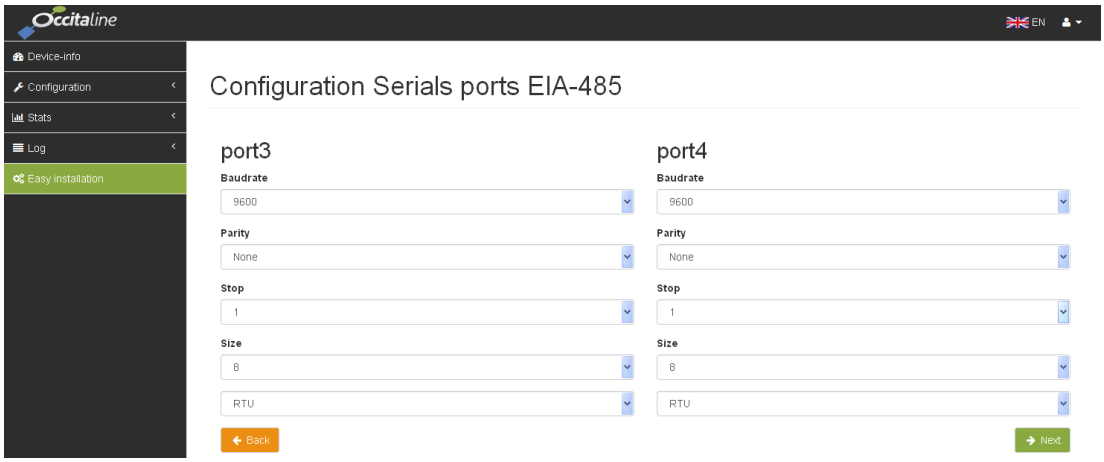


Figure 25
Serial ports EIA-485 setting

The source address is the address requested by Modbus Client on IP. The port is the line that will be sent. The request destination address is the real slave address of the device connected on line.

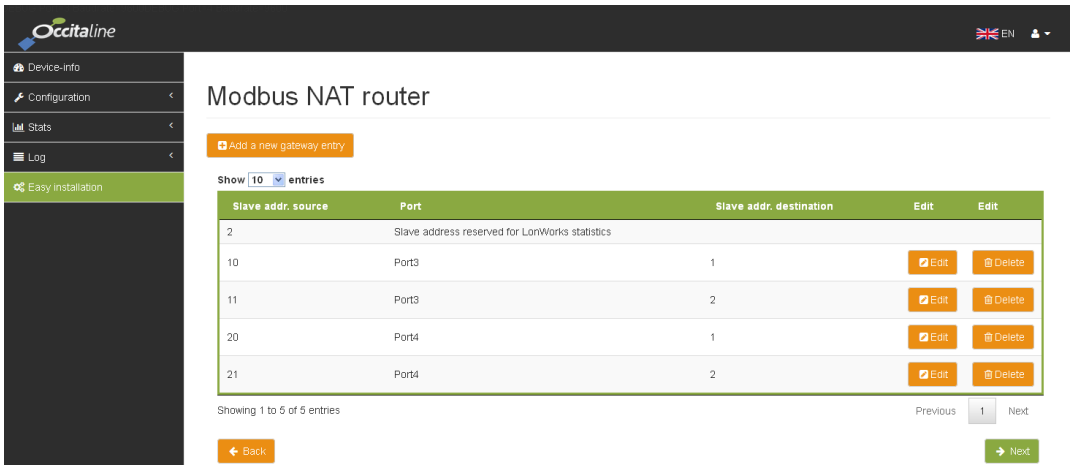


Figure 26
Translation address table for Modbus

3.9 Confirm and reboot

This page will record into the router all parameters entered by the user.

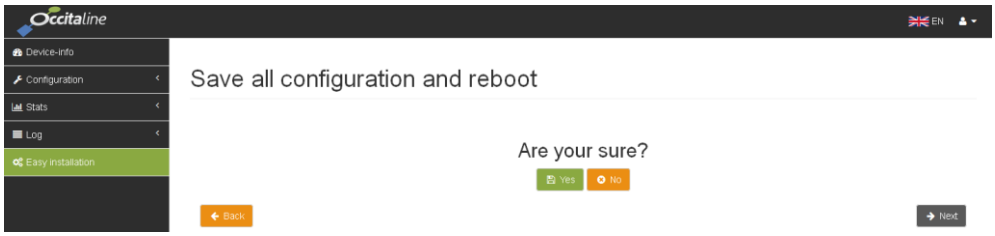


Figure 27
Validation du Wizard

The values will be used after the reboot or by turning off / on the router.

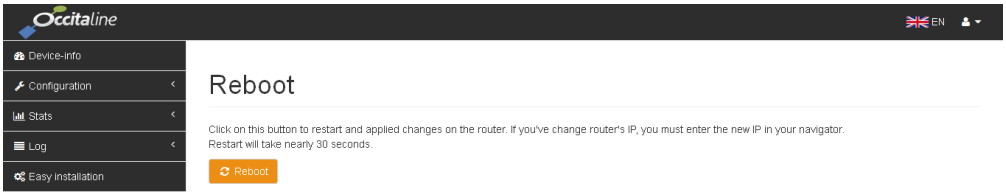


Figure 28
Router reboot

After validation, wait for 15 to 20 seconds for restart.

If you changed the IP address, the browser cannot find the router. You may need to change the address of your PC to be in the same subnet and enter the new router IP address to find its home page.

4 Details settings

4.1 Resizable page to the screen device

The Web site is automatically adapted to the device that consults.

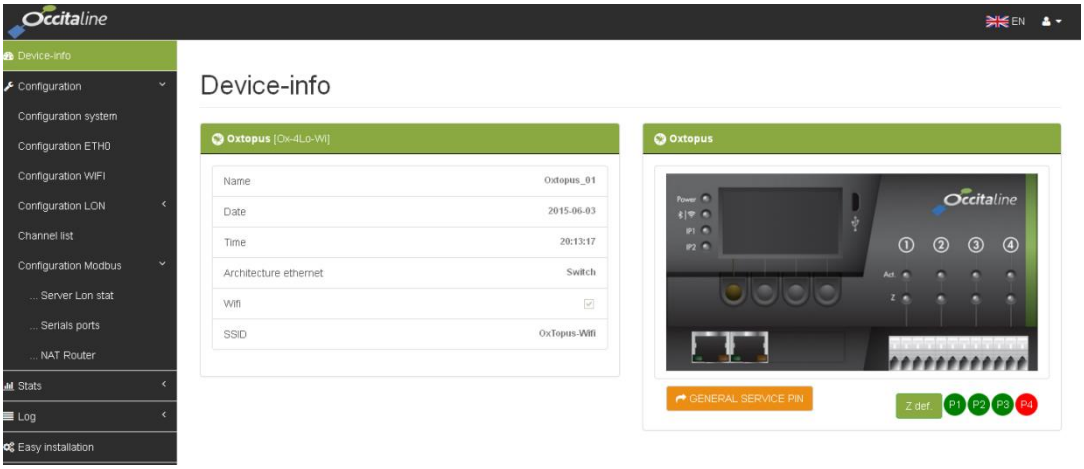


Figure 29
Home page on computer

When the device menu width no longer fits to the left, it is reduced and can be opened by the top right button.

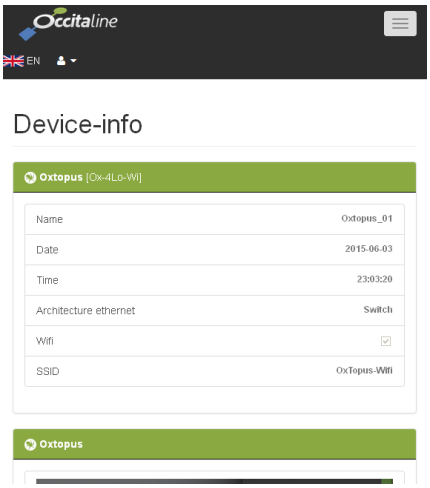


Figure 30
Home page on tablet in portrait

4.2 Home page

The home page displays the router's condition: configuration, impedance mismatches, sending services pin of each EIA-709.1 ports.

This page is not protected by password.

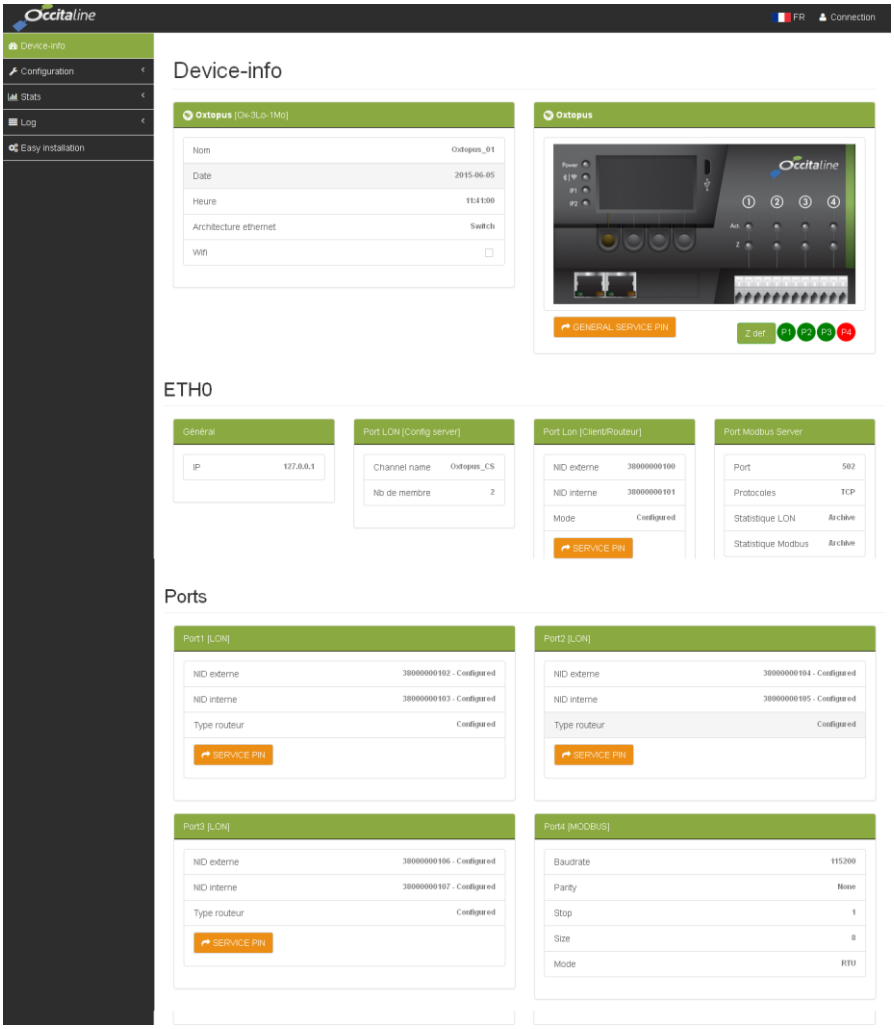


Figure 31
Complete home page

Several panels are displayed according to the reference product.

4.2.1 Device info

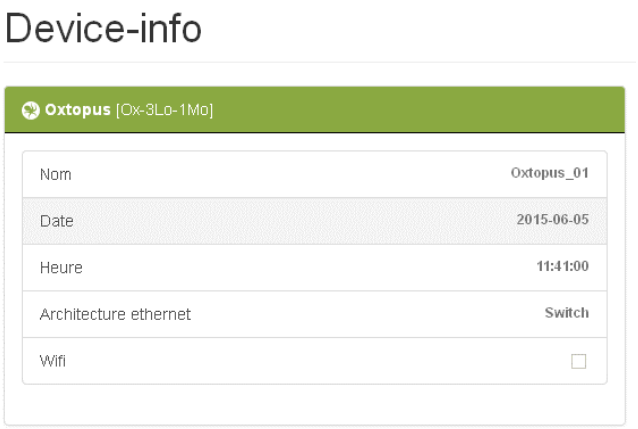


Figure 32
General Information

Reference of the product is shown in banner title.

Nom	This is the name of the router that is found among others on the LCD.
Date/Time	This is the current time of the router. It is used for log errors and statistics.
Architecture	It is the use of the two RJ45 connectors for Eth0 Eth1. The current mode is "Ethernet switch."
Wifi	indicates if WiFi is active or No.
SSID	When WiFi is active, this is the name of the visible WiFi access in devices used for connection.

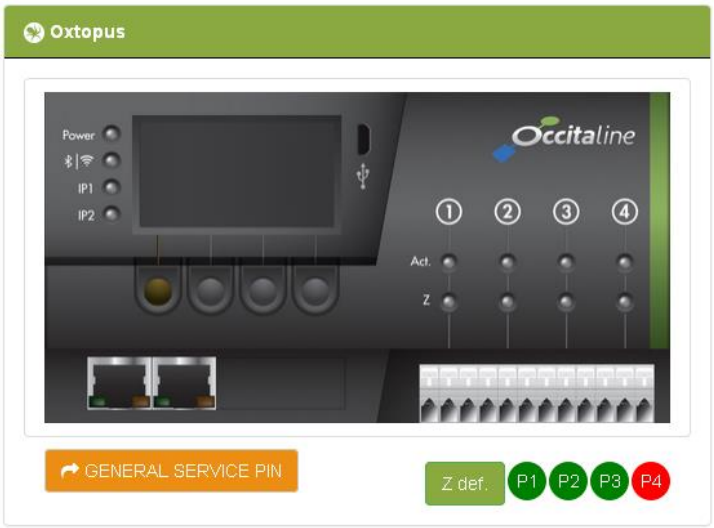


Figure 33
Oxtopus router

Under the image, the button “GENERAL SERVICE PIN” sends the service pin of all ports simultaneously. Red or green circles at the bottom right indicates the ports fault impedance on each line.

4.2.2 Ethernet chapter

Chapter Eth0 indicates all services provided by the router via Ethernet

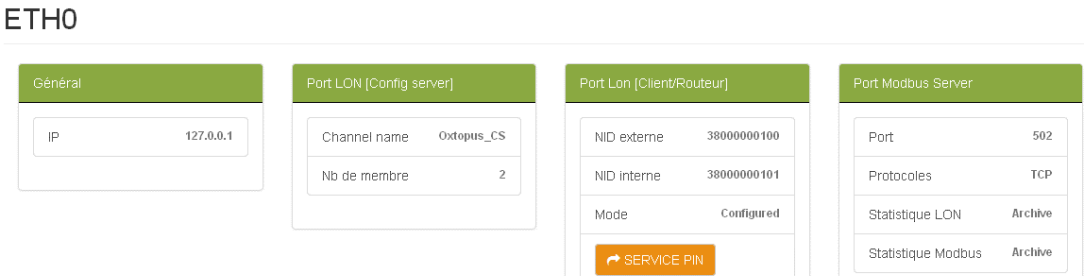


Figure 34
General services on IP

4.2.2.1 General panel

IP — IP address of router.

4.2.2.2 Config Server panel

Channel name — This is the name of channel IP for rule « Config Server ». This name is only used by the user. He has no rule in the protocol.

Nb member — Number of members declared in channel list.

4.2.2.3 Router EIA-852 Client panel

NID extern — Neuron Id on router EIA-709 IP side.

NID intern — Neuron Id on IP router internal side.

Mode — Routing mode EIA-709. (Configured, Repeater, Learning,...)

4.2.2.4 Modbus server IP panel

Port — Communication port for Modbus IP server.

Protocol — TCP: IP Protocol used for Modbus IP server.

Stat Lon — Indicates logs router EIA-709 statistics to view them graphically.

Stat Modbus — Indicates Modbus Router logs Modbus statistics to view them.

4.2.2.5 BACnet IP panel

BACnet routers have an additional inset screen :

Figure 35 BACnet IP general information

Port	BACnet IP communication port
Device ID	« Device Object » BACnet. identifier
Device name	Name of the BACnet object as entered by the user.
BACnet/IP network	BACNet IP « Network » number. All routers on the same BACnet / IP network must have the same network.

4.2.3 Ports chapter

In accordance with the reference product, the ports used are from 1 to 4. Each of them can be supplied for use in EIA-709 or Modbus.

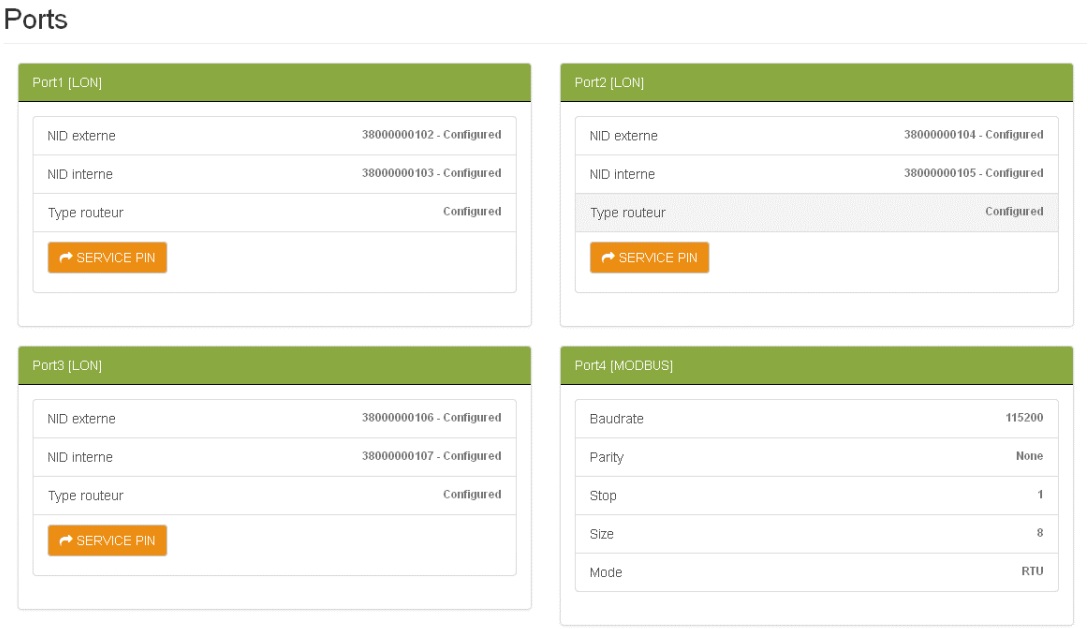


Figure 36
General on ports

4.2.3.1 EIA-709 port

NID external	External Neuron Id of router.
NID internal	Internal Neuron Id of router.
Type router	Routing mode choosen by your manager tool.

4.2.3.2 Modbus port

Baudrate	Speed of serial port.
Parity	Parity of serial port.
Stop	Number of stop bit for serial port.
Size	Size of each word for serial port (Modbus 8 bits).
Mode	Mode usage of serial port in Modbus « RTU »

4.2.3.3 BACnet MSTP port

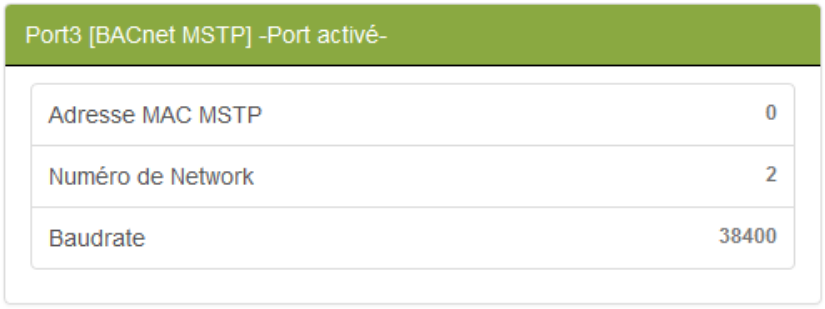


Figure 37 BACnet MSTP general information

MAC MSTP Address	BACnet MS/TP port MAC Address
Network	Network number MS / TP. Must be unique for each MS / TP port.
Parity	Configuring the parity of the words of the serial communication.

4.3 Menus

Menus are displayed on the left with a sufficient width terminal. If the width does not allow it, they fold out with the top right button. We find:

Device info	Home page
Configuration	Organized in system, Ethernet, Wifi, EIA-709.1 and Modbus
Stats	Graphical statistics
Log	Logs of communication and error
Easy Installation	The wizard

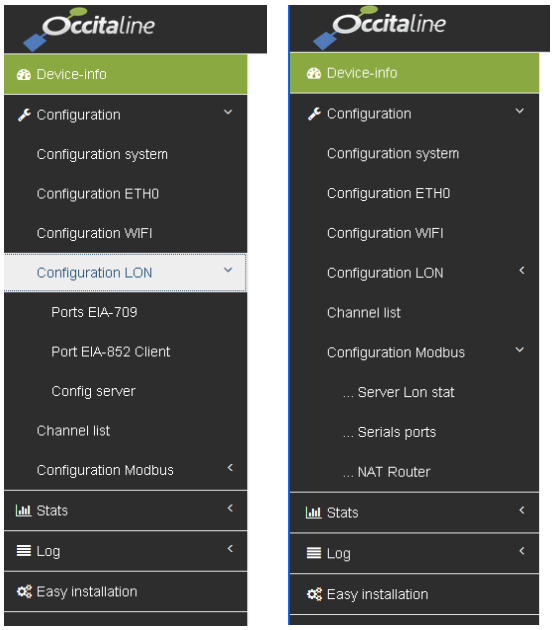


Figure 38
Menus example

4.4 Login page

When access to a configuration menu, if the user is not logged in, a login page is proposed. It is also possible to call this page from the top right menu: "Connection." The account is "**admin**" password is "**oxpass**".

Figure 39 identification page

4.5 User modification account

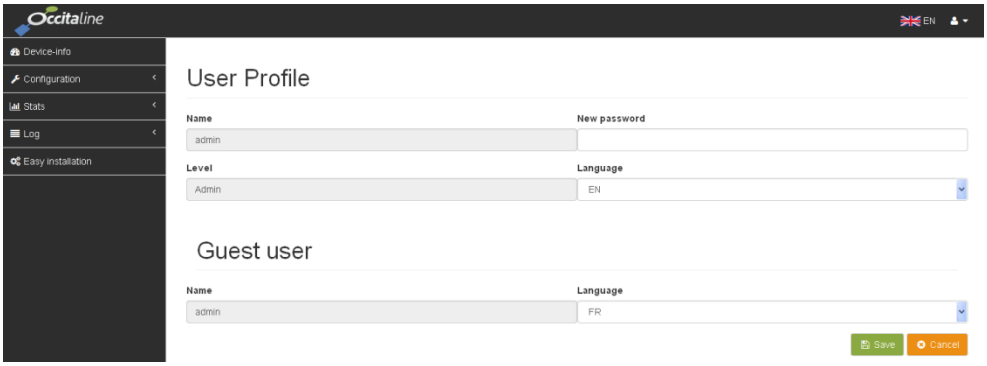


Figure 40
User modification page

With this page, the user can change his password and his language used after connection.

The language for « guest user» modifies the default language for not logged users.

4.6 Reboot page

This page will log into the router all the parameters entered by the user.

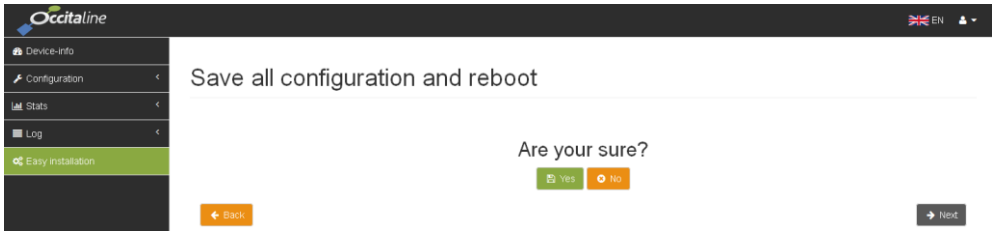


Figure 41
Wizard confirmation

The values will take effect after the reboot page or by turning off / on the router. After validating this page, you need to wait 15 to 20 seconds to reboot.

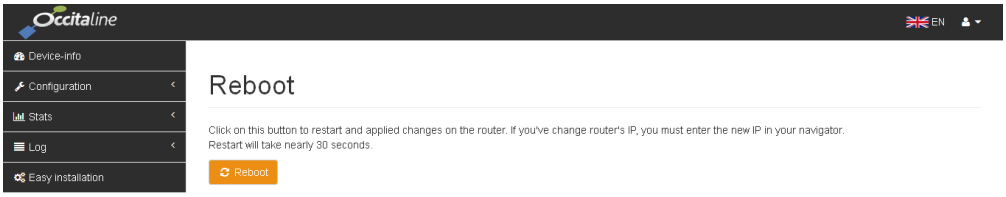


Figure 42
Router reboot

If you changed the IP address, the browser cannot find the router. You may need to change the address of your computer in same subnet and enter the new router IP address to find its home page.

4.7 System configuration

This page allows you to change the router's name, date and time.

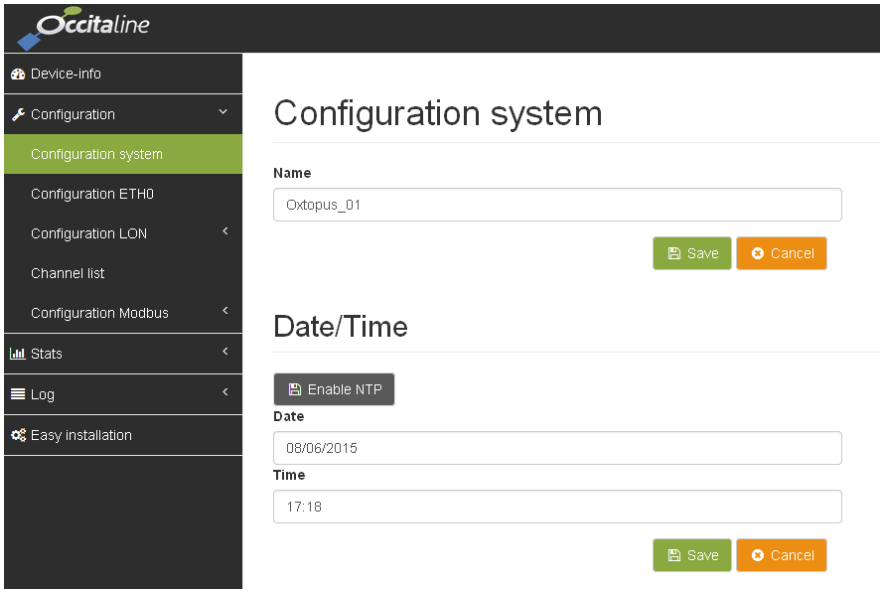


Figure 43
Configuration system

4.8 Configuration

This page allows to select the router's addressing mode. Either the IP address is dynamically assigned on the network by a DHCP server or it is manually assigned and called "static IP" address.

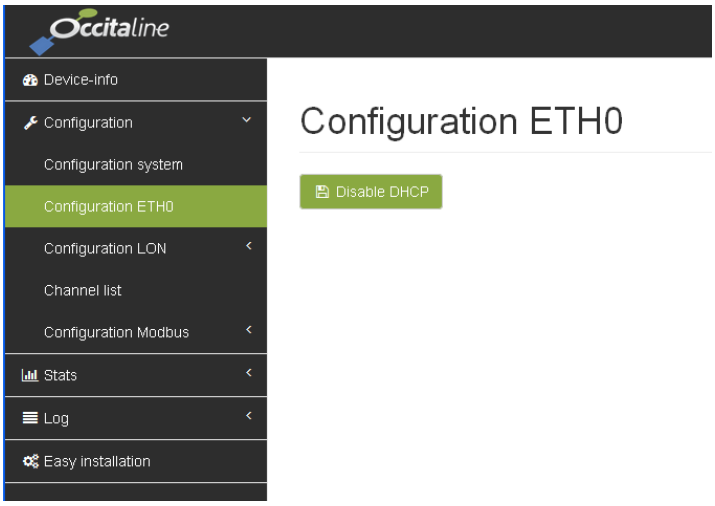


Figure 44
ETH0 configuration with DHCP

☞ All modification of IP address takes effect after reboot.

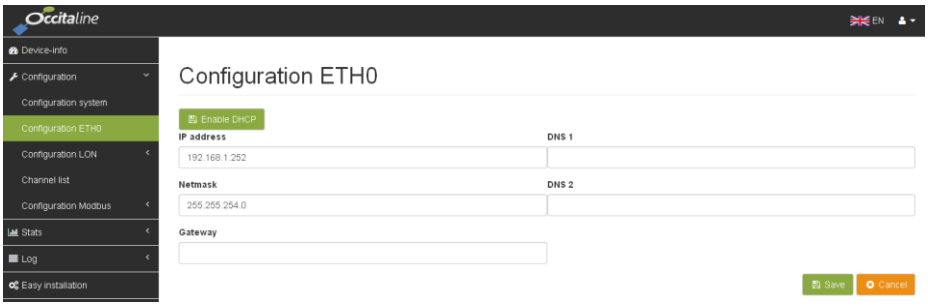


Figure 45
Configuration ETH0 with fixed IP

4.9 Port EIA-709

This page serves only to display the configuration of the EIA-709 router ports.

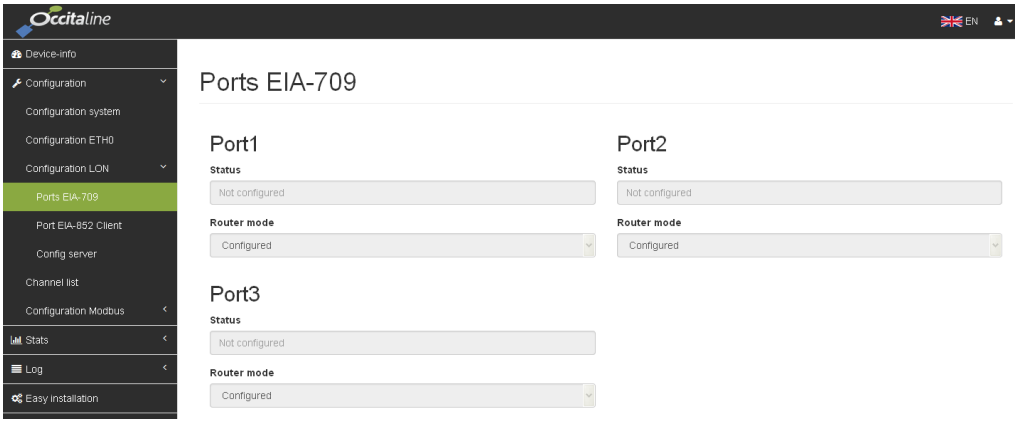


Figure 46
Configuration des ports EIA-709

4.10 Port EIA-852 Client

This page allows you to change the communication port for data exchange in EIA-852 Client (1628 by default) and the IP address and port (1629 by default) for the config server.

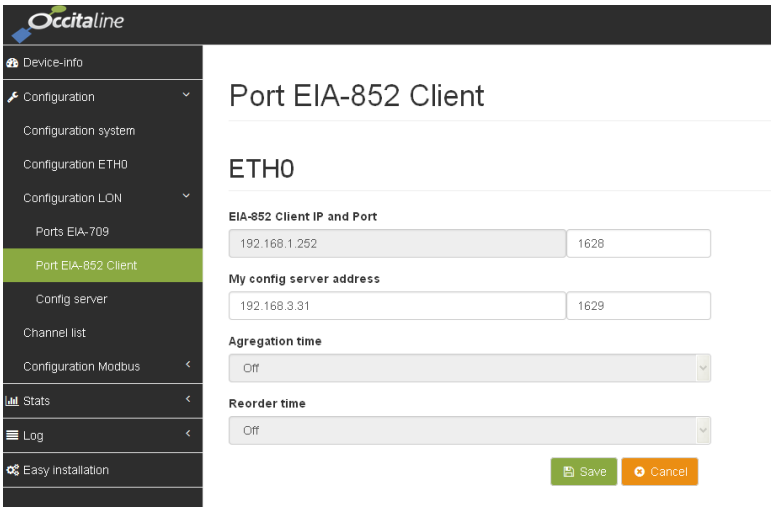


Figure 47
EIA-852 client configuration

Its config server is not necessarily the router itself. That may be another router or a computer. It will specify the IP address and port used for this function.

☞ An EIA-852 port that has no config server cannot know the member with which he must share data. The network will not work.

☞ There can be only one "config server" EIA-852 client

4.11 The config server

The router is delivered with the Config Server disabled. To enable and configure it, just click the button. "**Enable the config server**."

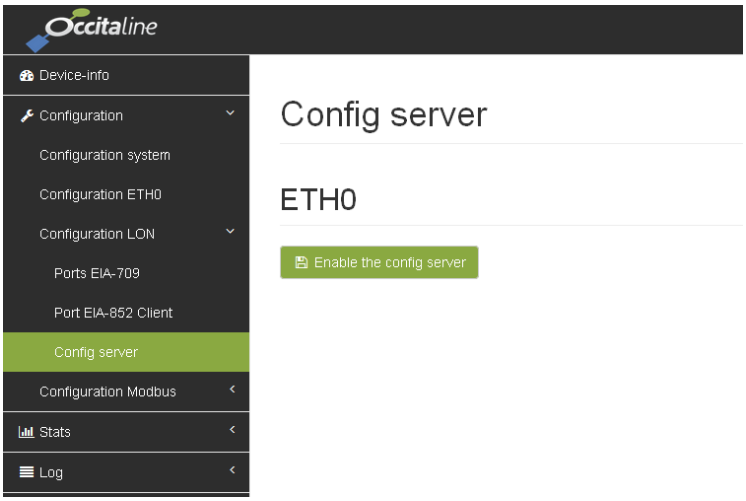


Figure 48
Config server disable

The IP address of the config server is IP address of the router itself. The port can be changed. The default value is 1629.

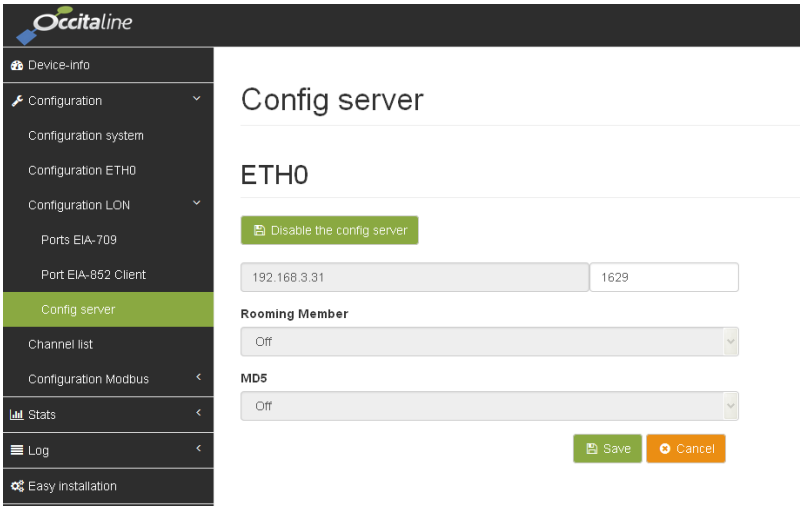


Figure 49
Config server activated

4.12Channel list

This page allows adding, removing, enabling, exporting, importing and test members of IP channel. All members of the list are likely to share data. They will be installed in one or more LNS databases.

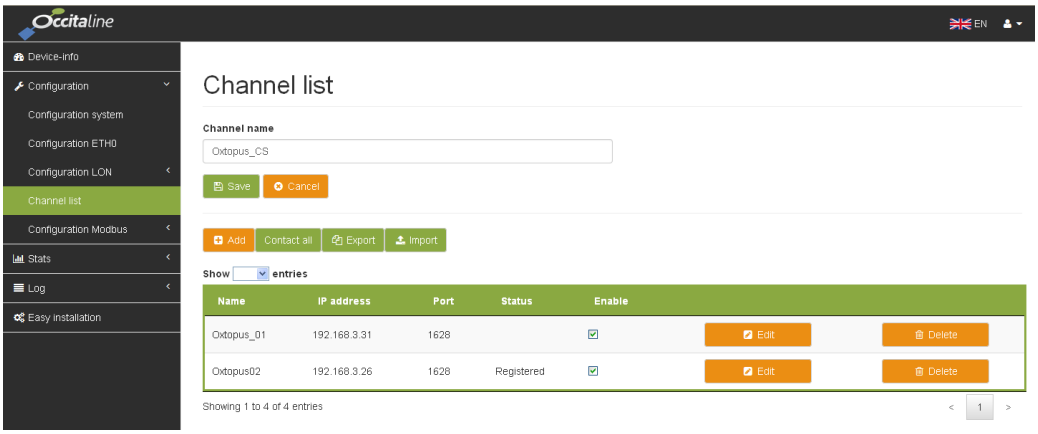


Figure 50
Liste des membres du Channel

The role of the Config Server is like a "virtual electrician" that will connect all devices on the same wired network.

4.13 Modbus server Stat EIA-709 configuration

This page provides the Modbus slave address to query the router on the statistics of external Neuron Chip of routers, status and Modbus Serial ports as impedance.

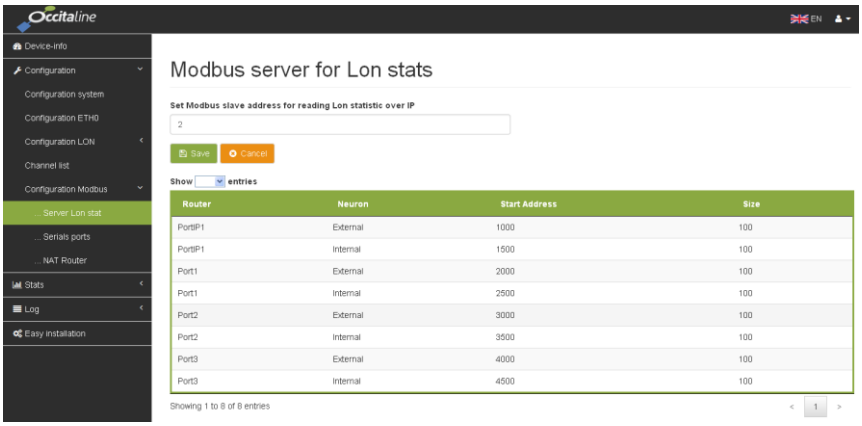


Figure 51
Configuration of slave address for statistics.

Each Neuron Chip has a base address and each counter is set to a 16-bit word.

The reading is done by a read command on an "Input Register" Modbus.

4.14 Modbus serial Ports configuration

This page allows to change all the serial parameters for Modbus serial ports

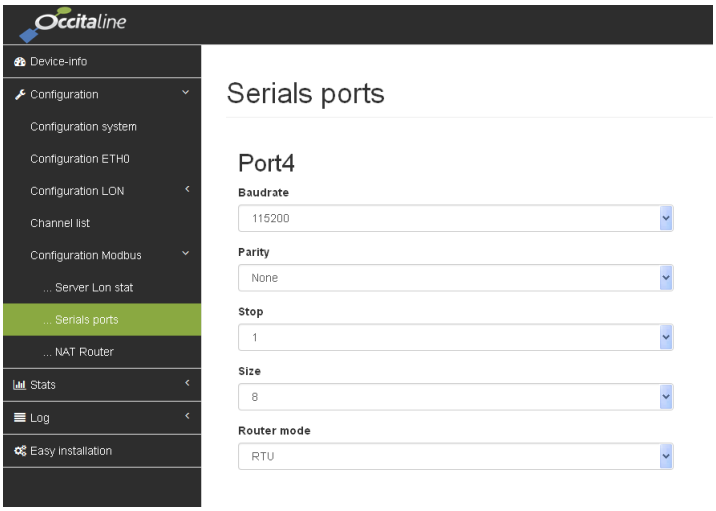


Figure 52
ModBus serial port configuration

4.15 Modbus NAT router configuration

This page allows to add, delete, edit, export and import translations Modbus Source slave address to a destination slave address on a serial port to join device.

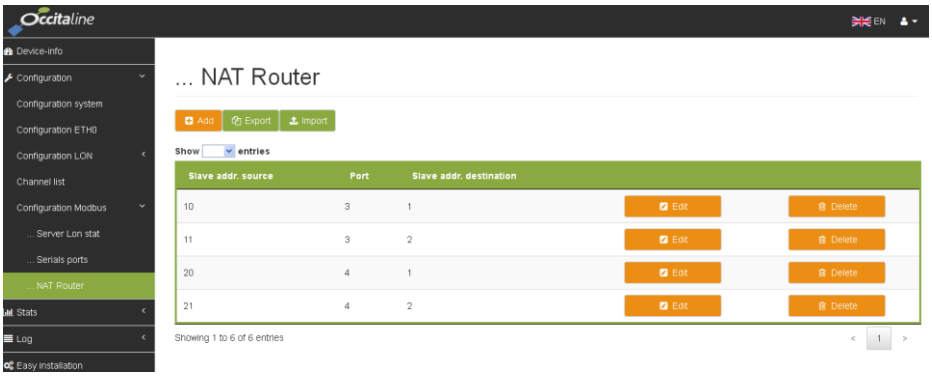


Figure 53
Router NAT Modbus configuration

To each source slave address matches a serial port and a destination slave address on that port. This table allows to use the same destination slave addresses on all serial ports.

4.16 BACnet Configuration

4.16.1 Device and BACnet IP

Figure 54 Configuring the BACnet IP and BACnet Device Object

This page allows you to configure the parameters described below:

Parameter	Default value	Description
BACnet/IP UDP port	47808 (BAC0)	BACnet UDP Port. All BACnet modules on the same network must have the same port.
BACnet/IP network	1	Can take a value from 1 to 65534. Represents the "network" number associated with the IP channel. All routers in the same network must have the same Network IP number.
Name	Ox-BAC-RT-IP/MSTP	Router name. This name will be visible through the BACnet network.
Device ID	152000	Unique identification number of the module on the BACnet network. WARNING, all routers come with a default ID of 152000. It's up to you to modify them. Each device on the network must have a unique ID.
Description	BACnet Router BACNet/IP and MSTP	Description associated with the BACnet router. This description will be visible through the BACnet network.

4.16.2 MSTP Ports

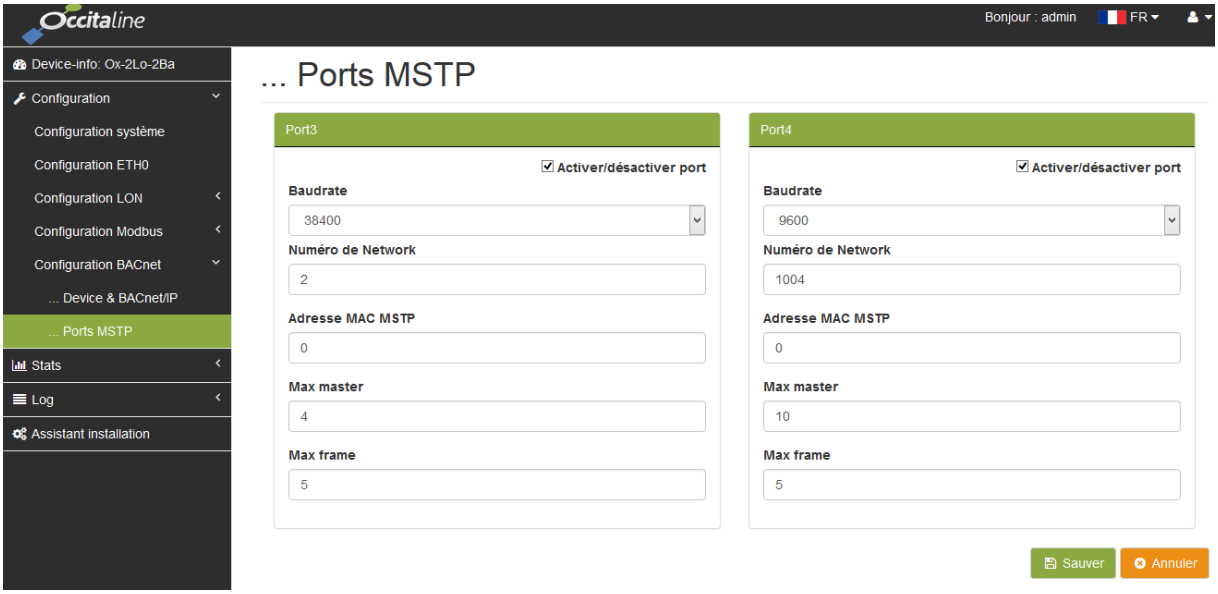


Figure 55 Configuring the MSTP bus line on RS-485

Parameter	Default value	Description
Baudrate	38400	MS / TP communication speed. All modules on the same MS / TP bus must have the same communication speed.
Network number	« 100x » , avec x numéro du port BACnet.	Can take a value from 1 to 65534. Represents the "network" number associated with the MS / TP channel. The Network number must be unique for each MS / TP bus.
MAC MS/TP	0	Allowable values range from 0 to 127. MAC address of the MS / TP port of the router. Must be unique on the bus.
Max master	127	Allowable values range from 0 to 127. Must be equal to the largest MAC address number accessible on the MS / TP port. Setting this parameter will improve the performance of your network.
Max frame	10	Allowable values range from 0 to 100. Specifies the maximum number of frames that the router can send on the MS / TP before passing the Token. Too high value can reduce the performance of your network.

5 LON Scheduler

5.1 Overview

Since the LON Scheduler is made up of several blocks, one BACnet the other in LON, it is necessary to set each of these blocks. In addition, the LON node must be added to the Config Server in order to connect to the "Channel IP". The LON Node will also need to be installed in the database via NL220 or equivalent. The steps for configuring and installing the LON node are described in this chapter.

The "Scheduler LON" node is embedded in the Oxtopus but is unlinked from the LON router These are two separate applications, equivalent to two nodes present on the Oxtopus. The router AND the LON scheduler must therefore be installed via NL220 or equivalent.

5.2 The home page

When the Scheduler option is active in the Oxtopus router, an additional line appears on the cover page indicating elements related to the BACnet and LonWorks part.

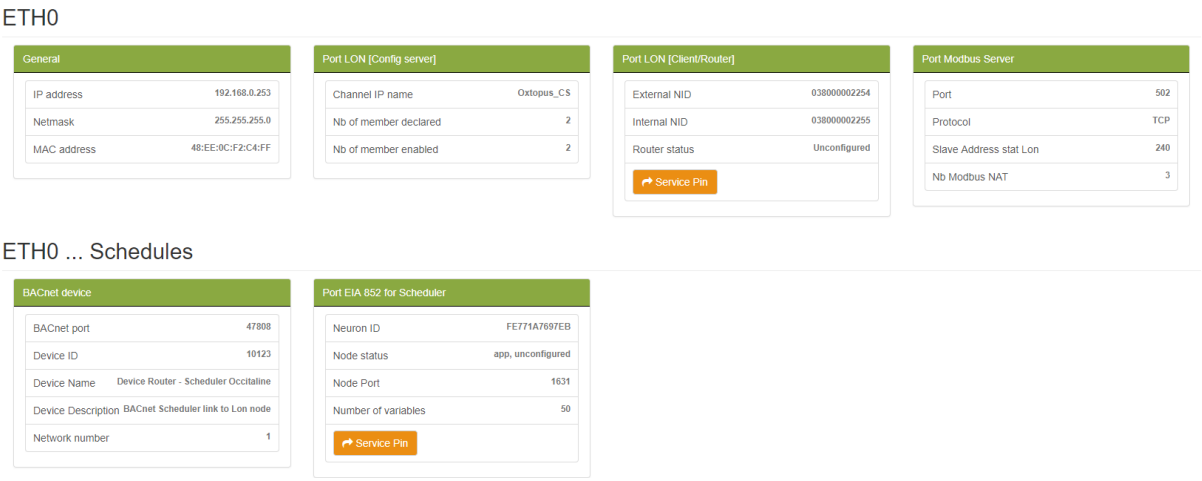


Figure 56 Scheduler home page

The Pin service button is available on the cover page, as for the router.

5.3 Configuration

5.3.1 Scheduler menu

When the Scheduler option is active in the Oxtopus router, three menu appears onto the left side

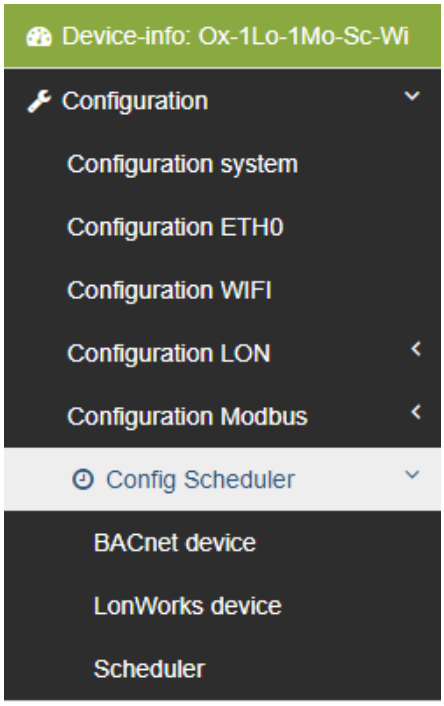


Figure 57 Scheduler menu

BACnet Device BACnet scheduler configuration.

LonWorks Device LonWorks scheduler configuration.

Scheduler Assign the values of the network variables according to the enumeration value.

5.3.2 LonWorks configuration

5.3.2.1 LonWorks device menu

The LonWorks configuration page allows you to view the state of the node, its physical and logical addresses.

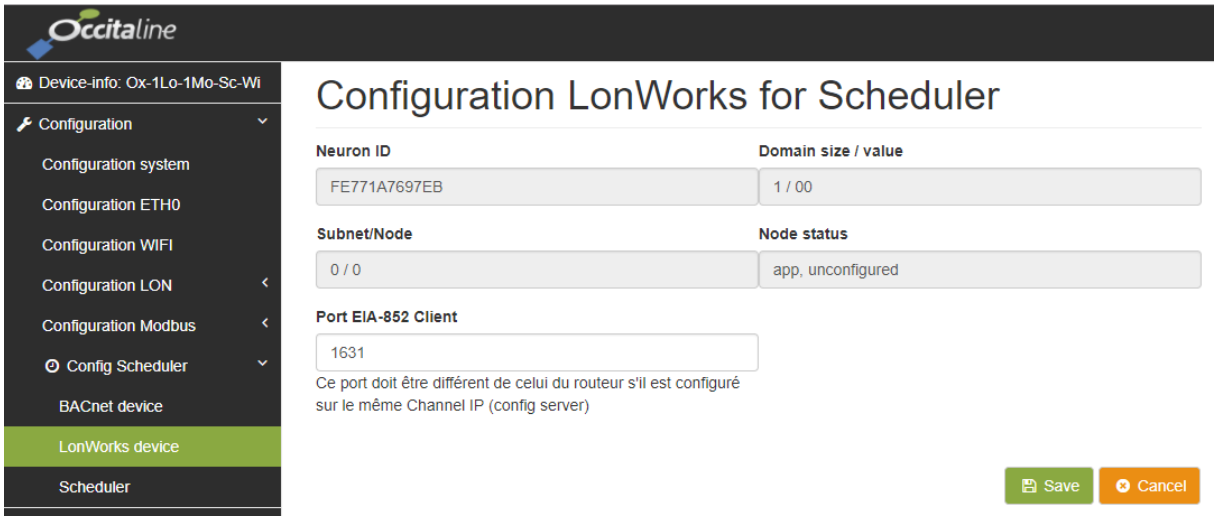


Figure 58 LonWorks configuration page

It is possible to modify the communication port of the LonWorks Scheduler node. This must be different from the communication port of the router. If the router and the node scheduler are in the same "Config Server", it is imperative to inform the two elements with the same IP address and their respective ports.

5.3.3 BACnet configuration

5.3.3.1 Device BACnet menu

Any BACnet device must have a “Device” object. The identifier of this device, or "device ID" must be unique in the BACnet project. Device ID settings are done by the website page.

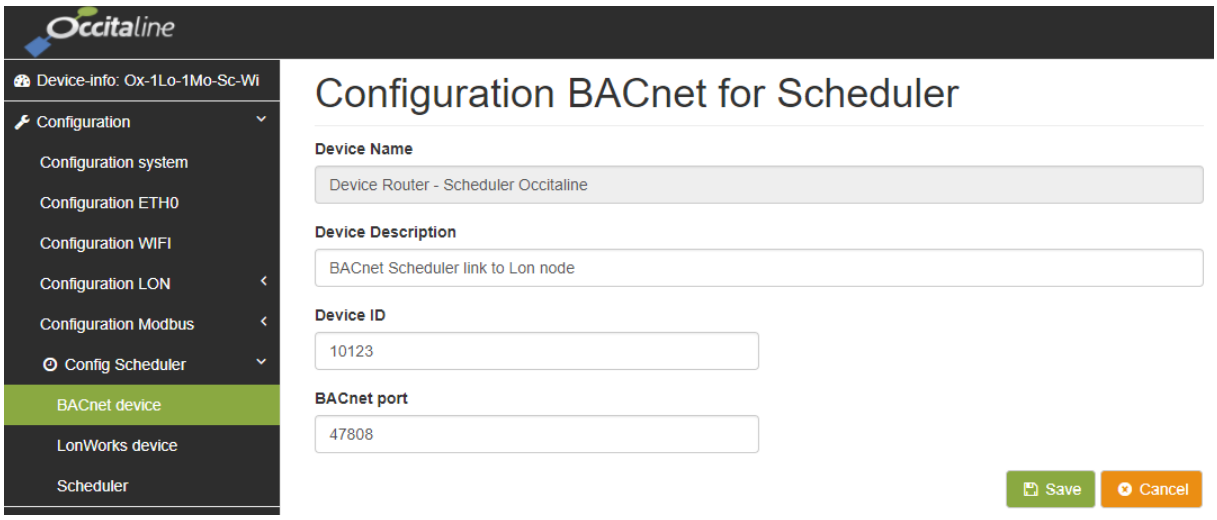


Figure 59 BACnet properties configuration page

You can change the description of the Device BACnet object, its logical address in the project and the communication port. The default port in BACnet is 47808.

5.3.3.2 Network variable values, label and Enumeration

Each scheduler is associated with an object of type "multi-state-output".This object allows the association to a label a value to create an enumeration. Each multi-state-output can contain 5 enumerations by default.

The enumeration name allow you to give a name of each set of value.

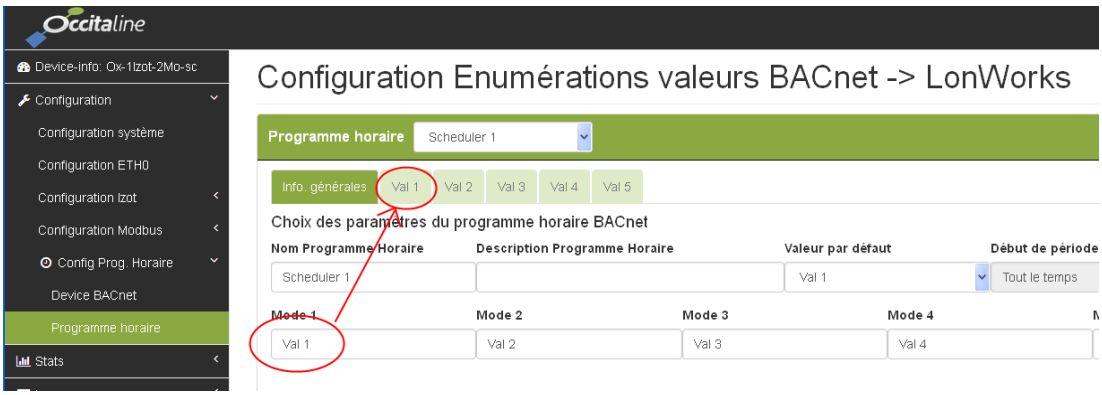


Figure 60
Enumeration name

The Shedule name allow you to give a specific name to your BACnet scheduler object, to find it in the list and in your BACnet browser.

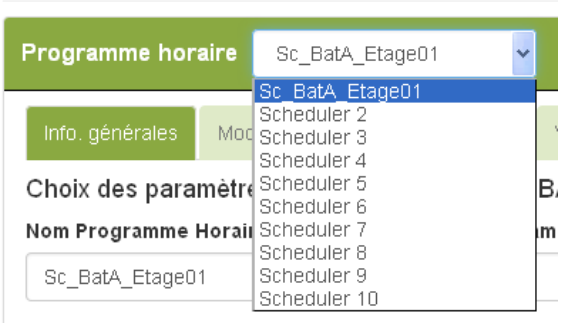


Figure 61
Schedule name

Each enumeration of each schedule object can individually be configured.

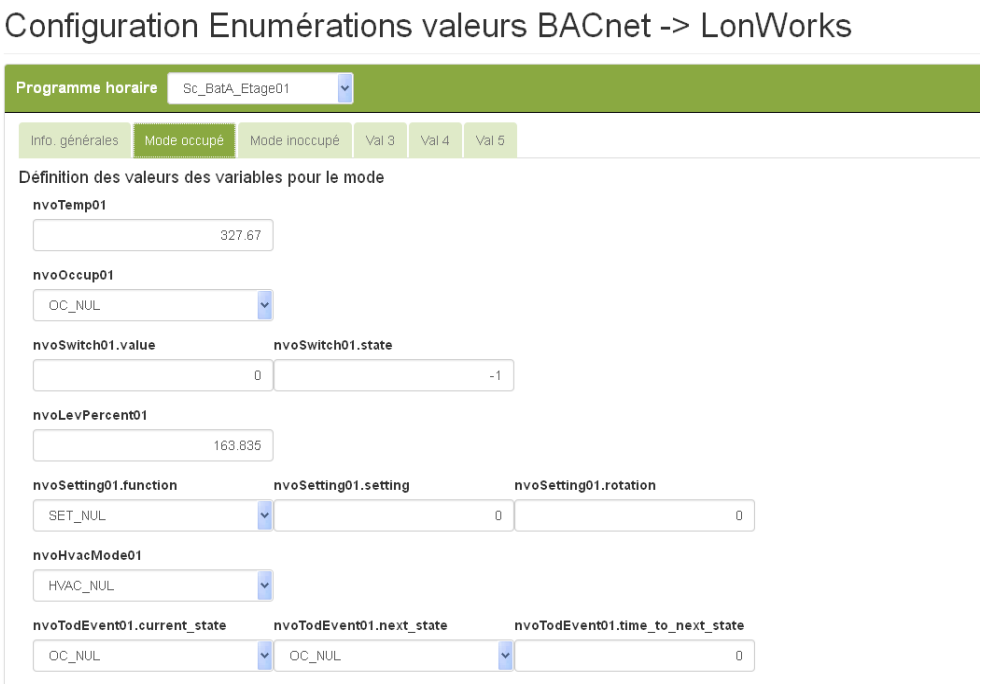


Figure 62
LonWorks value settings for enumeration named: Mode Occupé

5.3.3.3 Configuration of the time program and the exceptions

Once correctly set, via a BACnet explorer you can view and configure your time programs.

All time program configurations can be done directly via BACnet.

An example is shown below for which we use the Inneasoft BACnetExplorer (http://www.inneasoft.com/index.php/fr/produits/bacnet-protocole/bacnet-explorateur).

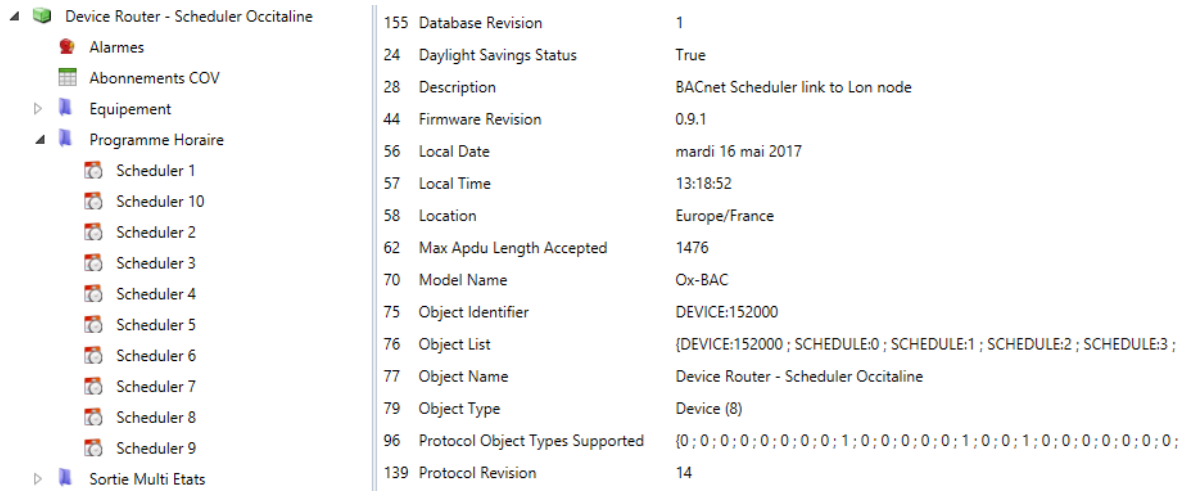


Figure 63
Occitaline Scheduler overview from the explorer

Create your schedule according to the enumerations previously configured in section 5.3.3.2

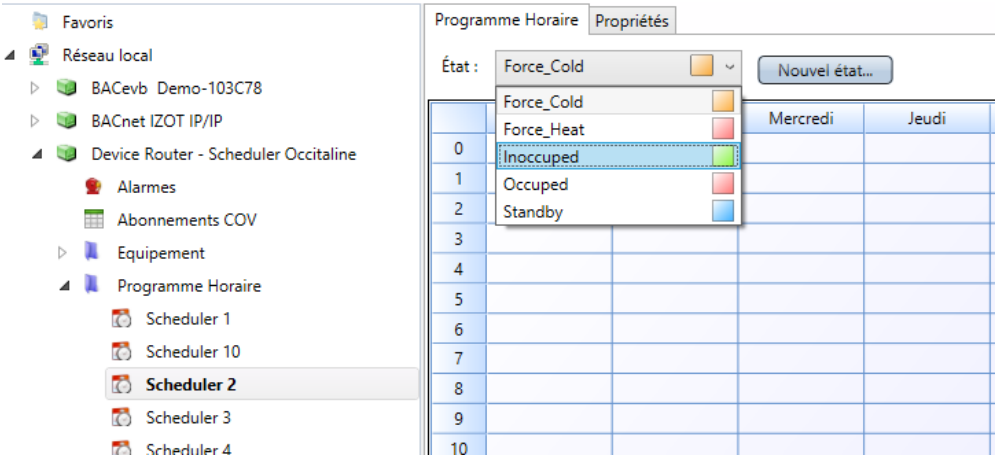


Figure 64
Enumerations previously configured

Figure 65
Time program example

In the same way, exceptions can be created / edited / deleted directly through the BACnet.

Writing to the multi-state output “present-value” will force the state and enumerated values will be immediately reflected on the LonWorks outputs.

5.3.4 LON node installation

The LON node "Scheduler" is a LON / IP node. It is therefore mandatory to register it on the config server of the IP channel. The server configuration can be the router itself or any other device that supports the server configuration function. By default, the LON Scheduler node is on port 1630. It is with this port number that you must register the node on the server configuration.

5.3.5 Installing template files

The files "OX-SCHED01.XFB", "OX-SCHED01.xfo", "OX-SCHED01.xif" downloadable from our website and "spidData.xml" are downloadable from our lonmark.org.

The file "spidData.xml" must to be copied, according to OS, into the directory:

- **C:\Program Files (x86)\LonWorks\Types** for **64bits** or
  C:\LonWorks\Types for 32 bits
- And in the case of the use of NL220, **C:\Program Files (x86)\Newron System\NL220\Bin**

The files "OX-SCHED01.XFB", "OX-SCHED01.xfo", "OX-SCHED01.xif" are to be copied, according to OS, into the directory:

- **C:\Program Files (x86)\LonWorks\import\Occitaline** or
- **C:\LonWorks\Import\Occitaline**

If the Occitaline directory folder does not exist, create it.

5.3.6 Adding the LON scheduler to an Oxtopus config server

The LON scheduler node is added like any other node. Be careful though, port 1628 (LON default port) is already used for the router. **The LON Scheduler is declared on port 1630.**

Log on to the website. Via the menu, select "Configuration", "LON Configuration", "Channel list".

On the page that appears, click on the button

which opens you a pop-up. Fill in the fields and validate.

Figure 66
Added a LON Scheduler to the channel list.

The server configuration then contacts the node and exchanges the channel information with it. When the exchanges are completed, the node must appear "Registered" in the list.

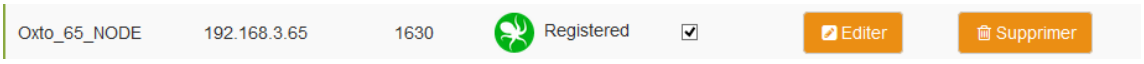


Figure 67
The LON Scheduler node correctly added to the channel list.

5.3.7 Installation in an LNS base with NL220

Create a node (here from the template) and name it.

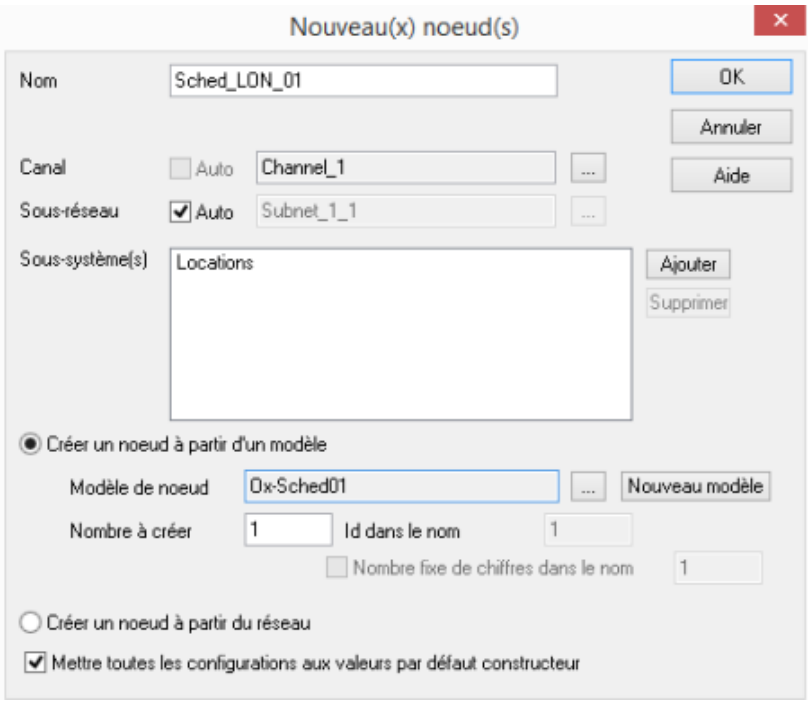


Figure 68
Create a node (here from the template) and name it.

Install the node. Select the node, right click, "Network" then click on "Install ..."

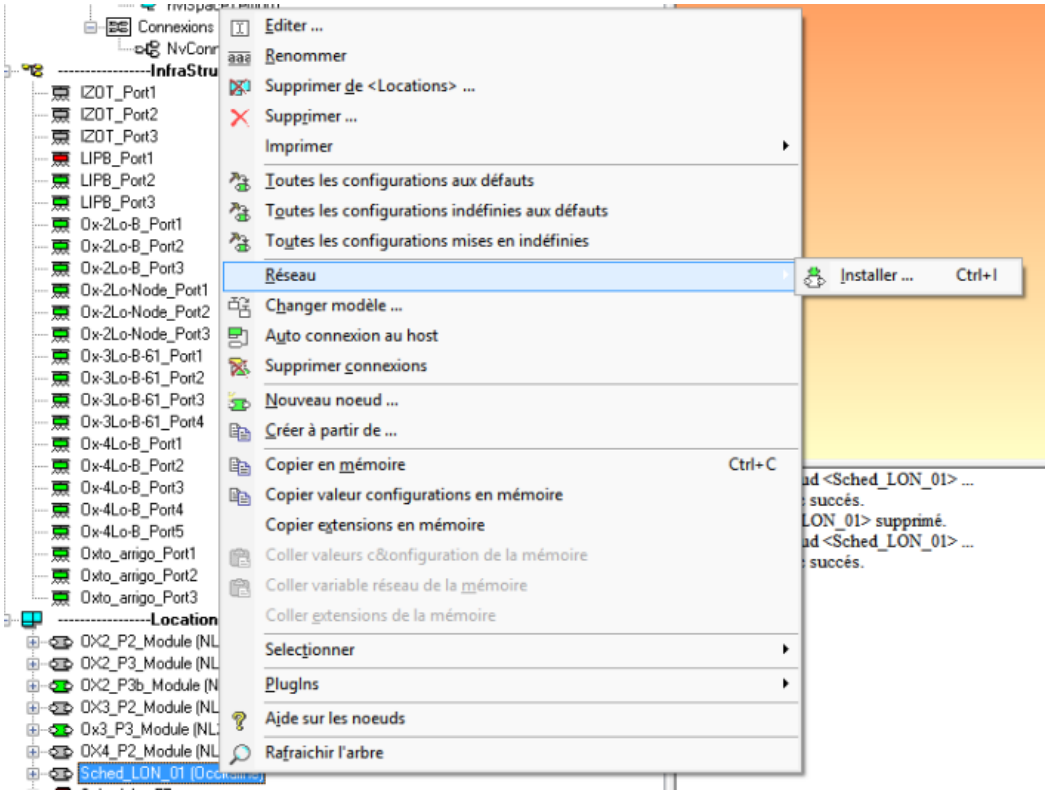


Figure 69 Node installation

The window that opens is waiting for a Neuron ID to continue. The Neuron ID is received directly from the network. To do this, connect to the Oxtopus website where the Scheduler is to be installed. On the LonWorks Node block, click on the SERVICE PIN button.

You must have received the PIN service on NL220, which has automatically filled the following window.

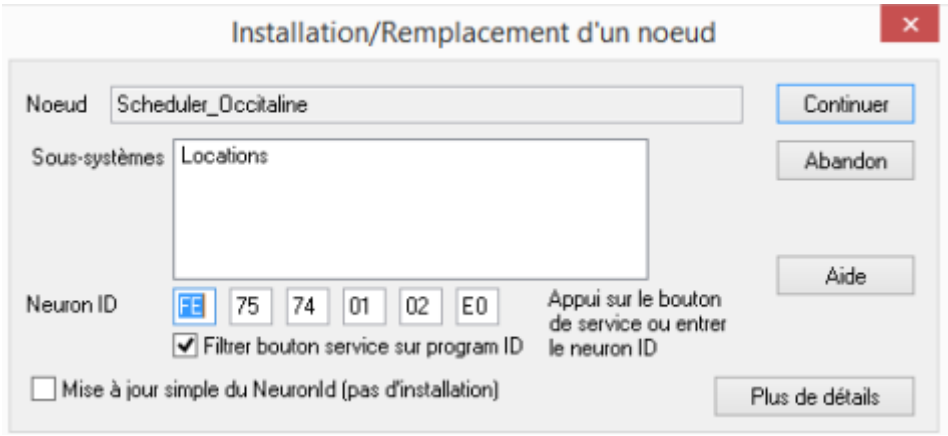


Figure 70
Node installation window

Click on "Continue".
Wait until the node is properly installed.

5.3.8 Binding

Scheduler takes advantage of LON bindings. "Bind" Scheduler nvo on the nvI of the modules you want to control. At each time zone change, the values are updated and automatically sent to their recipient (s).

The image below shows the installed node, its 5 functional blocks (ROOM_X), each with 5nvi / 5nvo.

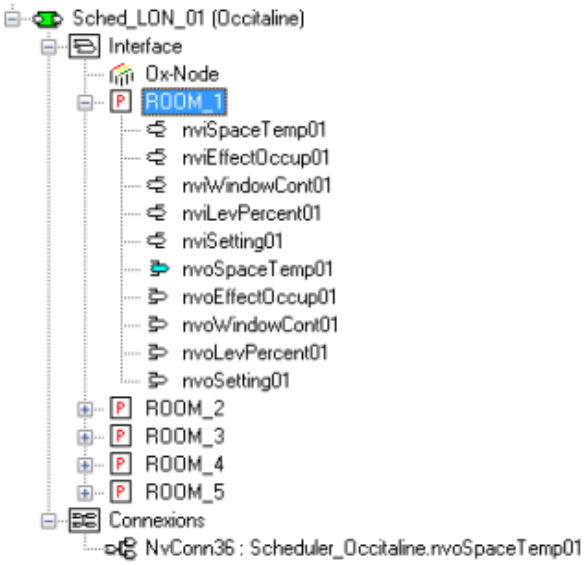


Figure 71
LON Scheduler Installed and Function Blocks

In the case of the image above, the nvoSpaceTemp01 is bound. As a reminder, the functional block is linked to scheduler 1 and 2 (for alternating summer / winter, see 1.5.4). On change of

time slot, the new value of nvoSpaceTemps01 will be automatically propagated to the nodes to which it is bound.

6 LON Switch mode

6.1 Overview

From version x.x.1.41, the Oxtopus router supports the « LON Switch » mode. The router can be configured to act as an EIA-709 network learning switch. In this operating mode, the router learns the network topology and decides if a message must be forwarded or not, based on the subnet/node destination address.

Advantage of this operating mode is that only plug&play and no router configuration nor installation is needed. Disadvantage is that this operating mode uses a lot of bandwidth and is not recommended for large network.

☞ In LON Switch mode, no installation by LNS is required and no configuration is needed except for IP.

☞ Only Subnet/Node addressed messages are filtered, all other type of messages are forwarded to all ports!

- The router can learn up to two domains. The LON Switch algorithm supports nodes of same subnet on multiple channels and keeps on tracking a node even if it has been moved.
- All messages received on an unknown domain are forwarded.
- All messages with an unlearned destination subnet/address are forwarded to all ports.
- In IP-852 mode, messages are forwarded using the Channel routing information. If channel routing is not provided by a node, messages will be forwarded which will increase bandwidth usage.

☞ We do not recommend the use of LON Switch mode on network with more than 10 IP-852 devices.

☞ In case of frequently frame losses or network instability, we grandly recommend the use of the standard configured mode (Router EIA-709)

In Lon Switch mode, the router doesn't support any request. It will not answer to any LON request. Service Pin are also disabled.

6.2 Lon Switch and IP Channel

On an IP channel, a router in Lon Switch mode is used the same way than a configured router. You **MUST** declare a configuration server, and each of your IP device **MUST** be added in its channel list.

For more details about configuration server, please see chapter **4.11 The config** server**.**

6.3 Enable Lon Switch mode

By default, the router is in configured mode. To enable Lon Switch mode, you must use the embedded website. Connect to your Oxtopus router and log in using “Connection” button.

Then select **“Update Software”** in the user menu.

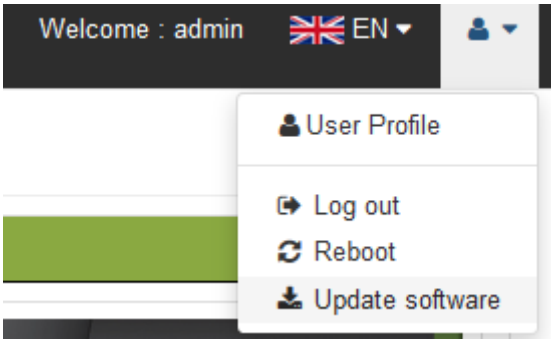


Figure 72
Access the change mode page

On the new displayed web page, you can select the router mode:

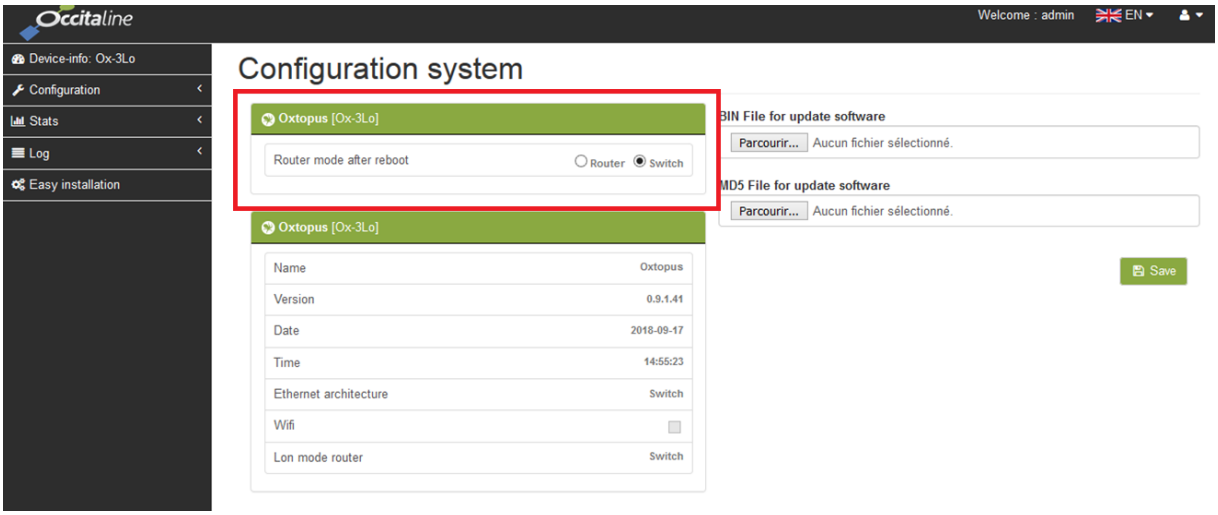


Figure 73
Oxtopus Router mode change

Restart the Oxtopus router using user menu **« Reboot ».** After restarting, the router will run in the selected mode.

☞ In Lon Switch mode, the home page is slightly different. Specific information of configured mode are not displayed.

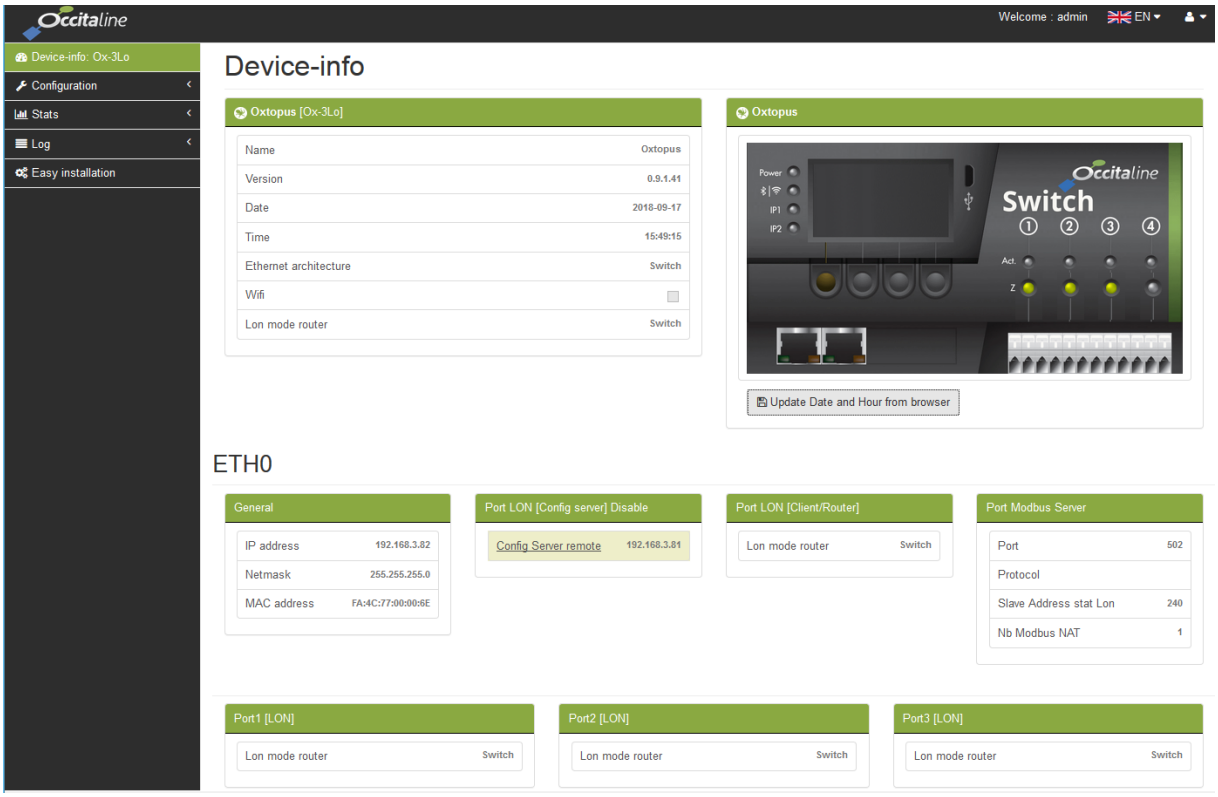


Figure 74
Home page in Lon Switch mode

6.4 Statistics and information

Some statistics are available using the menu "**Stats**". In Lon Switch mode, standards router statistics can always be seen, like the last hour of bandwidth use, neuron ID list received on each port, and Neuron Chip error counters.

In addition, in LON Switch mode, you can visualize the Lon Switch table, containing for each two domains, the Subnet and Nodes detected on each ports. This list can be accessed by the menu "**Lon Switch mode Lon**"

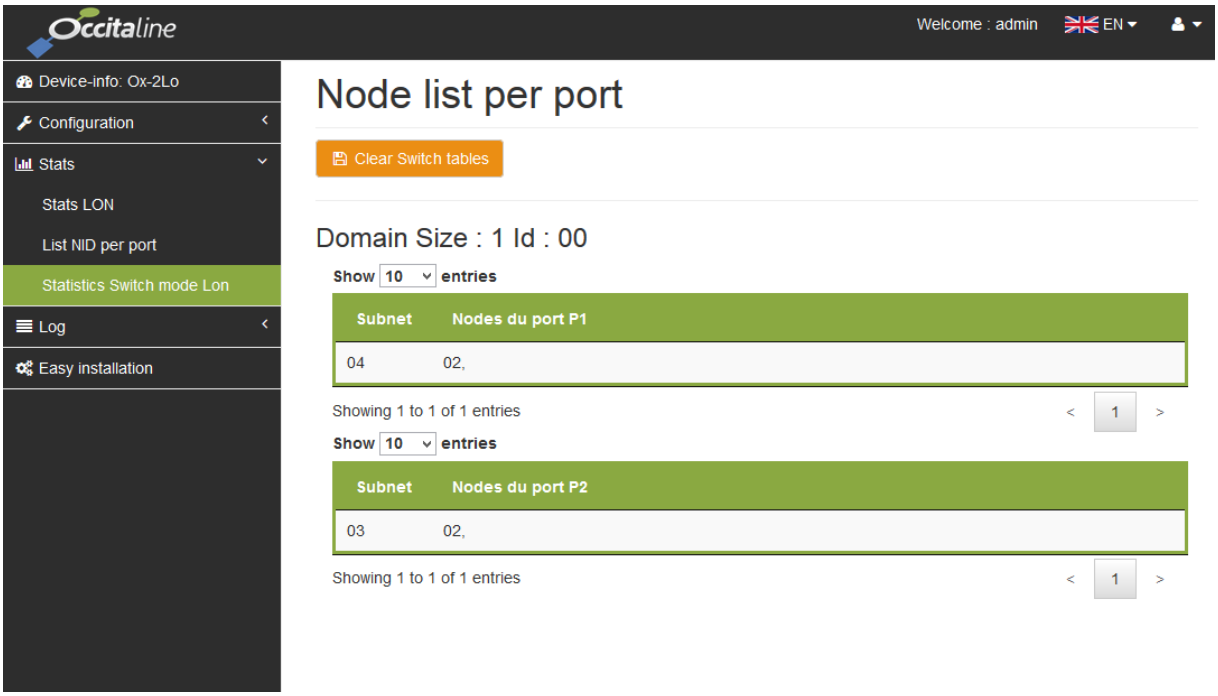


Figure 75
Subnets / Nodes detected on switch mode per port

☞ On this same page, you can clear the table. A clear could be needed when nodes are moved.

7 Configuration via USB

7.1 General Information

For the USB driver installation and terminal, refer to the annexes 9.2 and 9.3.

When your device is running and configured, press the "Enter" key to display the menu. There are two choices:

- Restore the default IP address **192.168.1.254**
- To restart

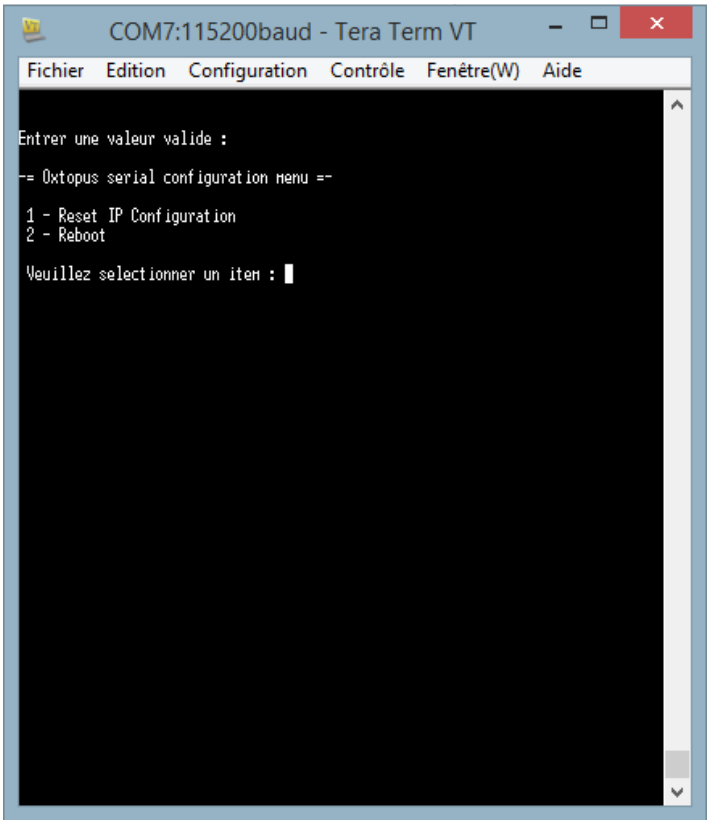


Figure 76
Screen on terminal connected to the router

7.2 Default IP address

To force the default IP address, select "1" on your keyboard, and confirm by pressing "enter"

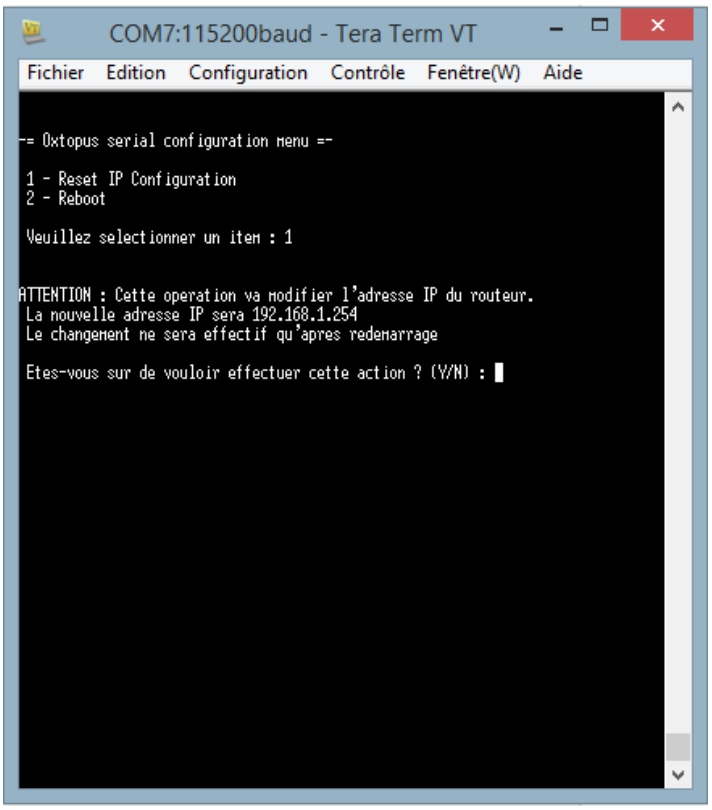


Figure 77
Confirmation load manufacturer values by "Y"

The interface asks you to confirm by pressing "Y" or "N" to return to main menu

☞ The changing IP address will be effective after restart. Please note that restart is not done automatically after the IP address change

7.3 Restarting

To reboot, select the "2" key on your keyboard, and confirm by pressing "enter".

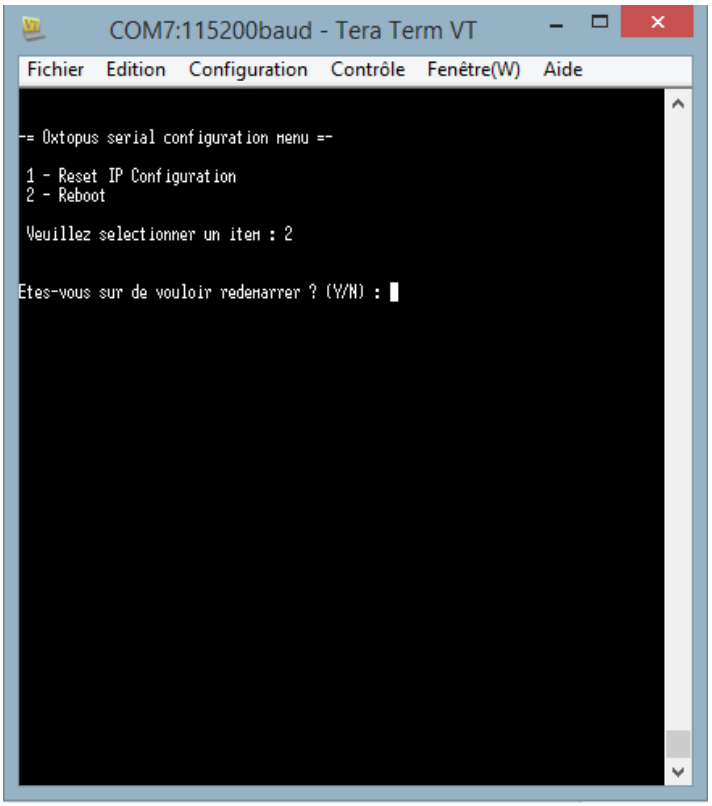


Figure 78
Confirm Reboot by "Y"

The interface asks you to confirm by pressing "Y" or "N" to return to main menu

8 Smart Channel usage

8.1 Preamble

To simply use the Oxtopus routers in NL220 or NLFacilities you must have placed specific files in the directory NLSmartChannel. See Appendix 9.1

These routers are equipped with an Ethernet port with an Ethernet switch on two RJ45 connectors and 1, 2, 3 or 4 ports TP / FT10. Some models can be equipped with 1, 2 or 3 Modbus ports. These are considered invisible in NL220.

Model to be installed in Smart Channel

	Modèle à installer dans Smart Channel			
Référence	Ox-1Lo	Ox-2Lo	Ox-3Lo	Ox-4Lo
Ox-1Lo	☑			
Ox-1Lo-Wi	☑			
Ox-1Lo-1Mo	☑			
Ox-1Lo-1Mo-Wi	☑			
Ox-2Lo		☑		
Ox-2Lo-Wi		☑		
Ox-2Lo-1Mo		☑		
Ox-2Lo-1Mo-Wi		☑		
Ox-3Lo			☑	
Ox-3Lo-Wi			☑	
Ox-3Lo-1Mo			☑	
Ox-3Lo-1Mo-Wi			☑	
Ox-4Lo				☑
Ox-4Lo-Wi				☑

8.2 Main channel modification

If the channel type on which you want to install the router is not IP10L, you can modify it by editing it.

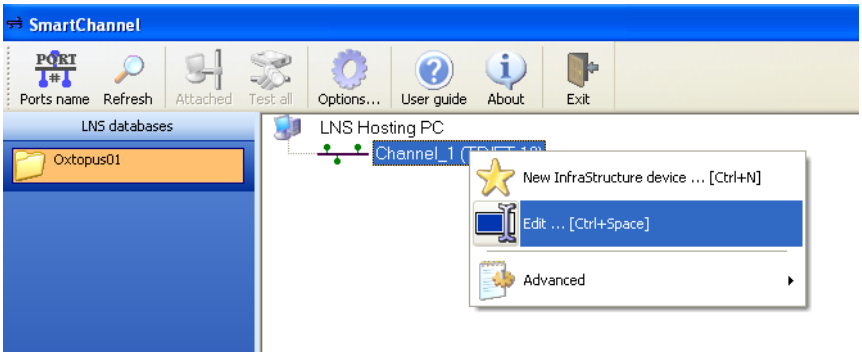


Figure 79
Editing Channel type

The name and type can be changed to fit to your project.

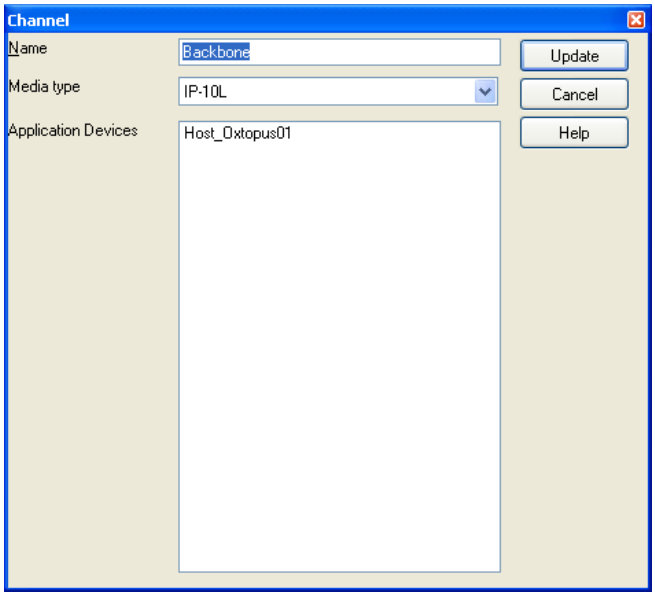


Figure 80
Name and type of channel

Once entered, you need to update by clicking the "Update" button.

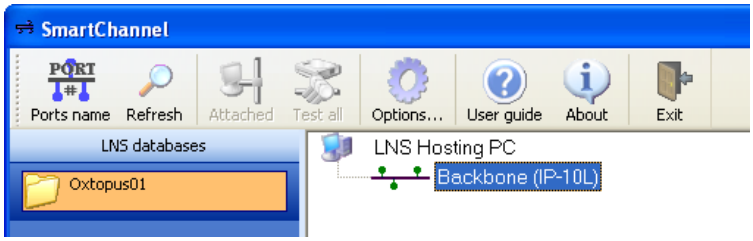


Figure 81
Channel modified following your needs

NLSmartChannel assists you in adding your project infrastructure products. Media types are checked. By adding an Oxtopus router, the IP port will always be connected to a channel IP-10L

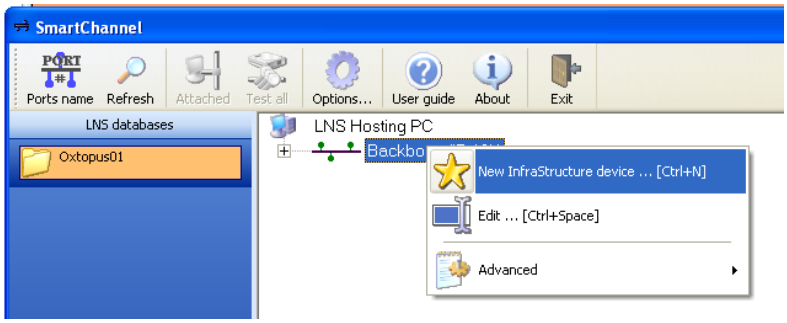


Figure 82
Adding an infrastructure device

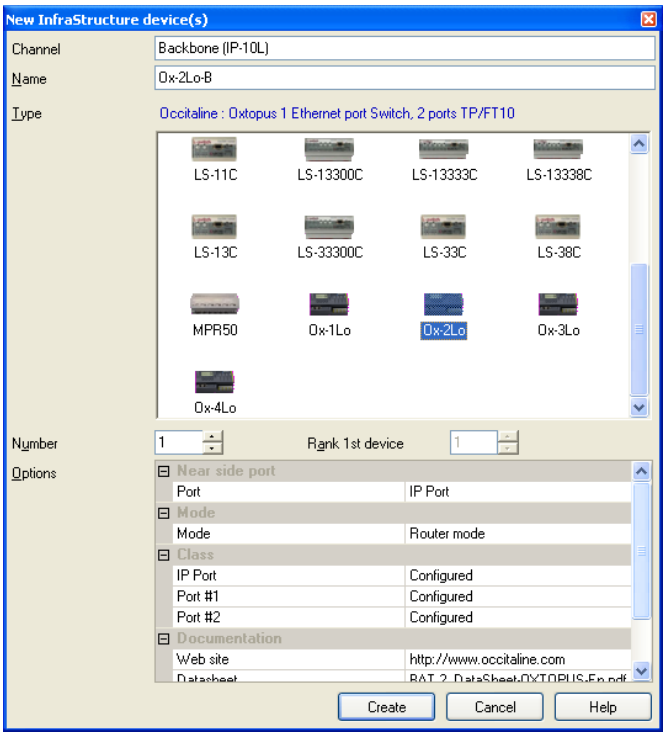


Figure 83
Oxtopus routers

You only have to choose the router version you want to install.

After validation, you can resume operations to add another router of the same type or a different one.

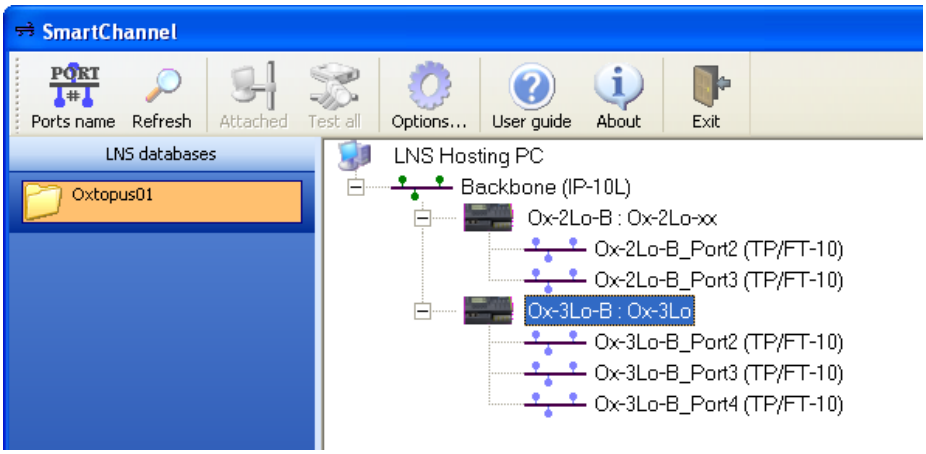


Figure 84
Plusieurs routeurs de type différents peuvent être ajoutés.

With “CTRL-”" shortcut or the installation menu, you can access the installation window below.

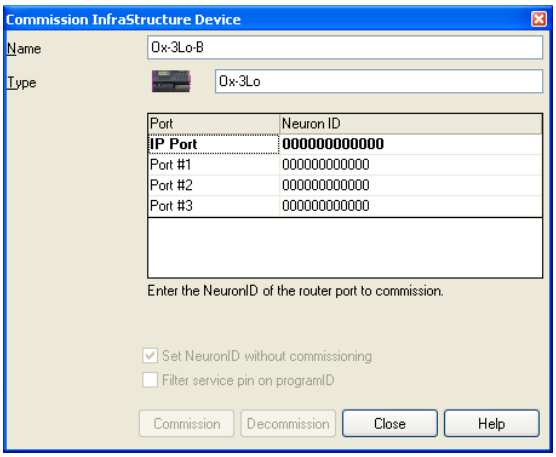


Figure 85
Entering the NEURON Id

If the router is turned on and connected to the Ethernet network, you can get its IP address by navigation with the buttons under LCD screen of router.

Figure 86
IP address of Oxtopus router.

This address is used in your Web browser to view the embedded Web server in the router Oxtopus.

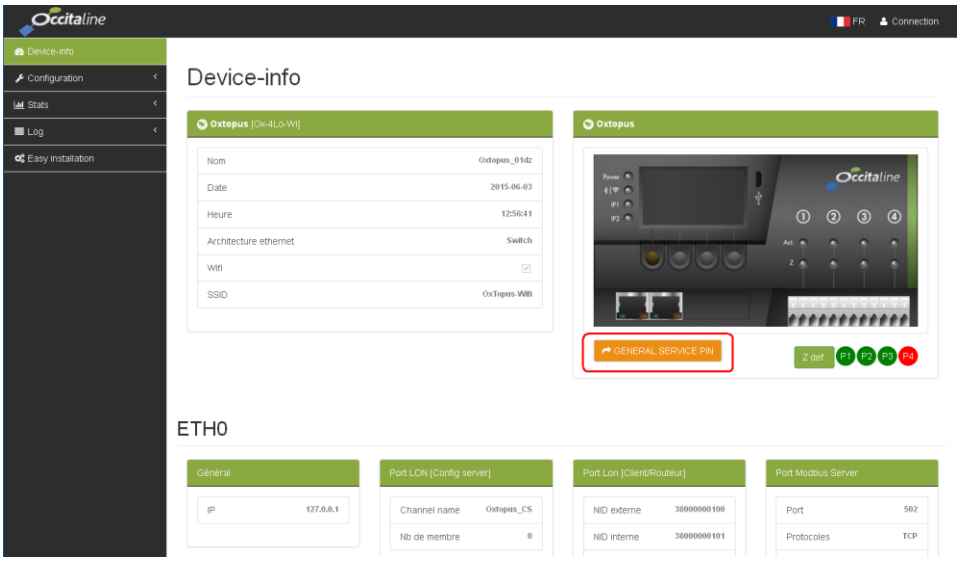


Figure 87
Home page of Oxtopus router

On the home page you have a "General Service Pin" button.

Each port sends its Neuron Id outside of the router. You will therefore be able to install the IP router in first. Then, for the other ports, you can activate the buttons on the home page or choose the port on the LCD screen and press the "[SP]."

When you have entered all the Neuron Id and closed the window, you will find that the router is green in the tree. It is now operational.

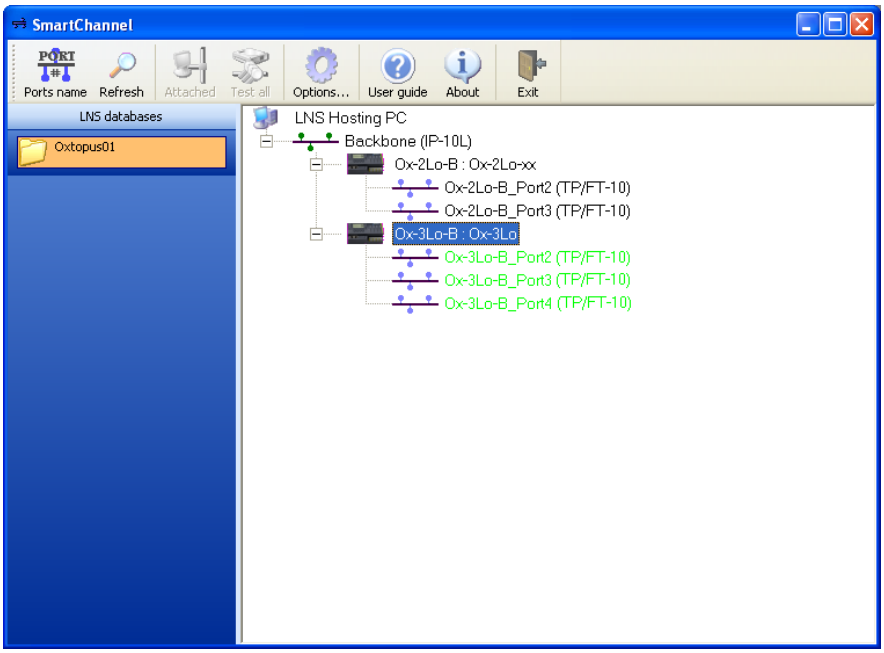


Figure 88
Router installed in LNS database

9 Appendix

9.1 Resources installation for NLSmartChannel

The compressed file "NL220_Resources.rar" allows software tools NL220 and NLFacilities to easily install the range of Oxtopus routers.

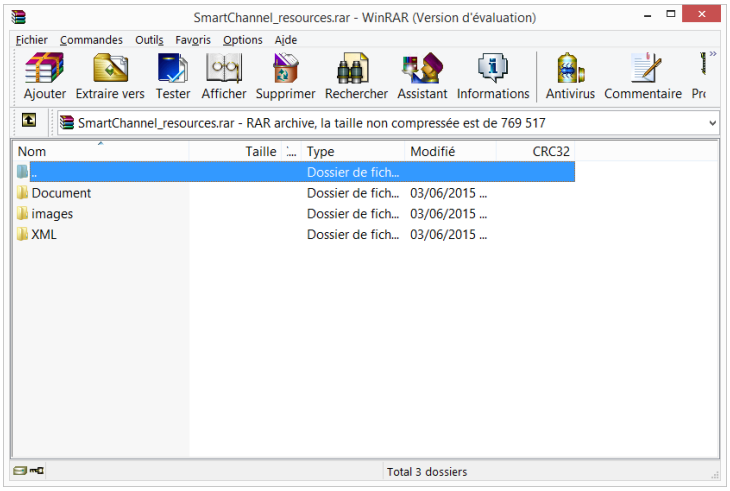


Figure 89
Contain compressed file for NLSmartChannel

Each directory in the compressed file contains files for defining Oxtopus routers.

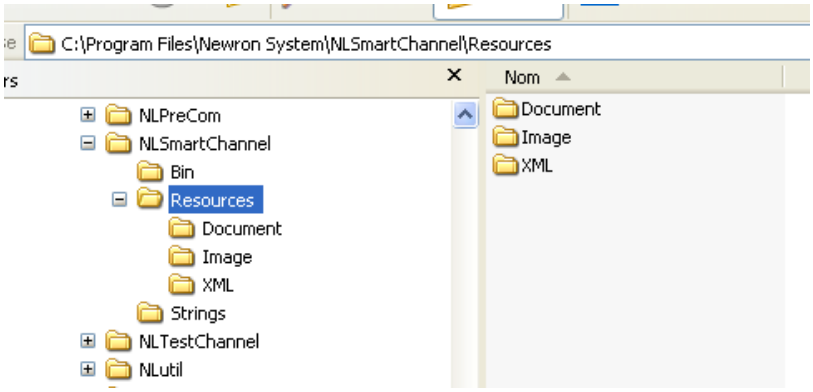


Figure 90
Directory where the files must be installed

When the files are installed you will find the following directories:

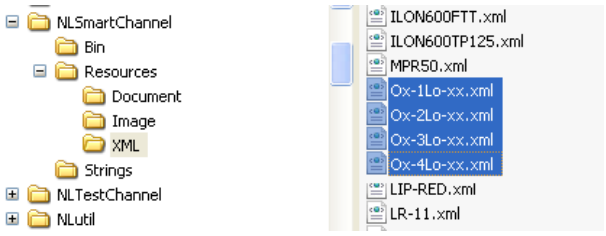


Figure 91
Directory XML

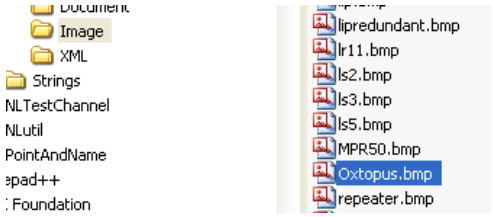


Figure 92
Directory Image

Figure 93
Directory Document

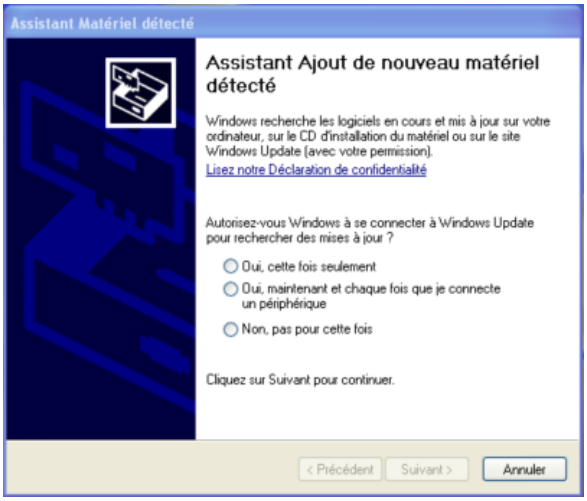
9.2 USB driver installation

9.2.1 On Windows 8

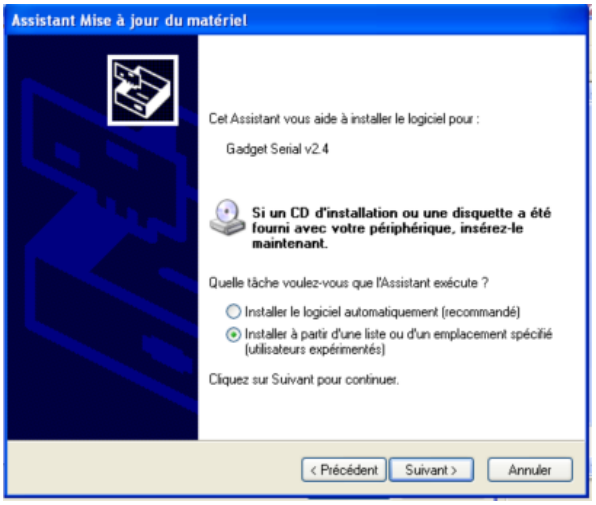
Under Windows 8 when you plug the USB cable, the device is recognized automatically.

9.2.2 On Windows XP / 7

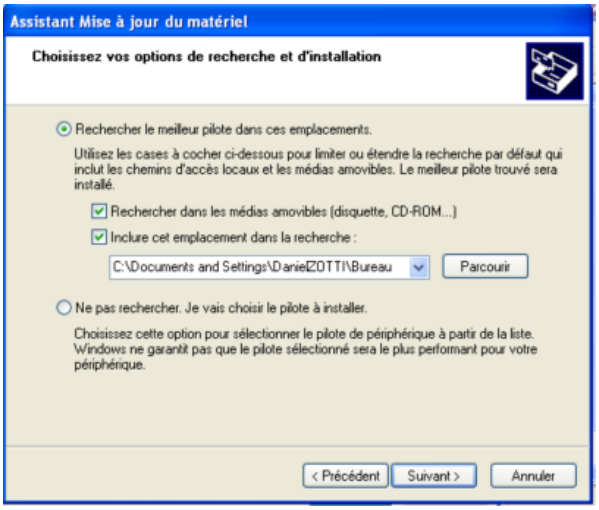
Under Windows XP, it is necessary to install the USB driver manually. To do this, connect the USB cable to the router and on the computer. When the "Wizard Add Hardware" appears, select "No, not this time" then click "Next".



On new windows, check “Install from a list or a specific location” then click on “Next”.



To finish, check « search the best pilotes in location » and specify the location of the file « Linux_acm_inf ». This file is available with the documentation of router. Click on « Next ».



9.3 Terminal installation (Tera Term)

To view information from the USB communication, a terminal must be used. If you do not have a terminal, you can use TeraTerm available on www.occitaline.com web site. Start Tera Term. A window appears, click on "File" then "New Connection".

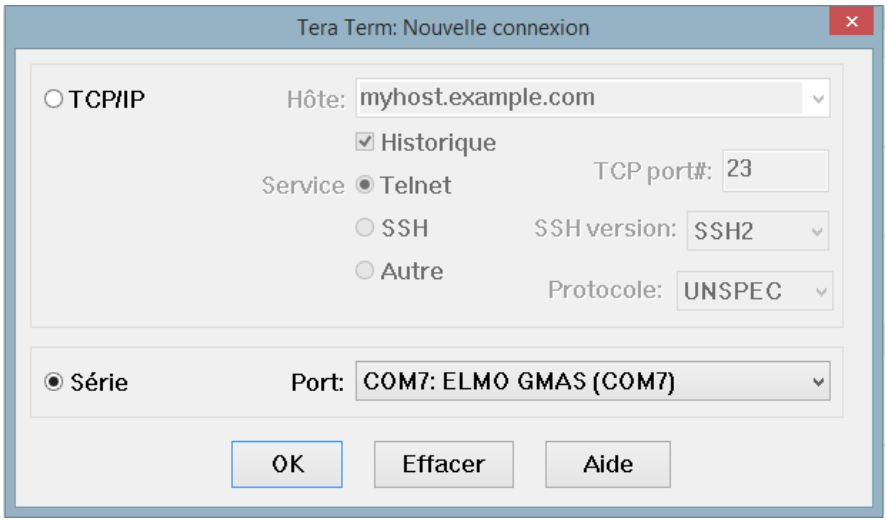


Figure 94
Start Tera Term configuration

Select « Serial » and in port the nom of device connected.

Under Windows 8, the device will be appear with name « ELMO GMAS »

Under Windows 7/XP, the device will be appear with name « g_serial »

The terminal configuration is made by clicking on "Settings" then "Serial Port", below the values to be set. Confirm by clicking "OK"

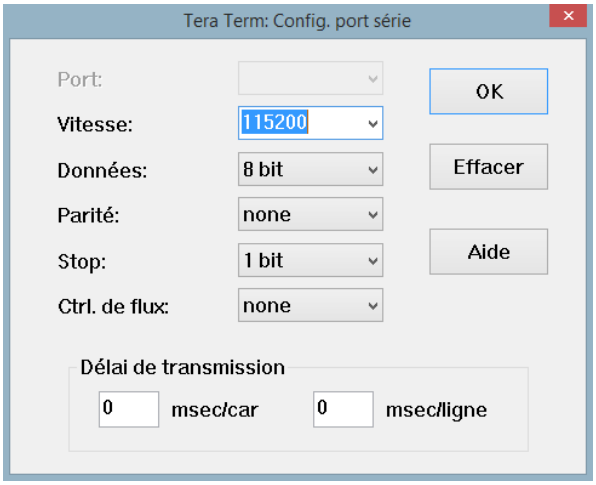


Figure 95
Configuration of serial port USB

END OF DOCUMENT

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