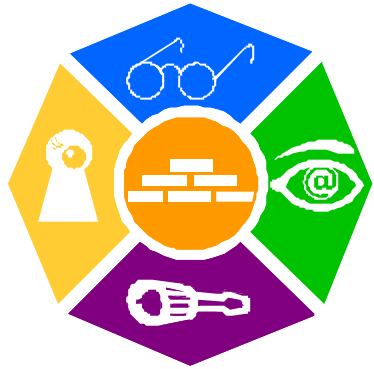
# TUTORIAL
# NL220



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# SUMMARY

# PRACTICE N°1

## Create device template from XIF

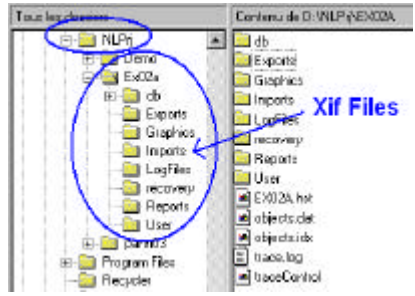
### Prepare your environment

Launch NL220

Be careful with the name of network interface, if more than one is declare on PC.

Create a new project named: Ex02A

An imported folder is automatically created in the home directory NLPrj\Ex02a.




Picture 1

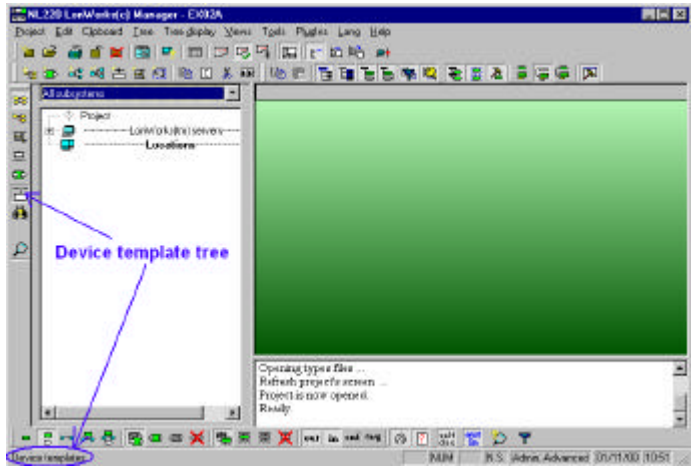
You store all files given by manufacturers in the Imports folder of your project:

*.XIF, *.XFB, *.XFO, *.NXE, *.AFB.

All manufacturer files are stored in c:\Training\App. Choose D13070HQINT07TA.* for this exercise.

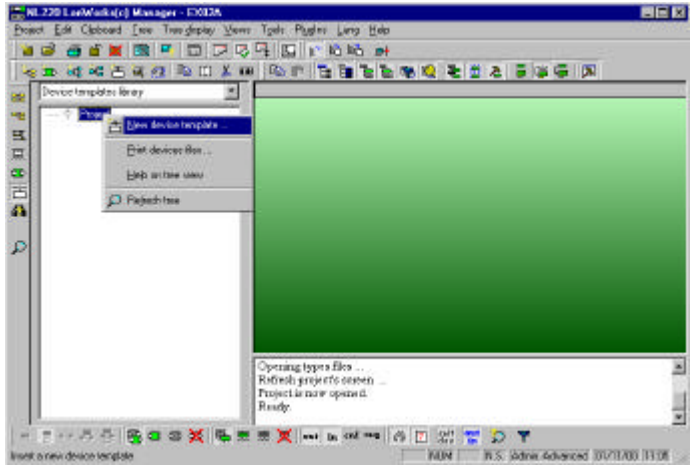
### Create your template

Select the Device template tree.




Picture 2

This tree is empty.



Picture 3

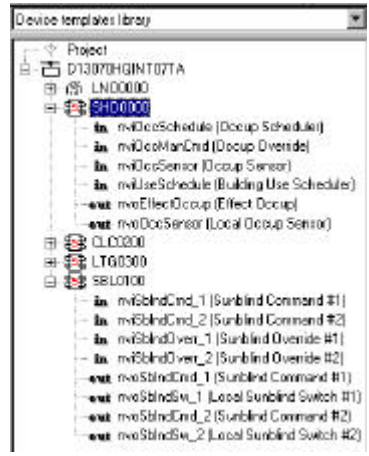
You can create a new device template in different mode:

1. From the pop up Menu cf Picture 3
2. From the menu Edit/New/New device template
3. From shortcut CTRL-ALT-D


Picture 4

A new window is opened cf Picture 4. After you press ..., you select the XFB description file and you validate with OK.

The device Template is created. You see it in the Tree view. You can open an object. You see variables in it.



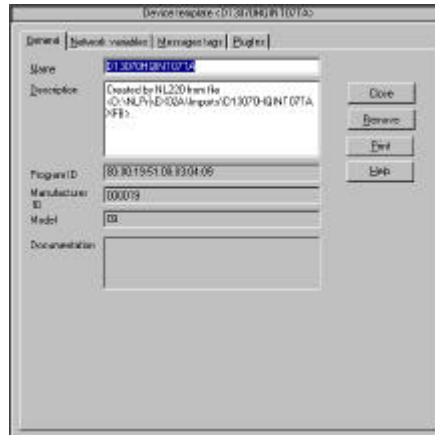

Picture 5

Each variable has a name and a comment.

ex: variable: nviOccSchedule Comment: (Occup Scheduler)

## Edit Device template

For edit device template you drag the device template D13070HQINT07TA and drop in the Edit View (to the right)



Picture 6

In this window, you see different folders.

General: description of the device template

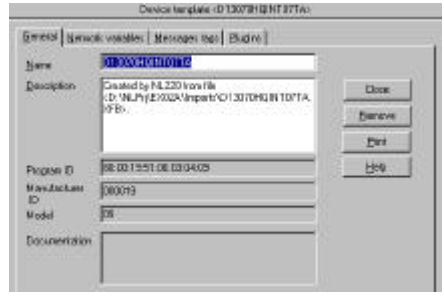
Network variables: Properties for network variables

Message tags: For message tags !

Plugins: Plugins list on this device template

***General folder***

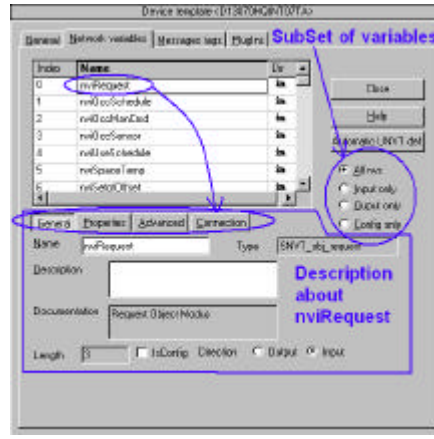
You see in Picture 7 information showed. You can modify the description if necessary. Program ID is the primary identification of the device template.



Picture 7

***Network variables folder***

In this folder, you can select all variables or a subset of variables input variable, output variable or config variables cf Picture 8.




Picture 8

In Picture 8 you see a specific description for nviRequest variable.

For each variable you have 4 folders.

General: Name of variable, Type, Documentation included in the Xif file. For this variable of this device template you can write a comment in Description box.

Select an output variable.

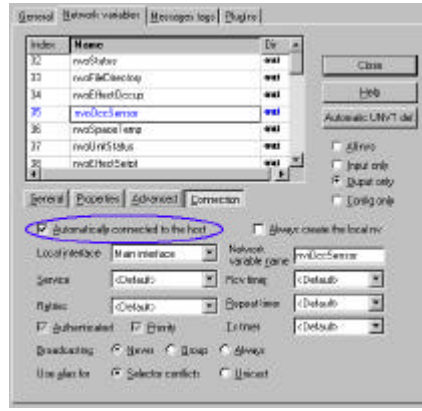
Properties: Information defined by manufacturer for this variable like priority, service and this information can be modified by you. cf Picture 9

Picture 9

Advanced: Information defined by manufacturer cf Picture 10.

Picture 10

Connection: In this folder, information is managed by YOU for all products of this kind used in this project cf Picture 11.



Picture 11

If you check « Automatically connected to the host », you define a connection for this variable to the host for each node created with this Device Template. You must specify all properties for this binding.

1. Select a subset « output variables »
2. Select the variable: nviOccSensor
3. Check « Automatically connected to the host »
4. Select another variable with mouse …. nviOccSensor is BLUE

1. Each variable with a property «connected to the host » is visible in blue.

***Message tags folder***

In this folder you see the msg_in item. In this node nether message tag is declared.

Picture 12

***Plugins folder***

In this view you see only plug ins applicable on device template.

## Create one node from device template

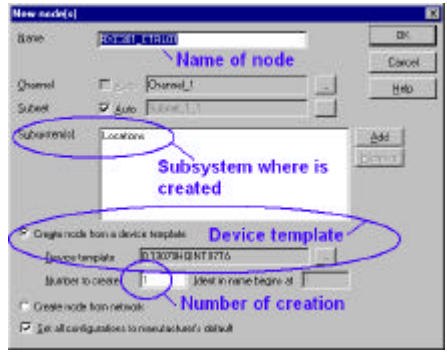
With popup menu on Device template, select action (Cf Picture 13):

New node from <D13070HQINT07TA> …

Picture 13

Picture 14 shows you the new windows for creation node.

4. You define a name for your node: RXC301_CTRL01
5. You verify in which subsystem it is added: Locations
6. You verify the Device template used: D13070HQINT07TA
7. How many nodes you want to create: 1

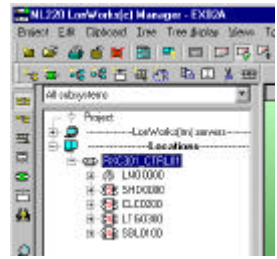



Picture 14

When all verifications are finished, validate the form with OK.

You change a tree view and you go in « all susbsystem » tree view (cf Picture 15).

2. The node created is GREY because it is not associated with a real target.

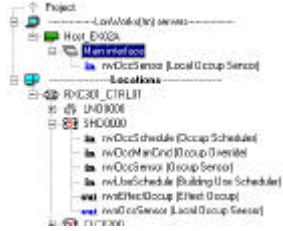


Picture 15

You can open each LonMark object and see variables.

Picture 16

nvoOccSensor is BLUE (cf Picture 16). This variable is bound. If you open the LonWorks Server, the Host node, and Main interface you see an input variable named « nviOccSensor » (cf Picture 17).



Picture 17

This variable was created automatically because it is defined in the device template.

## Change variable's name in node RXC301_CTRL1

8. Select « nvoOccSensor » variable
9. Press key F2 (Rename function)
10. Change the name with « nvoSensorOccupancy »
11. Edit the node and see in variable folder, the name is changed !

## Create a second node from device template

In the all subsystems tree view, with popup menu on locations object select action: « New node in <locations> … »

1. Write the name: RXC301_CTRL02
2. Check « create node from device template »
3. Verify the device template: D13070HQINT07TA
4. Validate with OK

Picture 18

In Picture 18 you see the variable name of blue variable. The name of the occupancy sensor is the name defined in the device template. This variable is blue because it is bound to the host.

## Change variable's name in device template

1. Open device template tree view,
2. Select variable « nvoOccSensor »
3. Press key « F2 » (rename) and change name by « nvoOccupancy »

## Create muliple nodes from device template

This exercise is the creation of 4 nodes from one device template.

1. Launch New node from <D13070HQINT07TA> with popup menu.
2. Change the number of node create by 4
3. Change the « indent in name begins at " by 10
4. Validate the form with OK
5. In log trace view, you see all operations for nodes created.

```
Creating node <CTRL10>
Automatic connection of <nvoOccupancy> to local variable …
```

…

Creating node <CTRL13>

Automatic connection of <nvoOccupancy> to local variable …

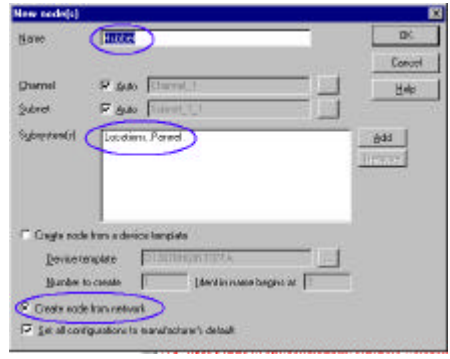
4. In All subsystem tree view you discover the 4 nodes created.
5. Open object SHD000 of CTRL10 node
6. See the variable bound to the host … the name is the one defined in the device template (cf Picture 19 ).

Picture 19

## Create device template from network

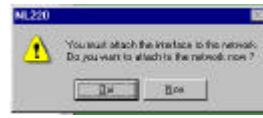
Before this exercise, you create a subsystem named: «Panel » (cf Practice 1)

1. You launch « New node in <Panel>… » with popup menu
2. Write the name « Hubbell » (cf Picture 20)
3. Check Create node from network (cf Picture 20)
4. Validate with OK




Picture 20

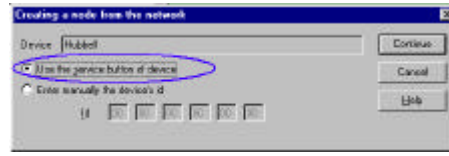
7. A message box appears because the project is not attached to the network and it is mandatory if you want to create a node from network ! (cf Picture 21)




Picture 21

**8.** The message display, depend on the language of your Operating system. Select « OUI » in French, « Yes » in english and so on.

**9.** The new window is shown. The question is: Which method you want to use for creating node. Check « Use the service button of device » (cf Picture 22) and press Continue




Picture 22

**10.** A new window is shown with a flash text. It is visible until NL220 receives a service pin message or you cancel operation.

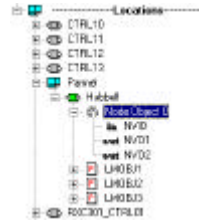

Picture 23

**11.** On Panel you open the door in front of Hubbell product, and you press the black button. The flashing red led, appears green.

**12.** In log trace view, you see all operations for creating a node.

| |
|---|
| Creating node <Hubbell> |
| Node successfully created |
| Uploading configurations of <Hubbell> |
| Configuration uploaded successfully |

**13.** The node Hubbel appears in Panel location, the variable names are not explicit because the node is not an embedded document.



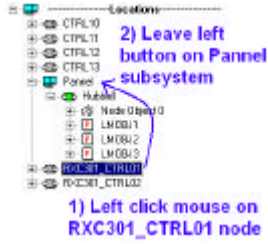

Picture 24

**3.** The node is GREEN because it is actually installed in field and in database.

## Move and install node in subsystem

Actually, you have defined different nodes of Controller, we are going to install one in the Panel subsystem.

**12.** With mouse, drag and drop node «RXC301_CTRL » from Locations subsystem to Panel subsystem (cf Picture 25 and Picture 26)




Picture 25


Picture 26

**13.** Launch « Install … » with popup menu on « RXC301_CTRL01 » (cf Picture 27)

Picture 27

**14.** The window «Installing/Replacing a node » appears, press 

and press the service pin button on RXC30.1 module.

**15.** The node becomes GREEN (cf Picture 28)

Picture 28

# Create a clone node

A clone node is used when you organise your database in diffrent views. In view ‘Locations’ nodes are created, for each all view clones nodes are created for access to the same node in diffrent ‘root subsystem’.

## Create a Root subsystem

1. You create a root subsystem named «Manufacturer » on “Project” object show in all subsystem view.
2. You create a subsystem «NEWRON SYSTEM » and «Hubbell » in Manufacturer subsystem

## Create a clone node

1. With keys SHIFT+CTRL make a drag and drop of Hubbel node to Subsystem Manufacturer. Hubbell. When you release left button of mouse, the node Hubbel is duplicated on the new subsystem.(cf Picture 29)


Picture 29

2. Repeat the same operation with node « RXC301_CTRL01 » in subsystem « NEWRON SYSTEM »
3. Change state of node in database with popup menu, launch “Mark as ..” “Bad” on a node RXC301_CTRL01 and the clone take the same property.

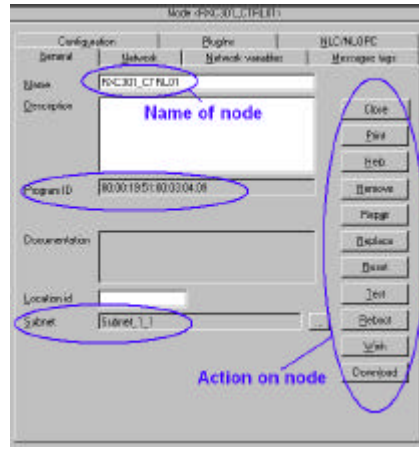
# Edit a node

To edit a node, you select action « edit » with popup menu on node or you drag and drop the node into Edit view.

The right window shows you several folders.

## General folder

In this folder you will discover the name, program ID and actions available on this node (cf Picture 30).



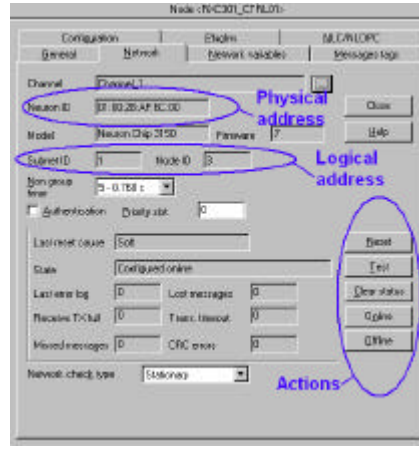

Picture 30

| Action | Description |
|---|---|
| Close | Close the window |
| Print | Generate report on node |
| Help | Help on node |
| Remove | Remove the node from Database |
| Repair | Reload configuration of a node |
| Replace | Change the node in field with another identical node |
| Reset | Send a reset to the node |
| Test | Send a test to a node |
| Reboot | THIS ACTION IS TO BE USED WITH CARE<br>The node reload manufacturer configuration writes in PROM.<br>Do not use it if you are not sure, whether the node will support this operation. |
| Wink | Send a wink to the node |
| Download | Download a specific program to the node |

**4.** If a reboot action is sent to a node, you can lose communication with this node. (With NL220 in maintenance mode, this action is unavailable)

## Network folder

In this folder, you see physical addresses, logical addresses and many other items used in practice N°3 (cf Picture 31).




Picture 31

## Network variables folder

You see the same things as in the network variables folder of device template edition. The only difference is the bound variable. If a network variable is blue, it is bound to another node. The host is one specific node.

Picture 32

## Messages tags folder

You see the same things as in the message tags folder of device template edition.

## Configuration folder

In this folder you can see all properties available on NODE (and not in LonMark object). In general these properties are network configuration variable or FTP.


Picture 33

## PlugIns folder

In this folder you can see all plugins available on NODE (but not in LonMark object or variable or device template) (cf Picture 34)


Picture 34

### NLC/NLOPC folder

NLOPC is a generic scada OPC server for LonWorks network. This folder is used to configure the export to NLC file.

1. You define if this node is the host for NLOPC applications. (In general it is not the host)
2. If this node is not exported in NLC file
3. If it is exported you choose from many options available in NLOPC. If you want to define a specific name for this node you check option and write name.


Picture 35

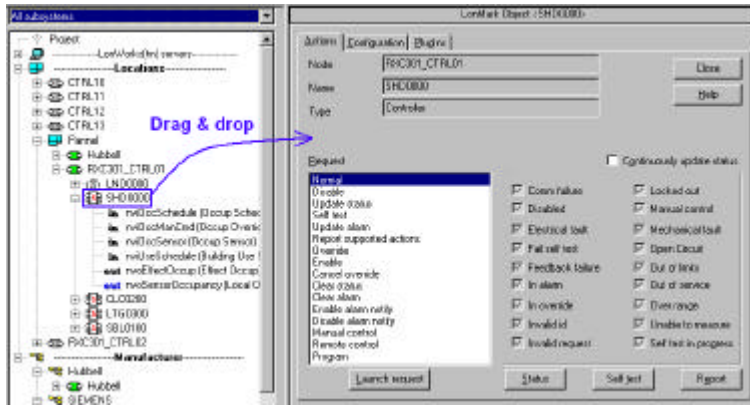
| Option in export | Description |
|---|---|
| The node is monitored | A tag is created for testing continuously the node by back task |
| Its output network variables are exported | All output variables are exported |
| Its input network variables are exported | All input variables are exported |
| Its config network variables are exported | All configuration variables are exported |

## Manipulation on LonMark object

In this exercise you manipulate a LonMark object. This function is available only if a node is designed in compliance with LonMark version 3.0 minimum.

## Editing the lonMark object

For editing the Lonmark object, you select action «edit » on popup menu on LonMark object or you drag and drop the lonMark object in Edit view (cf Picture 36).




Picture 36

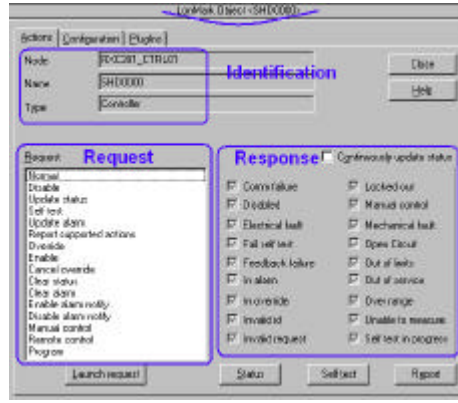
## Folders on lonMark object

| Folder | Description |
|---|---|
| Actions | Send a specific request to a node about LonMark selected (cf Picture 37) |
| Configuration | All properties network configuration variable or FTP defined for this LonMark object |
| Plugins | All plugins registered for this LonMark object |

## Action on lonMark object

Actions are not mandatory.

When there is a LonMark object support request, the answer is presented in response section. (cf Picture 37)

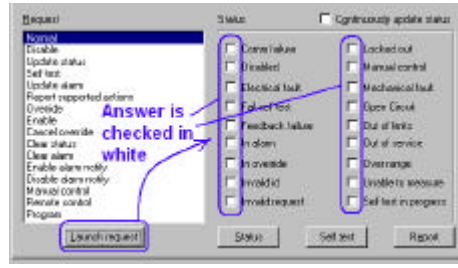



Picture 37

If a LonMark request is not supported by module, the log trace view shows the error message in red and the check response has a grey background (cf Picture 38).

Picture 38

When the module supports the request, there is no message in the log trace view and each check response has a white background. Select SHD000 LonMark object and try request.

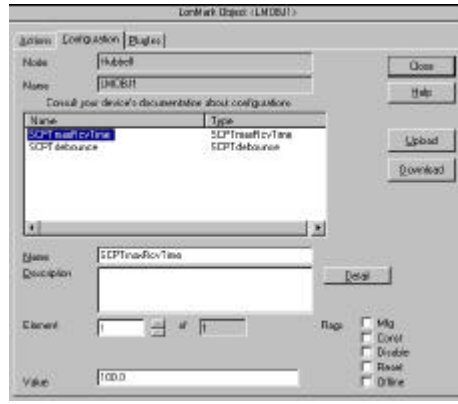



Picture 39

## Configuration on lonMark object

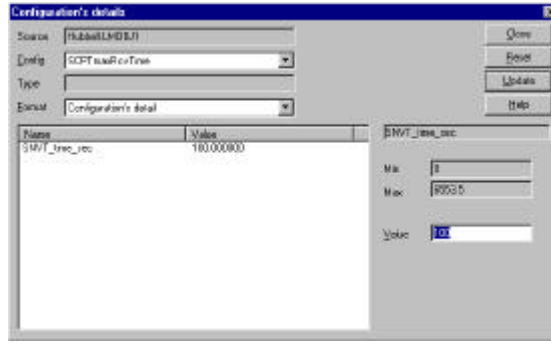
This folder shows all properties for configuring an lonMark object

Picture 40 shows you 2 properties for a LonMark Object « LMOBJ1 » of « Hubbell » node. The SCPTMaxRcvTime is selected and all information is shown below.




Picture 40

If you press Detail button, a new window appears for value modification.(cf Picture 41)




Picture 41

The value is modified when you press Update.

# PRACTICE N°2

## Preparing your environment

You create a new project named: Ex03A

In folder « imports » put manufacturer files:

Dt24S21F.*

Jt24r20f.*

Dj24r22f.*

All files are located in c:\Trianing\App

### Create all device template

In Picture 42 you see the three devices template created.

Picture 42

### Create two nodes

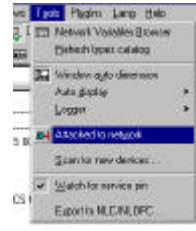
With device template « Dj24r22f » you create two nodes named respectively « LeftSwitch » and « RightSwitch » cf Picture 43.

Picture 43

These two nodes are located on the bottom of the panel to the left and to the right of occupancy sensor.

### Installation of nodes

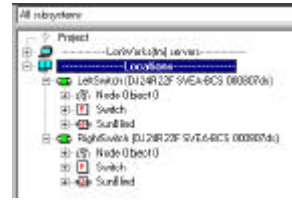
Attach the project to the network with the small icon  or large icon  or using the Tools.Attached network menu (cf Picture 44)




Picture 44

Take out the front panel of each switch with care. Behind there are two little holes. The right hole is the button service pin, to the left there is a led service pin. When you press the button in the right hole, a red led comes on.

With popup menu on each node, launch « install … » and press service pin of each node one at a time. The project is initialised. (cf Picture 45)




Picture 45

**5.** The popup menu is different according to if the node is uninstalled or installed.

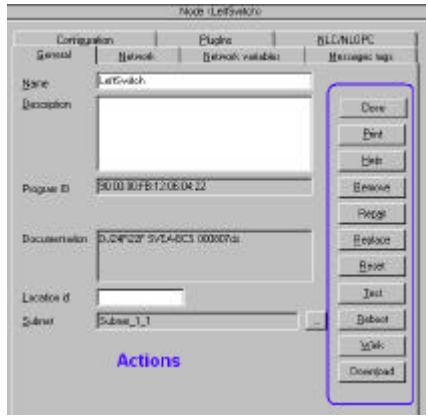
Don't forget to replace the front panel of each switch with care.

## Accessing actions on node

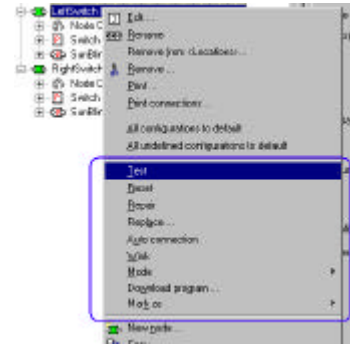
For launching an action on a node, you have different ways:

**16.** You drag & drop a node into Edit view and choose the folder where the action is available (cf Picture 46).

**17.** You select a node with a mouse and you launch popup menu by right clicking button (cf Picture 47).




Picture 46



Picture 47

# Launch actions on node

## Simple action

The two previous methods for accessing can be used for a single action.

Launch a test on node LeftSwitch and then RightSwitch. The result is shown in the trace log view.

| |
|---|
| Node test results of LeftSwitch: |
| The device passed all applicable tests. |
| Node test results of RightSwitch: |
| The device passed all applicable tests. |

If you launch test from popup menu, the test is quick. If you choose the edit node, you must drag & drop the second node into the active window and then launch the test for the second node.

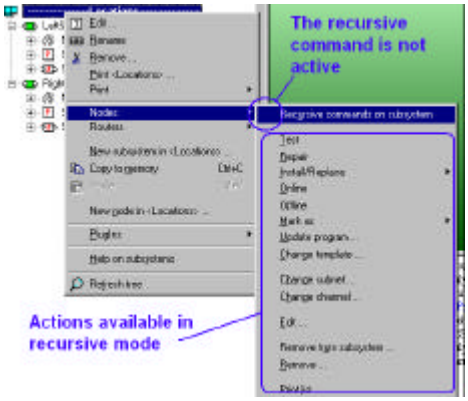
**6.** In fact, if you drop the node in the edit window, a test is automatically made.

## Recursive action

When you have many nodes it is not easy to test each node at a time. The best way is by recursive command.

This operation is possible from two actions in popup menu.

**4.** Select a subsystem « locations » and check the recursive command, if not active, with left button on mouse (cf Picture 48 and Picture 49)




Picture 48


Picture 49

**18.** If you recheck the item in the popup menu, the recursive command switches off.

**19.** Launch test operation with popup menu on subsystem «locations » (cf Picture 49)

**20.** The result is show in trace log view.

| |
|---|
| Node test results of LeftSwitch: |
| The device passed all applicable tests. |
| Node test results of RightSwitch: |
| The device passed all applicable tests. |

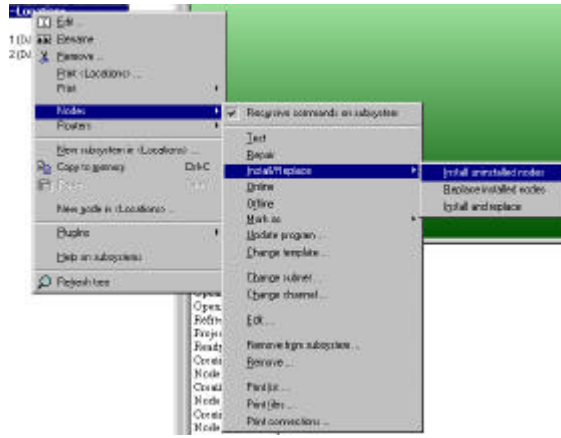
The same operation is possible for all actions.

**7.** The recursive command can be used for installing nodes. In this case, all nodes are created from the device template. You organize your project with the subsystem and you launch a recursive install on each subsystem. You press the service pin on each correct node (association name and location on panel).

Try to create projet « EX03B », install manufacturer files in import directory, redefine device template, create two nodes with template « Dj24r22f », Attach to the network, and launch recursive command

« Nodes » « Install/Replace.Install » « uninstalled nodes »

on locations subsystem (cf Picture 50).

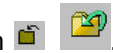


Picture 50

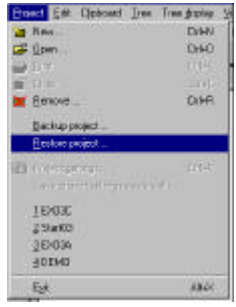
## Restore project

In this exercise, you discover a new functionality of NL220 with backup and restore. This operation is very important because, it can be used to reload a database into a new PC.

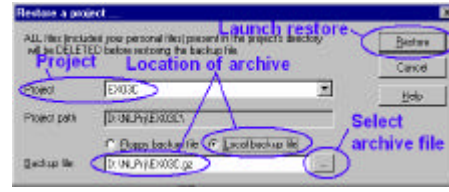
**21.** Create a new project named: « EX03C »

**22.** Close project with menu or with icon  .

**23.** Select restore project in project menu (cfPicture 51)



Picture 51




Picture 52

**24.** In a new window select project « EX03C », check « local backup » (cf Picture 52)

**25.** Select archive file and restore it. (cf Picture 52)

**26.** Open a project « EX03C » and verify network interface.

**8.** Network Interface depends on PC that has created the restored database.

# Replace node

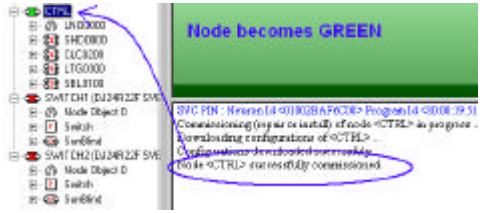
## Simple replace

In the restored EX03C project you have seen 3 nodes. All are green, but the network is not attached.

Attach network and try to recursive test all nodes. Nodes become RED because neuron ID is not correct for your panel.

**27.** Launch action repair on « CTRL » node with popup menu and press Continue (cf Picture 53 and Picture 54)


Picture 53



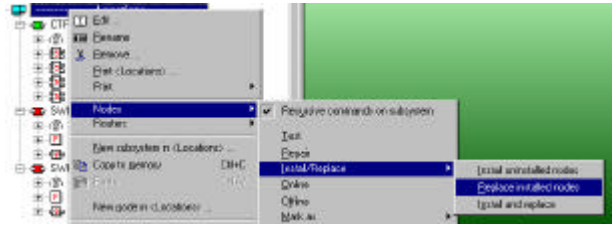

Picture 54

## Recursive replace

In this exercise you try to install the two switches « SWITCH1 » to the left and « SWITCH2 » to the right.

**28.** Check recursive command on popup menu

**29.** Launch « Replace installed nodes » (cf Picture 55)




Picture 55

**30.** Skip CTRL node installed yet with 

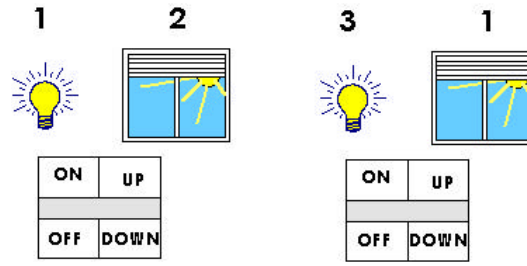

**31.** On node SWITCH1 launch installation with 

and press service pin on left switch module (Take off and replace button panel).

**32.** Do the same thing for SWITCH2.

**33.** All nodes are GREEN. Try to push button, and the actions on panel.

**9.** You have reloaded database with binding. (cf Picture 56)




Picture 56

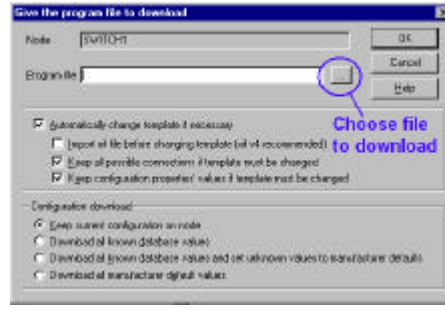
## Replace with changed template

In this exercise you try to reload program on nodes with different. LonMark object

**34.** Create device template « Dt24s21f »

**35.** In all subsystems, launch « download program … » with popup menu on node: SWITCH1 (left button)

**36.** Choose file DT24s21f.nxe to download (cf Picture 57)




Picture 57

**10.** Many options are available in this form. By default NL220 tries to keep all binding and all property configuration values. You can change them.

**37.** Launch operation by pressing OK

**38.** The Trace log view shows you the report of operation

```
Downloading program <Df24s21f.nxe> to <SWITCH1> …
Changing template of <SWITCH1>
At least one network variable connection lost
Change done
Uploading configurations of <SWITCH> …
Configurations upload successfully.
Downloading done.
```

One connection is lost because the network variable is changed. The sunblind has no action on left switch. The light stays on. (cf Picture 58)


Picture 58

# Repair node

This operation reloads all properties in the EEPROM of node.

**1.** Open project « EX03A »

**2.** Launch repair on node «RightSwitch » a new window appears (cf Picture 59)


Picture 59

Many options are available on this operation.

| Option | Description |
|---|---|
| Keep current configuration on node | Values of network variable and FTP are never changed. |
| Download all know database values | Only the values modified by user are changed. |
| Download all know database | The values modified by user or |

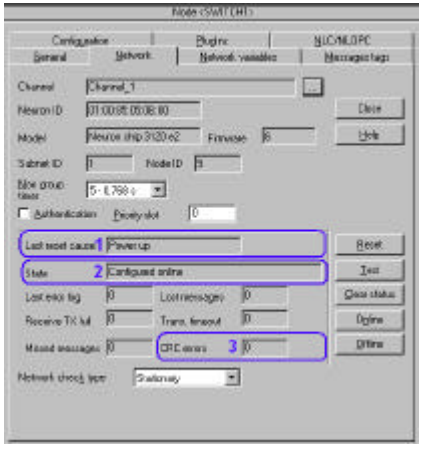
| | |
|---|---|
| values and unknow values to manufacturer | defined by manufacturer are changed. |
| Download all manufacturer default values | The values defined by manufacturer are forced. |

3. Try to repair node « RightSwitch »
4. An error occurs because the device template is different in the database and in the field.
11. The project is Faulty. You mustn't leave the project in this state. All modules must be declared in the database.
5. Bindings between left Switch and controller are kept
6. Open the project « EX03C »
7. Launch recursive command « Repair » on location subsystems
8. All bindings on « EX03C » modified are recovered (you have lost binding on sunblind SWITCH1).

# Test a node

## Diagnosing the communication

The first level of analysis is possible with network folder on edit node (cf Picture 60).




Picture 60

Other information in this form is explained in advanced training.

| Num | Item | Description |
|---|---|---|
| 1 | Last reset | The last cause, which produced a reset. |

| | | |
|---|---|---|
| | cause | |
| 2 | State | The current state. |
| 3 | CRC errors | Number of errors seen by node in this location. |

| **Last reset cause** | **Description** |
|---|---|
| No reset | You have cleared status |
| Power up | The module has been put on power |
| Soft | The module received a message reset through network |
| Hardware | The pin reset of node is decreasing to 0. |

| **State** | **Description** |
|---|---|
| Configured online | The module can run correctly |
| Soft offline | **Applications of node are stoped** |
| … | All others are available but not when the node is installed in tree view |

CRC errors are generally caused by poor network, bad impedance adaptation, long distance on network, noise on wire network because it is near a big electrical machine.

Exercises possible with panel are about cause reset and node state.

1. Select « SWITCH1 » and edit node by drag and drop.
2. Change folder on network
3. Switch off the power DiaLoc BA for panel for a couple of seconds
4. Press 

and see last reset cause.
5. Press 

and see last reset cause.
6. Press 

, and after 

and see state.

# Change configuration properties

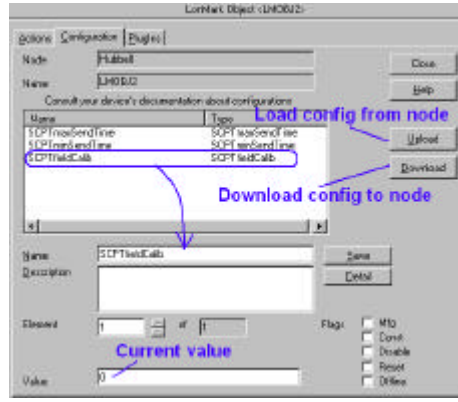
## Prepare exercise

1. Create a device template « Lon3w203 »
2. Create Hubbell node (Service pin is behind door)

## Discover and show all properties

3. Drag & drop « LMNOBJ2 » on edit view.
4. Change folder on « configuration »

**5.** Select « SCPTfieldCalib » and see value in the form. (cf Picture 61)




Picture 61

**12.** The Save button appears when you try to change current value.

When you press Upload NL220 read values of SCPT from node.

When you press Download NL220 writes values into node.

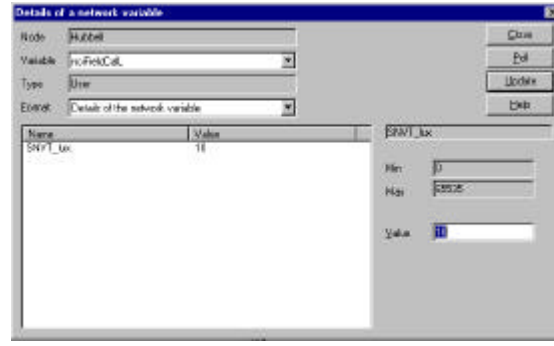
**6.** Change current value to10 and press Save.

**13.** The new value is stored in the module AND in the database.

## Modifiy a configuration property

**39.** Show configuration variables with large icon or icon cnf. You see « Non interoperable variables » (cf Picture 62) and you search « nciFieldCal ». When you have found it, you double click on it. A new window appears showing details of a network variable (cf Picture 63).

Picture 62



Picture 63

The value is changed to your value.

**40.** Modify it by 7. The value in Configuration folder is unchanged and equals 10.

**41.** If you try to repair node with default option, the value 10 will be downloaded into node. Try it and see the value by double clicking on variable.

**42.** Some values are stored just in module, others are stored in database, others are defined by manufacturer.

# PRACTICE N°3

## Prepare your environment

A plugins is a specific program (LNS client) which uses one or more kind of object in database.

### Install plugins on PC

In directory c:\Training\Plugins you have two sub directories for two plugins.

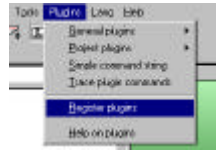
Plugin LPA Is an export from LNS to Loytec Protocol Analyser

Nl004c Is a configuration plugin for specific module

1. Launch « Setup.exe » in each subdirectory
2. When Plugins LPA is installed, start «Plugin NSLPA » and select « register plugin »
3. Create new project « EX04A »

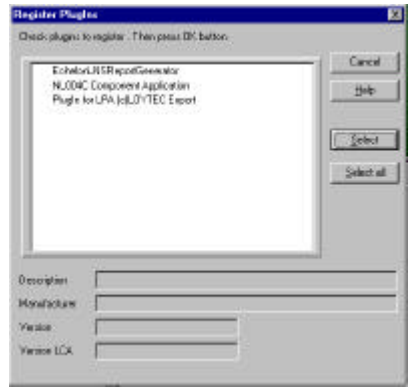
## Plugins menu

4. Display device template tree. It is empty !
5. Launch Register NL004C Plugins (cf Picture 64)




Picture 64

6. A new window appears (cf Picture 65)




Picture 65

7. Select NL004C and Plugin for LPA and press Select, an icon is displayed in front of each line selected.
8. Launch registration into the project with OK
9. After registering window, press on refresh tree icon
10. A device template is shown.

## Launch plugins on device template

1. Edit device template by drag & drop template to the edit view.
2. Select plugin folder and see the plugin available on device template. It is a documentation.


Picture 66

Start plugin with Launch button in edit view or directly by popup menu on device template in tree. A French PDF documentation appears.

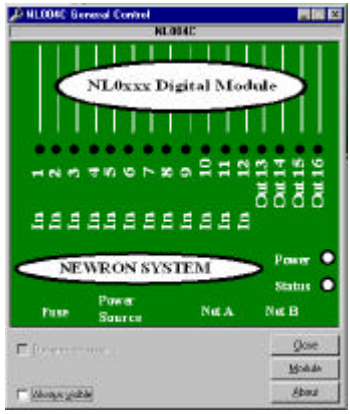
# Launch plugins on node

1. Create node from device template.
2. By pop up menu on node see and launch plugin « general control ». (cf Picture 67). There are two plugins available.


Picture 67

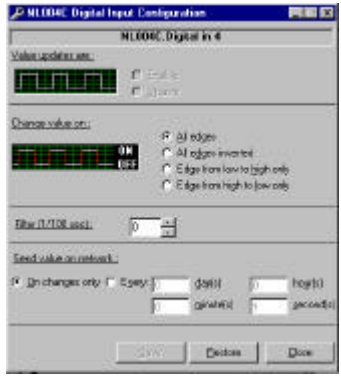
After a couple of seconds a new window appears. It is the design of product (cf

3. Picture 68). With a left click on mouse, you select operation « configure » on an input (cf Picture 69).
4. For an input configuration you have a first application (cf Picture 70)
5. For an output configuration you see a second application (cf Picture 71).

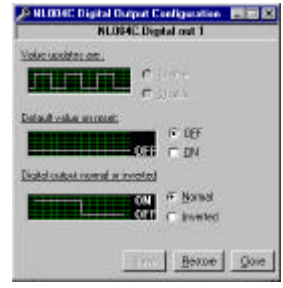



Picture 68


Picture 69




Picture 70




Picture 71

This plug-ins modifies configuration properties of the LonMark object.

## Launch plugins on lonMark object

5. With popup menu on LonMark object you have two different plugins. (cf Picture 72)


Picture 72

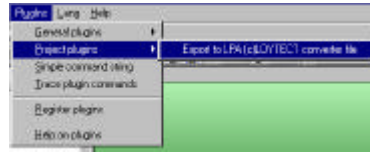
6. If you start to configure digital input, you discover the same application shown in Picture 70.

# Launch plugins on Project

The LPA is a Protocol Analyzer for LonWorks. It is mandatory for debugging and tunning network. This tools is explain in an other training.

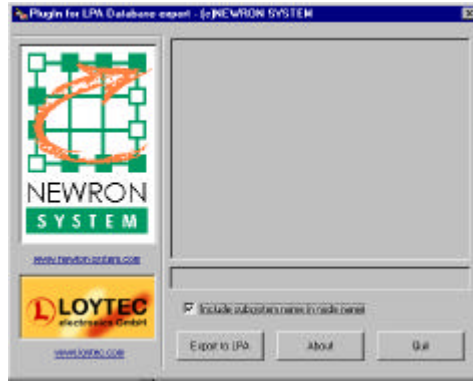
Register LPA plug-ins in current project.

Plugins associated with project are available in menu « Plugins ».« Project plugins »




Picture 73

This plugins prepares a file protocol analyser Loytec.

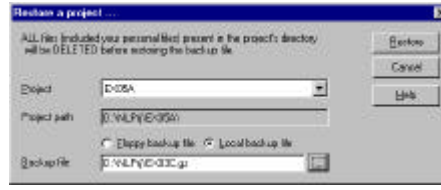



Picture 74

# PRACTICE N°4

## Prepare your environment

1. Create a project « EX05A » and close it.
2. Restore « EX03C » in project « EX05A » (cf Picture 75)



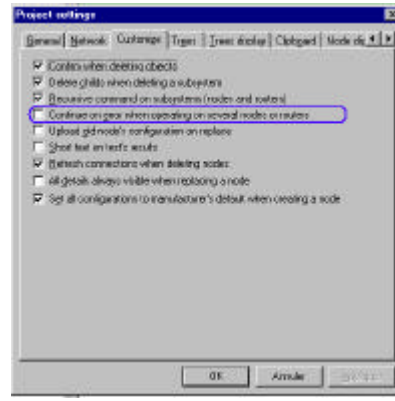

Picture 75

3. Open « EX05A »
4. If you don't see connection on node press  on tree setting tool bar (cf Picture 76).


Picture 76

5. Attach the network and launch a recursive repair on « locations » subsystem.
6. The program ID of node « SWITCH1 » is not matched with field.
7. Download « Dj24r22f » program on « SWITCH1 ».
8. Try to Switch on and off lights 1 and light 3.
9. If « SWITCH2 » has no action on light 3, repair it. In fact, NL220 is configured for stopped operation when an error occurs.(cf Picture 77)

7. Check the option « Continue on error .. » if you often use recursive commands.

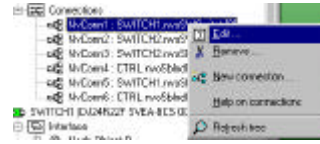


Picture 77

# Binding

## Edit Connection by pop up menu

**1.** Select one connection on node and with popup menu launch edit (cf Picture 78)



Picture 78

A new window appears (cf Picture 79)

Picture 79

In this window you see the name of this connection and the output variable and input variable. It is the command for light 1 on panel.

2. Change the name of this connection to « CmdLight01 »

3. A new button appears (cf Picture 80). Press Update for updating the database.


Picture 80

In a real project, a connection name is important for maintenance because you can see immediately the variables and properties.

## Connection by popup menu

Switch on, when a light is ON, led red is also ON. If when switch OFF the light 1 with upper button light on panel, the led is still ON.

In fact: information feedback is not returned to SWITCH.

1. Press to show only device and interface.

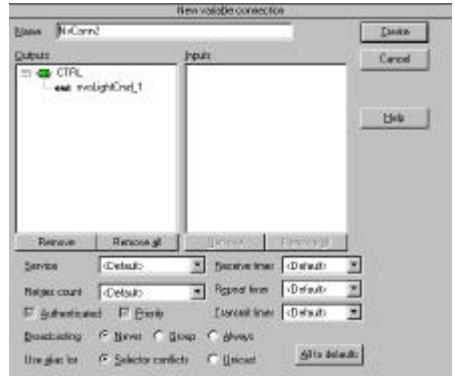
2. Open Lonmark object « LTG0300 » on CTRL and « Switch » on SWITCH1 (cf Picture 81). All bound variables are blue.


Picture 81

3. Select the variable « nvoLightCmd_1» on CTRL node and with popup menu launch « Variable's connection » (cf Picture 82)

Picture 82

**4.** « network variable connection » window is open on right view and shows you the output variable selected (cf Picture 83).



Picture 83

**5.** Drag & drop the variable « nviSWSwitchFb[0] » from node SWITCH1 on edit window. The variable is added in inputs list variable.

**6.** Change the name of connection by « FeedBackLight1 » (optional)

**7.** Press  for updating connection on field.

**8.** Close edit « network variable connection » window

The led of SWITCH1 is ON when the light is ON !

## Drag & drop on connection

Do the same thing on SWITCH2 with a direct drag & drop.

**1.** Open lonMark object « Switch » on SWITCH2.

**2.** Drag « nviSWSwitchFb[0] » directly onto « nvoLightCmd_3 »

**3.** The « network variable connection » window appears with the two variables (cf Picture 84).


Picture 84

4. Press  to update connection on field.

5. Close edit « network variable connection » window
6. Try feed back action with upper button and see led on Swith button.

## Special Drag & drop on variable

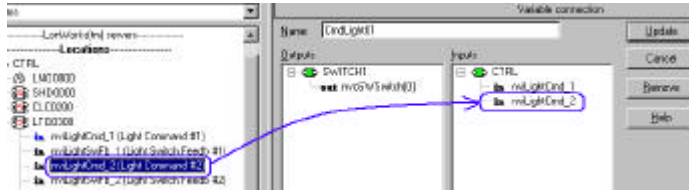
When you don't see the connection on nodes, but you know the variable is connected to something but you don't know with what.

1. Close the edit window on the right. (**this is very important**)
2. Select a blue variable « nviLightCmd_1 » on a node, press key « CTRL » and drag & drop this variable on edit view.
3. The « network variable connection » window appears with all properties visible.


Picture 85

You can modify this connection and update nodes.

4. Drag & drop variable «nviLightCmd_2 » in the connection edit view. (cf Picture 86)



Picture 86

**5.** Press Update and see how the light goes ON and OFF.

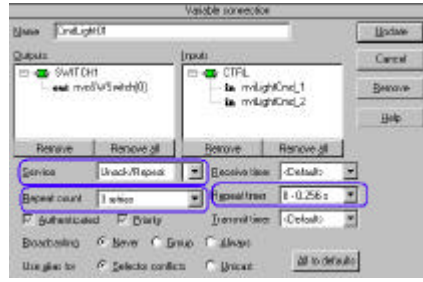
# Properties on binding

## Timers

To demonstrate operation on timers, we are going to modify properties of the preceding binding.

**1.** Open the connection « CmdLight1 ».

**2.** Modify Service by Unack/Repeat, Repeat Count by 3, Repeat timer by 0.256 seconds. (cf Picture 87) and press Update.



Picture 87

When you Switch the light ON or OFF, there is a long time between the two actions. To be exact: Send NV wait 0.25s, repeat 1 NV, wait 0.25s, repeat 2 NV, wait 0.25s, repeat 3 NV, wait 0.25s

Between two actions there is 1 second. If you try to command sunblind the same time is used to propagate your command. But the node memorises information in it's buffer.

**8.** Node can't treat more than one transaction at a time. When the first is finished, the next starts.

| Option | Description |
|---|---|
| Retries | Count or repeat count<br>- For acknowledged and request.response service, number of retries<br>- For unacknowledge/repeat, number of repetitions |

| | |
|---|---|
| Repeat timer | Time between two repetitions of an unacknowleged/repeat message |
| Receive timer | Time period within which receiving devices will treat messages from the same source with the same reference ID as duplicate messages |
| Transmit timer | Time between two acknowledged or request/response messages |

Each defaut value is based on network topology and channels.

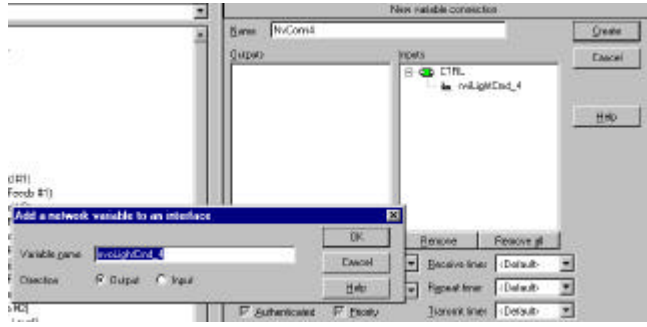
# Advanced binding

## Drag & drop connection with host

**1.** Drag variable « nviLightCmd_4 » on Main interface of Host (cf Picture 88).


Picture 88

**2.** A window appears to define name of host's variable (cf Picture 89).




Picture 89

**3.** Press OK for the name,

**4.** Press Create on « new variable connection »

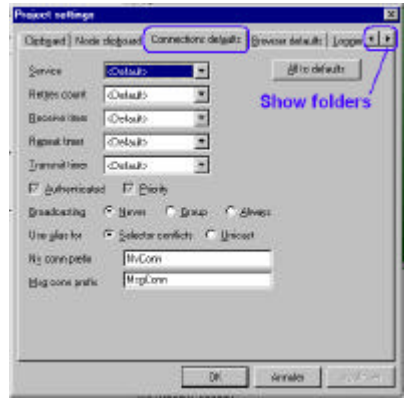
**5.** A variable on Host has been defined. (cf Picture 90)

Picture 90

## Default connection setting

If you want to create many connections with protocol change service or other parameters, you can define a new default value in project setting.

**1.** Press icon on general tool bar or launch project setting in project menu. A new window is shown. (cf Picture 91)




Picture 91

**9.** Each parameter is defined by default until you change project setting.

**10.** If you save project setting by default, all your projects will use this configuration for connection.

| Option | Default value |
|---|---|
| Service | Acknowledge |
| Retries count | 3 |
| Other parameters | Depend on media |

# PRACTICE N° 5

## Prepare your environment

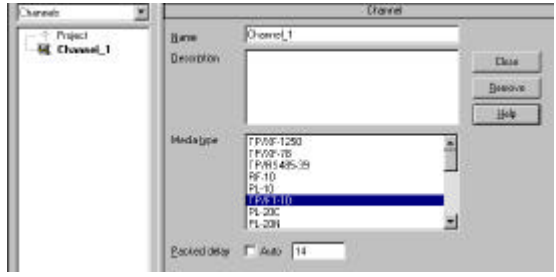
1. Create new empty project « EX06A »
2. Copy manufacturer file in import directory and create device template for:

   D13070HQINT07TA

   Dj24r22f

## Create channel

1. Show the tree channel with icon  on tree tool bar.
2. Edit channel with popup menu or drag & drop channel onto edit view. (cf Picture 92)




Picture 92

| Item | Description |
|---|---|
| Name | The Name you give to the channel<br>(It must be unique on database) |
| Description | Description of the channel |
| Media type | Media type of the channel. |
| Packed delay auto | If checked the packed delay is automatically determined. |
| Packed delay | The average number of milliseconds required for a packet to get onto the channel once queued.<br>Only if Packed delay auto is unchecked. |

Kind of channel type

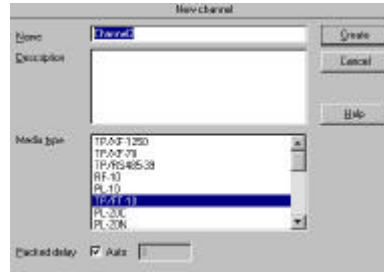
| Media type | Description |
|---|---|

| | |
|---|---|
| TP/FT10 | Free topology FTT10 or LPT10<br>78Kbit/s |
| TP/XF-125 | Twisted Pair topology bus 1.25 Mbit/s |
| TP/X-F78 | Twisted pair topology bus 78Kbit/s |
| PL-20C | Power line Cenelec (EN50065-1) |
| PL-20N | Power line Non cenelec |
| FO-10 | Fiber optic 1.25 Mbit/s |
| … | |

**3.** Create channel with popup menu on Project in Channel tree (cf Picture 93)


Picture 93

**4.** Write name « Channel2 » and select TP/FT-10 on media type (cf Picture 94).




Picture 94

**5.** Press 

. The new channel is displayed in Channel tree.

**6.** Rename «channel_1 » on «Main_channel » by editing Channel_1, change the name and update database.

## Create router

Routers are displayed in tree list when you press icon  in tree tool bar.

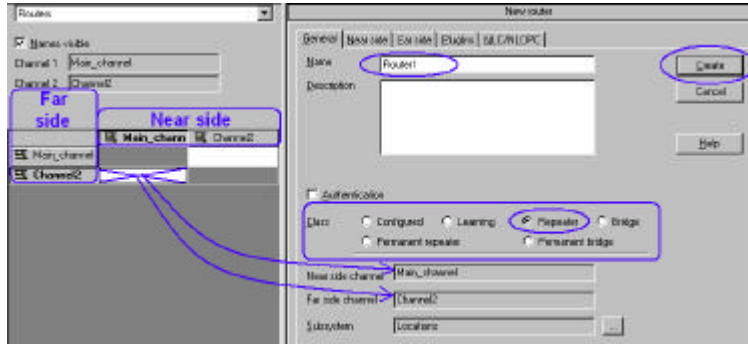
**1.** When you check « Name visible » name of channel is explicit.

Picture 95

**2.** Double click on a WHITE cell. A new window appears on right view (cf Picture 96).

**3.** The router has two sides. Near side (near the network interface) and Far side (far from network interface).

**4.** If you create a router you must select correct cell for creation. In new router window, the two sides are dearly defined. If it is not correct, cancel operation and recreate router.




Picture 96

**5.** Select class « repeater » for router

| **Router class** | **Description** |
|---|---|
| Configured | Router has a router table defined by NL220 |
| Learning | On each reset, the router table is cleared and recreates automaticaly |
| Repeater | All correct messages across the router in domain defined (no filtering) |
| Bridge | All correct messages across the router in all domains (no filtering) |
| Permanent repeater or Permanent bridge | If you choose one of the two permanent classes (Permanent repeater or Permanent bridge), you will not be able to change the class to a non permanent class. |

# Router parameters

## Near side folder on router

**6.** Select folder «Near side » look at information about it. You discover information equivalent to a node because the router is made with Neuron chip, like a node.


Picture 97

## Far side folder on router

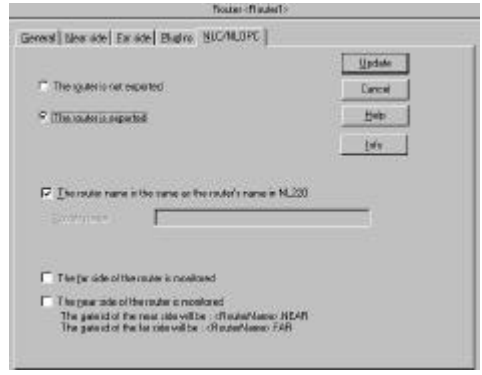
It is the same window with different Subnet definition.

## Plugins folder on router

Includes plugins list for router

## NLC/NLOPC folder on router

In this folder you can export the router to survey it with NLOPC if you wish.



Picture 98

## Routers on trees

**1.** Router in locations tree is defined with just one link (cf Picture 99).

Picture 99

**2.** Router in channel tree is defined with two links (cf Picture 100)

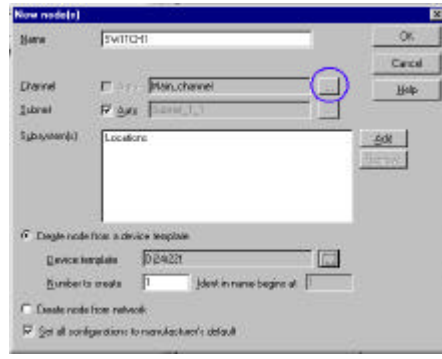
Picture 100

Each side is connected on one channel.

## Create node on channel

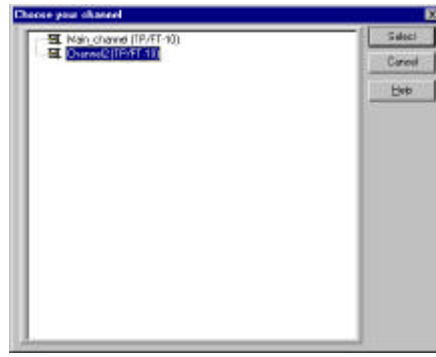
**1.** Create device « CTRL » with template « D13070HQINT07TA » on Main_Channel.

**2.** Create device SWITCH1 with template «Dj24r22f » on Channel_2 by pressing button shown in Picture 101.



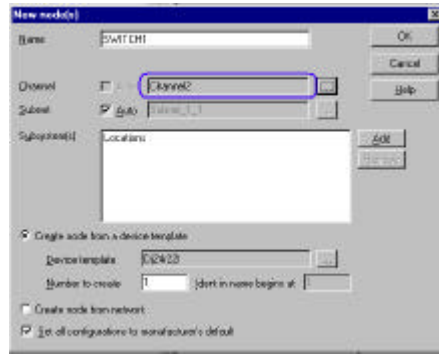
Picture 101

**3.** The new window appears for selecting channel (cf Picture 102) then press Select to validate.




Picture 102

**4.** Picture 103 shows you the channel modified for node SWITCH1. Press OK to create node.




Picture 103

# Move node on channel

## Move one node

**1.** To move node on channel, you edit node. In folder network, you can change the channel. When you update node, logical address changes.

**2.** Try to change channel three or four times on node and see the address. Subnet is equal to the subnet of channel, node is incremented on each creation. (cf Picture 104)


Picture 104

## Move mupltiple nodes

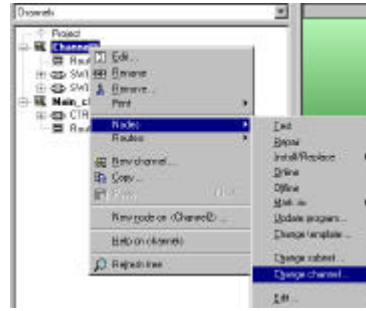
The second way to move nodes between channels is in channel tree.

**1.** Create a second node SWITCH2 on Channel2.

**2.** Open channel tree (cf Picture 105)


Picture 105

**3.** With popup menu on Channel2, launch «Change channel » on sub menu « nodes » (cf Picture 106)



Picture 106

**4.** A confirmation message appears (cf Picture 107)


Picture 107


Picture 108

**5.** You choose channel and press Select (cf Picture 108)


Picture 109

The result is shown in Picture 109.

**6.** If node is installed and router in class configured, you can't move node

**7.** between channels. Change router class, move nodes, restore router class.

## Transaction through routers

**1.** Messages take time to cross the router. In a correct network a message takes 5 to 20 ms to cross router TP/FT-10 on both sides.

**2.** If you bind variables across router, connection parameters must be controlled and modified.

All connections have a default value defined in project settings. When you have many bindings with the same value, different from default value, you can redefine default value. see Exo05.

# PRACTICE N°6

## Prepare your environment

**1.** Create new project « EX07A »

**2.** Copy manufacturer files in imports directory for:

D13070HQINT07TA

Dj24r22f

**3.** Create device template: Dj24r22f and D13070HQINT07TA

## Create multiply nodes

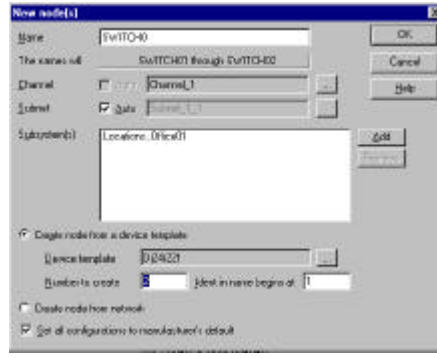
### Prepare subsystem and node

**1.** Create subsystem « Office01 » on subsystem « Locations »

**2.** Create node « CTRL1 » in subsystem « Office01 »

### Create multiply node from device

**3.** Create 2 nodes « SWITCH01 » and « SWITCH02 » on subsystem « Office01 » from template Df24r22f (cf Picture 110)




Picture 110

**4.** Create binding for CmdLight1 and CmdLight2 (cf Picture 111)

Picture 111

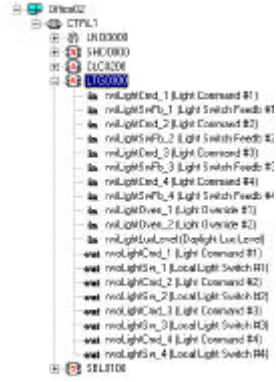
## Copy paste nodes

**1.** Create subsystem « Office02 »

**2.** Copy node «CTRL1 » with menu copy or key CTRL-C or popup menu « copy to memory »

**3.** Paste on subsystem « Office02 »

**4.** Open LonMark object on «LTG0300 » node « CTRL1 » and see the connection variables have been lost (cf Picture 112).



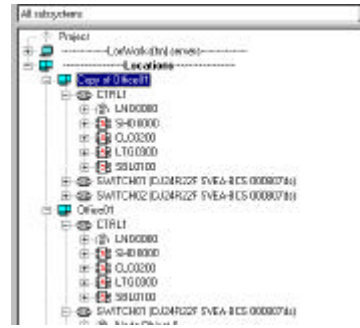
Picture 112

**5.** Copy node « SWITCH1 » in Office02

## Copy paste subsystem

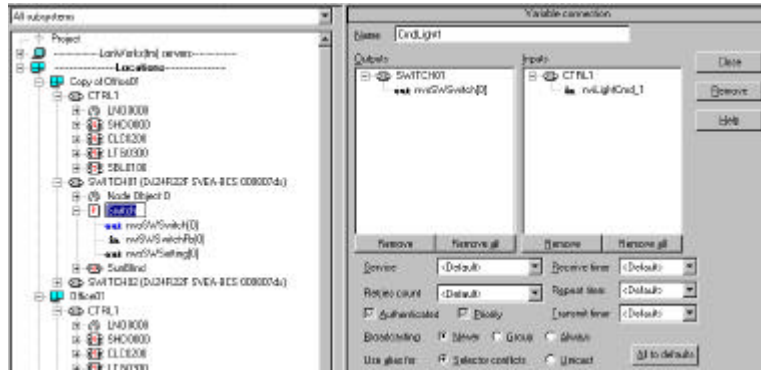
**6.** Copy subsystem « Office01 » with key CTRL-C

**7.** Paste on subsystem « Locations » (cf Picture 113)



Picture 113

**8.** Open LonMark object on «LTG0300» node «CTRL1» and see the connection variables have been kept.



Picture 114

**9.** Open connection network variable with key CTRL pressed and drag & drop variable « nvoSWSwitch[0] »

**10.** Modify service property on this connection by « Unack/Repeat » update connection and open connection on the same variable in subsystem « Office01 ». The service is set « Default ».

**11.** Change the name of subsystem « Copy of Office01 » to « Office03 »

**12.** In copy paste, the name of node, variable and connection are kept. All properties are copied and if you modify one. it is only modified locally.

## Properties of Copy Paste

There are many options on copy paste. All are available on clipboard tool bar (cf Picture 115).


Picture 115

| Icone | Operation | Description |
|---|---|---|
|  | Copy object | Copy subsystem or node in memory |
|  | Paste object | Paste subsystem or node |
|  | Copy original root subsystem | If checked the original root subsystem is copied |
|  | Copy child subsystems | If checked child subsystems are copied |
|  | Copy subsystem's nodes | If checked subsystem's nodes are copied |
|  | Copy subsystem's internal connections | If checked subsystem's internal connections are copied |
|  | Use nodes filter | If checked nodes filter is used for copying subsystem's nodes |
|  | Memorize subsystem's state | If checked NL220 will memorize subsystem's state when copying it into memory. In this case added items after copying the object will not be pasted |
|  | Duplicate node in all subsystems | If checked a node will be copied in all subsystems it belongs to Automatically generates subnet id If checked subnet id will automatically attribute to the new node. If unchecked the subnet id of the original node is always used. |
|  | Copy node configurations | If checked node's configurations will be copied (slows down node's copy) |
|  | Node's connections to host | **None:** No connections to host are made when copying a node |
|  | Node's connections to host | **Use device auto connections**: If checked the copied node will use the automatic connections of its template |
|  | Node's connections to host | **Use original node's connections**: If checked the copied node will have the same connections to the host as the original node |
|  | Detailed traces | If checked detailed traces appear in trace log view |

## Copy paste subsystem once more

**1.** Create subsystem « Level01 » in « locations »

**2.** Move «Office03 » in «Level01 ». A confirmation window appears. (cf Picture 116). When you press  (on French PC), the subsystem is moved with all nodes.


Picture 116

**3.** Move all other « Office0x » in « Level01 » (cf Picture 117)

Picture 117

**4.** Copy paste «Level01 » in «Locations » and change the name of this subsystem copied in « Level02 » (cf Picture 118)

Picture 118

**5.** Change name of node « Level02-Office03-CTRL1 » to « PANEL_CTRL1 »

**6.** Change name of node « Level02-Office03-SWITCH01 » to « PANEL_SWITCH01 »

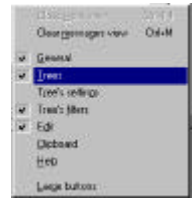
**7.** Change name of node «Level02-Office03-SWITCH02 » to «PANEL_ SWITCH02 »

Picture 119

# Filters on tree

## Shows tool bar tree's filters

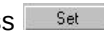
With right click on grey border of NL220 application a special window appears. You can check or uncheck all tool bar. (cf Picture 120)




Picture 120

**1.** Check Tree's filters and search the tool bar displayed in Picture 121.


Picture 121

**2.** Set in nodes box: « PANEL* » and press 

button on tool bar.

**3.** The tree refreshes and displays it (cf Picture 122)

Picture 122

## Recursive command filtered

**1.** Attach project to the network.

**2.** On Subsystem «Locations » Check recursive command and launch « Install uninstalled node ».

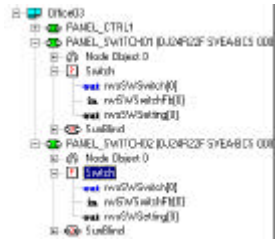
**3.** For each node uninstalled and found by filter you see an installing window (cf Picture 123)


Picture 123

**4.** Press Continue and press service pin of node requested.

**5.** Clear filter by pressing Clear on tree's filter tool bar.

**6.** All nodes are displayed, but just nodes started by PANEL are green. Binding on light 1 and light 2 are done on panel. (cf Picture 124)



Picture 124

# Reports

## Reports on node

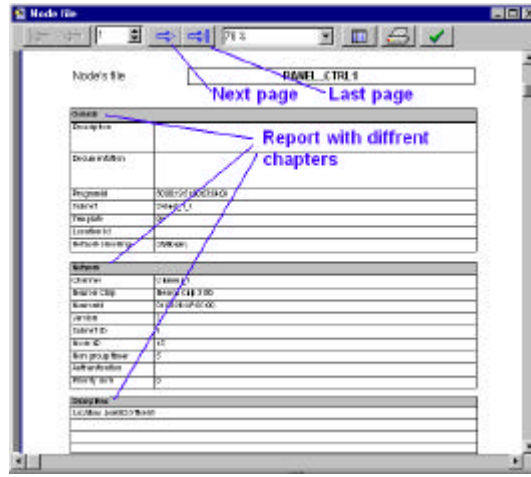
**1.** From popup menu on node, you can launch « Print… » (cf Picture 125)

Picture 125

**2.** After launch command, a window appears for selecting option (cf Picture 126). Printer is default value, screen and RTF file is available.

Picture 126

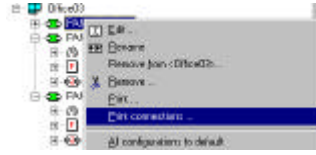
Picture 127 is a report window on node.




Picture 127

## Report on connection

**3.** From popup menu on node, you can launch « Print… » (cf Picture 128)



Picture 128

On node connection, all connection links with this node are reported.

Connections

**Selection** Connections of node <PANEL_CTRL1>.
**Filter** None

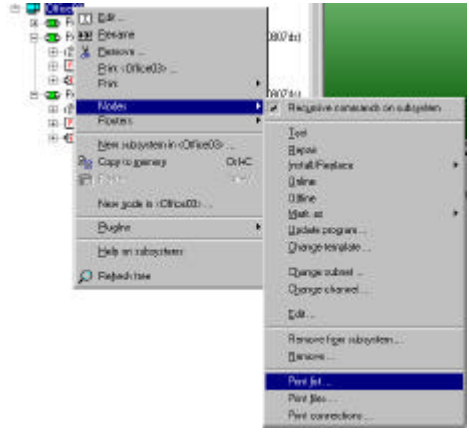
| CmdLight1 | | |
|---|---|---|
| PANEL_SWITCH01 | nwSWSwitch[0] | out |
| PANEL_CTRL1 | niLightCmd_1 | in |
| **CmdLight2** | | |
| PANEL_SWITCH02 | nwSWSwitch[0] | out |
| PANEL_CTRL1 | niLightCmd_2 | in |

Picture 129

## Recursive reports

In popup menu, recursive reports are three kinds (cf Picture 130).

| Action | Description |
|---|---|
| Print list | Report on general node information on subsystem |
| Print files | Reports detailed node information included in subsystem |
| Print connection | Reports list of connections in subsystem. |




Picture 130