Integrating the EX1200 with NI Switch Executive

INTRODUCTION

VTI Instruments provides IVI compliant instrument drivers with all EX1200 LXI modules. These drivers are intelligent, and are available in both IVI-C and IVI-COM flavors, which enables users to choose their favorite language for application development. These drivers can be configured such that they perform path level signal routings, in accordance to IVI-Switch guidelines. This intelligence, built into our drivers, will help programmers to relieve burden on application software, and maintain multiple switch module configurations, with ease.

In some cases, users may prefer to use specialized 3rd party tools, like NI Switch Executive (NISE) to help controlling a large number of switch paths. For example, when multiple EX1200 mainframes are used in a signal switching application, managing switch paths in test plans can be challenging. National Instruments Switch Executive uses information contained in the IVI Switch driver to create and control valid paths for the switch subsystem, such that it will be convenient for developers and intuitive for end users.

This application note, is intended to explain the configuration procedure of NI Switch Executive in NI MAX (Measurement & Automation Explorer), such that VTI's EX1200 based switch cards can be detected, configured and used effectively.

PREPARATION AND SETUP

This tutorial was created using National Instruments Switch Executive (Rev. 15.1) and VTI's VTEX Switch IVI Driver (VTI part # 72-0247-100 / Rev: 3.12.26). To prepare your system for this tutorial, make sure you have completed the following steps:

1. You have obtained, and installed suitable version of NI's Measurement & Automation Explorer (MAX), ver 15.0
2. You have obtained, and installed NI's Switch Executive (NISE).
3. You have downloaded, and installed a suitable version of the IVI Compliance Package from National Instruments
4. You have obtained, and installed the VTEXSwitch IVI driver from www.vtiinstruments.com

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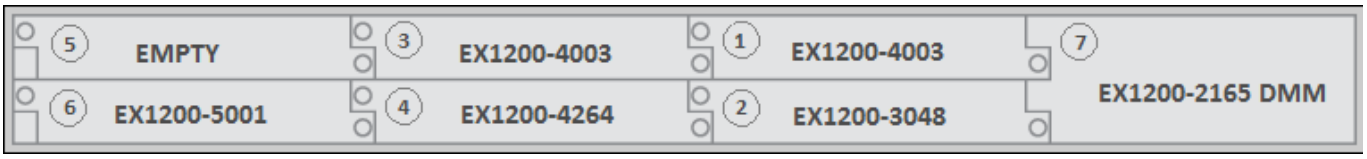
For the purposes of this tutorial, assume the following switching system to begin with

- EX1206A (6 slot mainframe) unit and modules with latest firmware, consisting of:



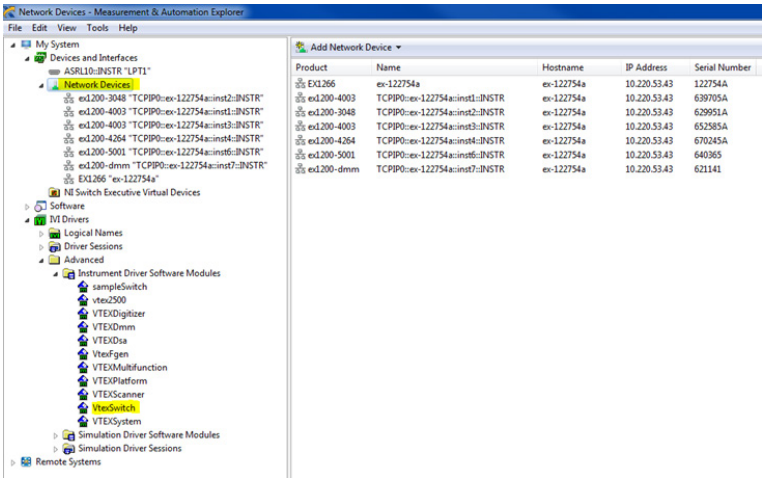
Application Example EX1206A Configuration

The instrument driver provided with the VTI Instruments EX1200 switches fully complies with the Interchangeable Virtual Instrument (IVI) Switch class specification. The significance of this is that the IVI driver contains switch topology information which is essential for creating correct switch paths. NI Switch Executive extracts the information from the IVI driver and creates the relevant topology map to allow correct switch paths to be created. Also, NI Switch Executive will help in assigning alias names for switch channels, in an interactive manner, which would otherwise require few driver calls.

In this example, we will use NI MAX to detect various switch cards plugged into the EX1206A chassis. In order for NI Switch Executive to use the IVI driver for switching, an IVI driver session must be created and defined in the IviConigurationStore.xml file. An editor for the configuration store is built into NI MAX, which makes creating and using Switch Executive routes relatively simple.

Step 1: Detect your EX1200 switch modules in NI MAX

VTI EX1200 instruments will be listed under "Network Devices" automatically. If not detected automatically, you can manually add the IP address of required EX1200 device to the list.



At this stage, also ensure that your IVI drivers are listed under My System >> IVI Drivers >> Advanced >> Instrument Driver Software Modules, section.

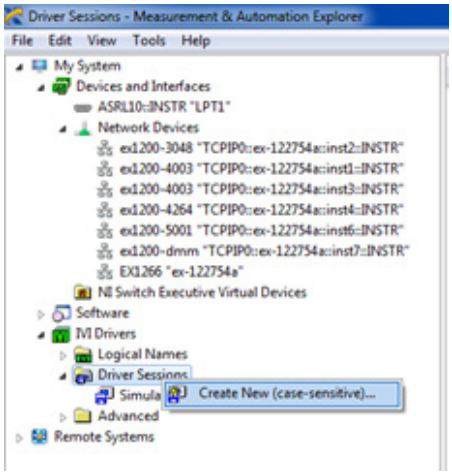
Step 2: Edit the IVI configuration store and create a driver session

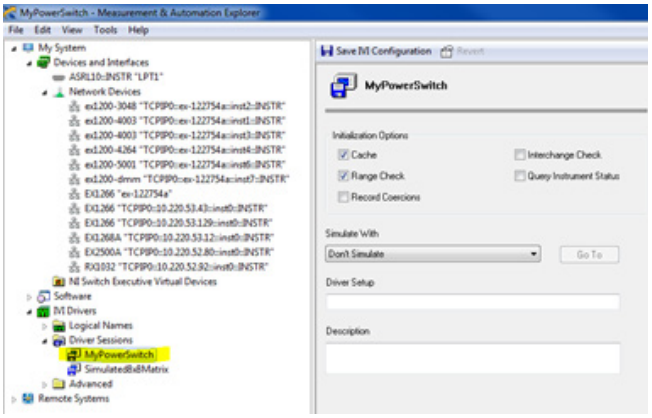
The first step to using NI Switch Executive is to create an IVI driver session. The IVI driver session information is contained in a file known as the IVI configuration store. Details of the IVI configuration store are beyond the scope of this application note and not necessary to know if just using NI Switch Executive. For detailed information, please refer to IVI foundation web site: www.ivifoundation.org

An IVI configuration store editor is built into NI MAX which can be used when configuring NI Switch Executive. The following steps demonstrate how to use the editor to create the driver sessions.

Step 2.1: Create a new driver session

Open NI-MAX with Switch Executive and right click on "Driver Sessions" and select "Create New…" from the pop-up menu. Rename the session as desired and press enter. Note that driver session names are case sensitive, and hence it is advised to give unique names. In this case the driver session is named as "MyPowerSwitch".



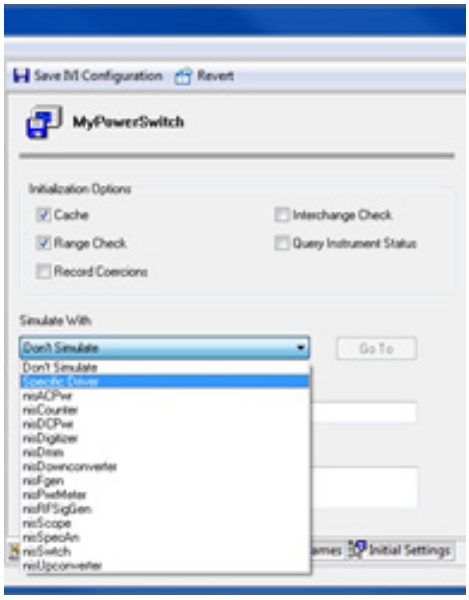


Step 2.2: Edit General Tab

After creating the new driver session, now we should edit the same. Select the "General" tab, from the right hand pane. In this tab, you can select various initialization options, based on your application management preferences.

The driver session set up can be done with or without the hardware present.

Now select the "Simulate With" dropdown box. If you have actual hardware connected to the system, you can choose the "Don't Simulate" option. If you don't have real hardware access, you can choose to simulate the hardware. In such case, set "Simulate With" to "Specific Driver". In our case, we have EX1200 hardware connected to the system, and hence we are selecting "Don't Simulate" option.

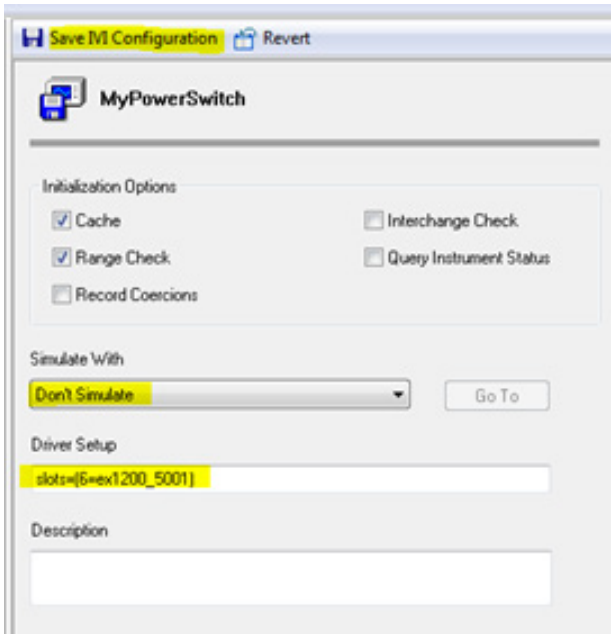


Step 2.3: Configure 'Driver Setup' in General Tab

The "Driver Setup" field must be entered correctly. This information is specific to each manufacturer's driver. In this case of VTI EX1200 switches, enter the string "slots=(n=ex1200_xxxx)", where n is the slot number, and 'xxxx' is the 4 digit model number of the switch. In this example, we would like to use EX1200-5001 switch, located in the slot-6 of the EX1200 mainframe. Hence the driver setup string will be, "slots=(6=ex1200_5001)"

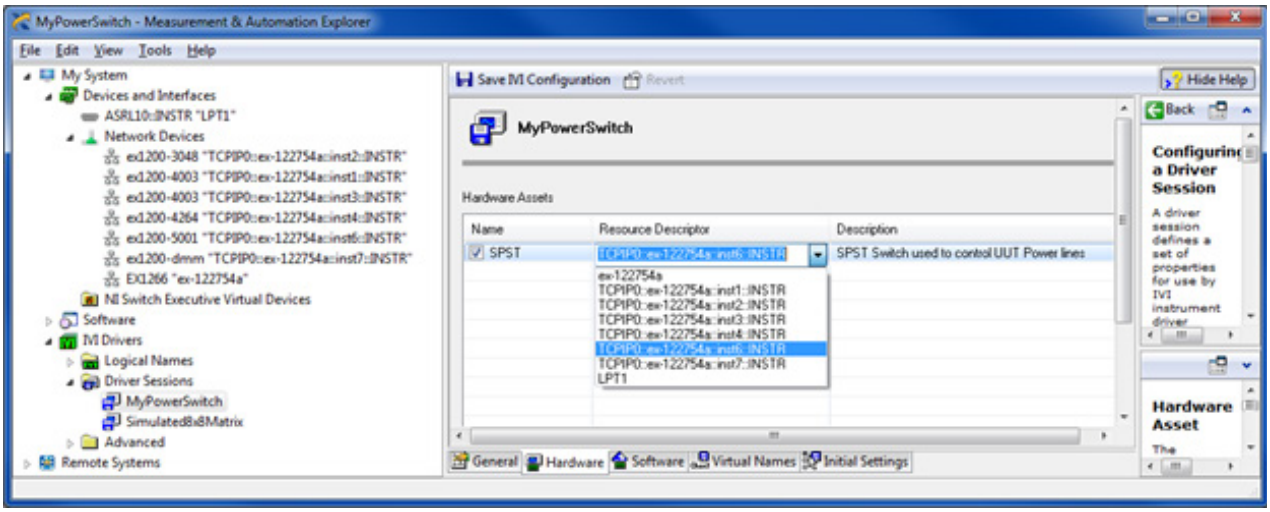
Note: Notice that the symbol between EX1200 and card model number, is underscore '_' and not hyphen '-'.

Save the configuration, by clicking on "Save IVI Configuration" button, and proceed to the "Hardware" tab for the next steps.



Step 2.4: Hardware setup tab

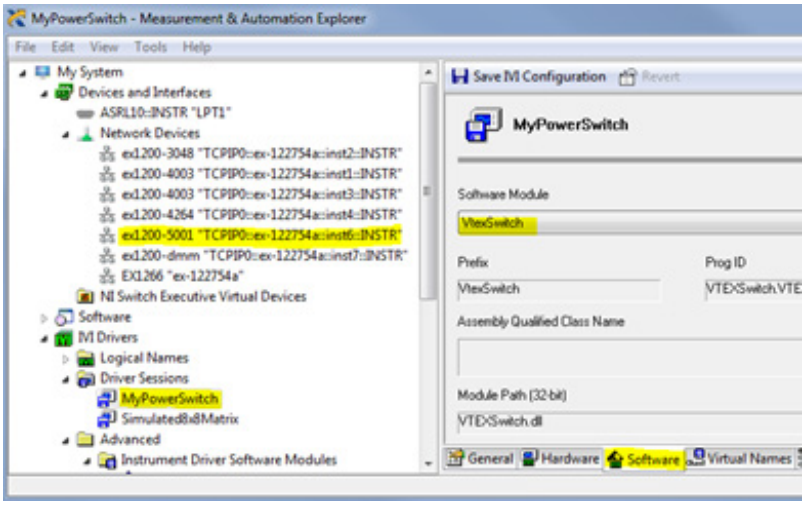
In this tab, you will be configuring the hardware, (if physically available) for the required IVI Driver Session. If you are simulating any switch card, then you don't have to configure this. In this case, we have an EX1200-5001 card available, and configured in NI MAX. You can create a meaningful name for your asset, and select the associated resource from the dropdown list box. In this case, the EX1200-5001 card is available with the VISA resource name of "TCPIP0::ex-122754a::inst6::INSTR". Select the check box, and save the configuration.



Note: Be sure to select the checkbox to the left of the Hardware Asset Name (multiple addresses may be present, be sure to select the correct one)

Step 2.5: Software setup tab

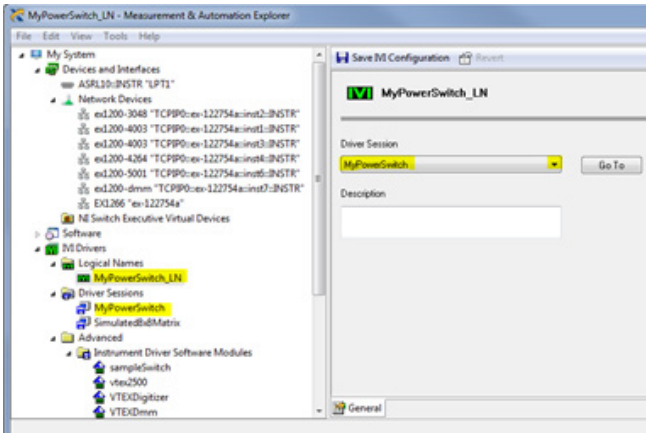
In this tab, you will be configuring the instrument driver, which you would like to be associated with your IVI Driver Session. In this tab, open the "Software Module" dropdown list, and select the "VtexSwitch" driver. After the driver is selected, various fields in this window will be populated with driver information. You may save the configuration, and proceed to the "Initial Settings" tab. Save the configuration, by clicking on "Save IVI Configuration" button.



Note: You don't have to configure "Virtual Names" and "Initial Settings" tabs. Virtual / Alias names for the channels can be created at later stage.

Step 3: Create a Logical Name

Create an IVI Logical Name which will be used by the switch path editor to access the driver session. Right click on "Logical Names", and select "Create New (case-sensitive)…" from the pop-up menu to create a new session. You can rename the session as desired. In this case the driver session is named "MyPowerSwitch_LN".

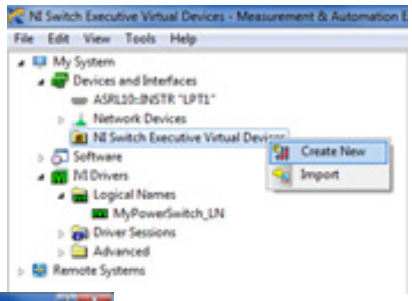


Now, select the "Driver Session" dropdown menu and select the driver session you have created.

Now we have successfully created an IVI driver session and logical name. Save the configuration, by clicking on "Save IVI Configuration" button. The NI Switch Executive, will now be able to use this information (stored in the IVI configuration store file) to create a configuration for a Switch Executive virtual device.

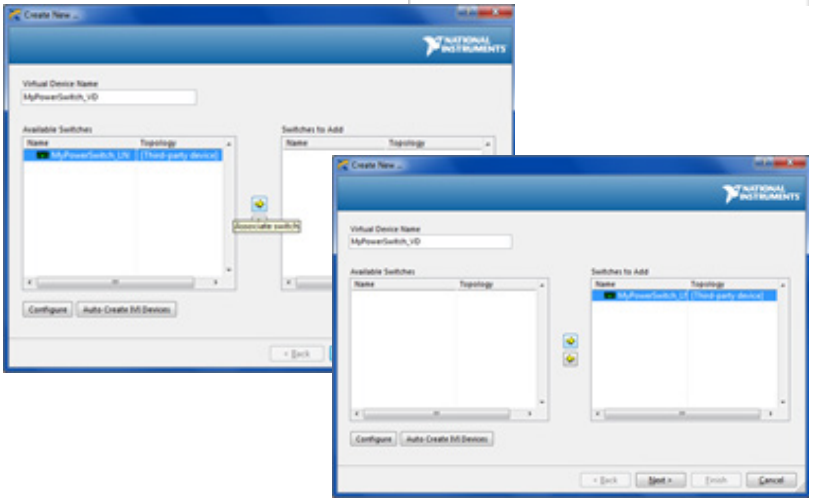
Step 4: Create and configure a Virtual Device for Switch Executive

An NI Switch Executive virtual device is a representation made up of switch modules, channels, wires and other components making up the switch block. Many Virtual Devices can exist together, using the same or different sets of hardware, and software combinations.



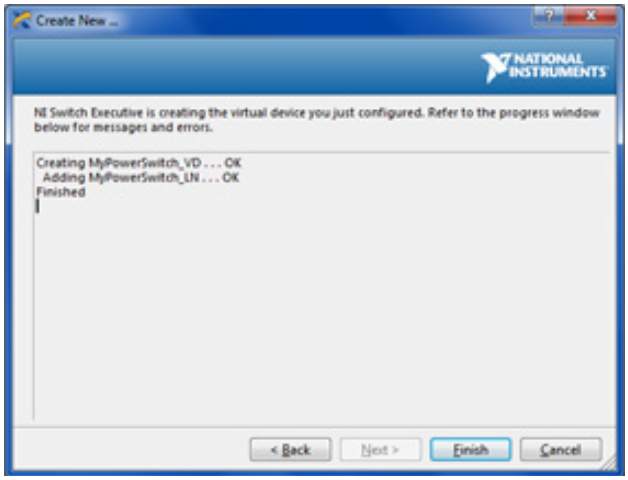
In order to create a new Virtual Device, right click on "NI Switch Executive Virtual Devices" and select "Create New", option from pop-up menu.

A new window will pop-up, which will help you to configure the Virtual Device session. In this window, change the "Virtual Device Name" to any meaningful alias name. In this application example, we named it as "MyPowerSwitch_VD". The "Available Switches" table on left, will show the list of IVI Switch Logical Names available. Select the required Logical Name (in this case, MyPowerSwitch_LN), and click the right arrow symbol. The Logical Name will now be added to the "Switches to Add" table on the right.



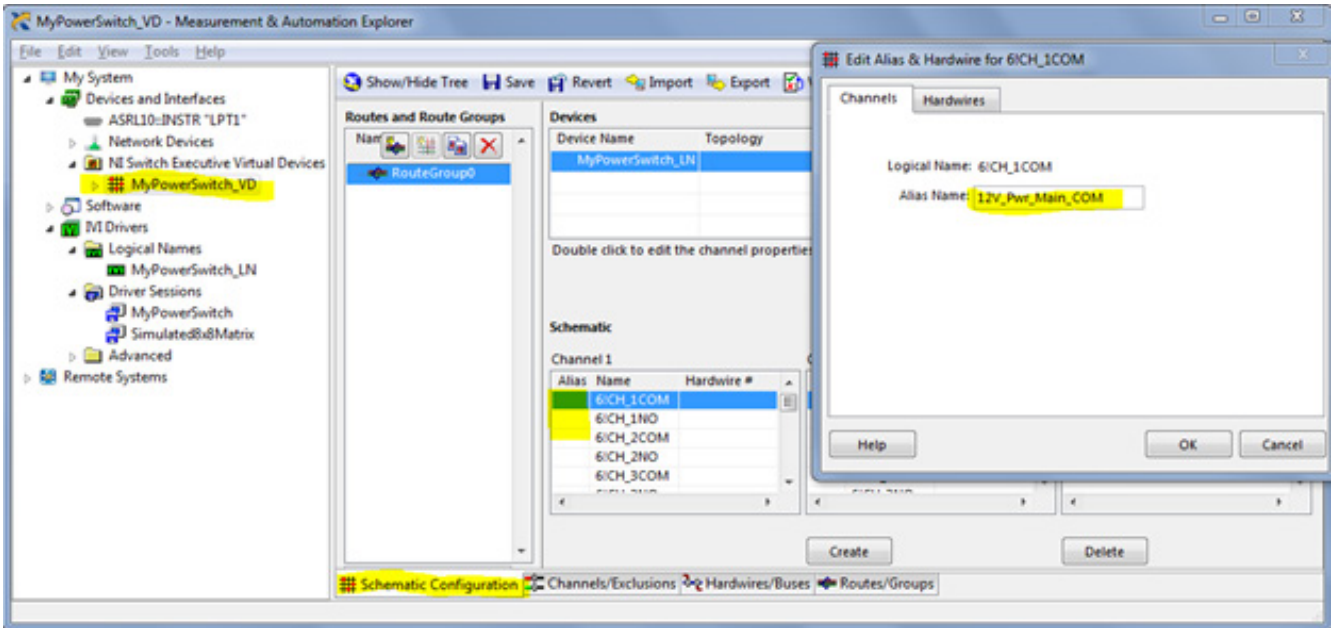
Click on the "Next" button to proceed further. A new window will pop-up, and shows the status of configuring the new virtual device. If this step, does not pop-up any error, it means that you have successfully created a new Virtual Device.

Click Finish button to exit this window. You will be returned to NI MAX, and you will be able to see a new Virtual Device created under NI Switch Executive Virtual Devices section. Upon selecting the same, you will see a window, which will allow you to configure your Virtual Device, further.



Step 5: Create Alias names for physical channels

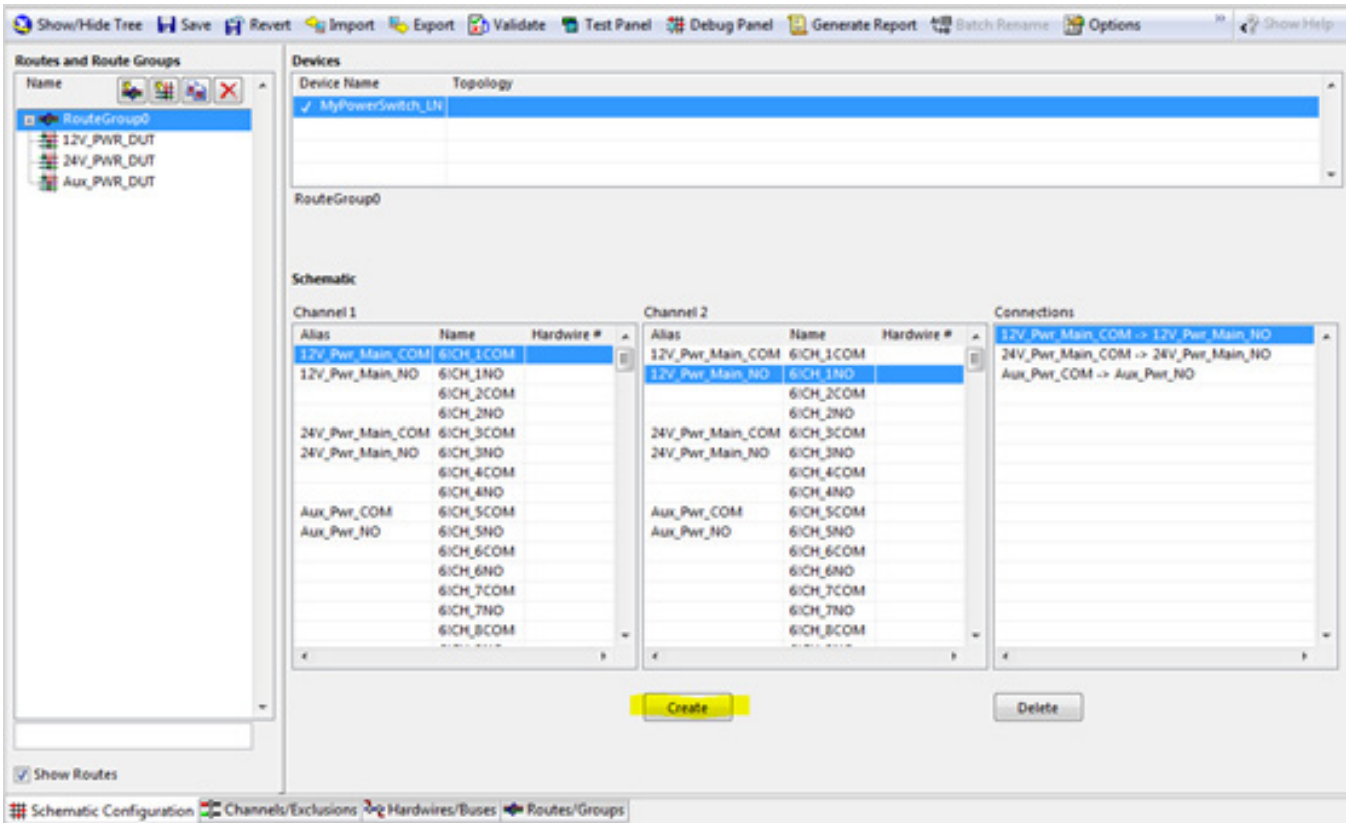
You will be able to configure Alias Names for each physical channel/pin, which will help you to remember and program, based on the context of application. In order to assign a new alias name, double click on the "Alias" column, against the required physical channel / pin name, in the schematic section of Schematic Configuration tab. A new pop-up window will open, which will help you to configure the Alias name. Note that it is also possible to name the channels using VtexSwitch drivers, by writing an application program code. Refer to driver documentation for associated calls and details. However, this method is less interactive, than using NI Switch Executive.



Step 6: Create New Connections between physical channels

You can interactively create new physical connections (routes) between physical channels. In order to do this, select appropriate source pin from the Channel-1 table, destination pin from the Channel-2 table, and click Create button. If this is a valid path, then a new route will be created, and will appear in the connections list. You can create, as many connections as possible, and name the route / group accordingly. Refer to NI Switch Executive documentation for more details. In this application example, we are using EX1200-5001 card, which contains 80 number of SPST (Form-C) switches. In this example, we have created a new connection between 6!CH_1COM to 6!CH_1NO, and renamed this route as 12V_PWR_DUT.

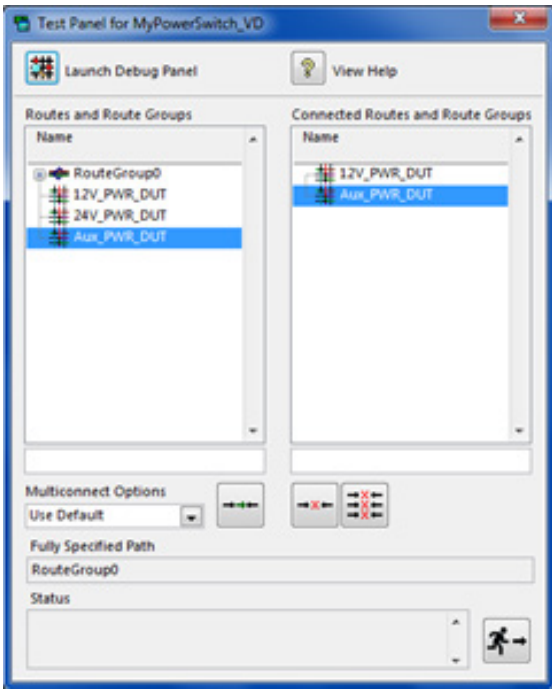
Save this configuration by clicking on the "Save" button on the top left side of window.



Step 7: Verifying the Signal Routes

You can interactively test the new signal routes you have just created. It is useful if you have real hardware connected to the system. In order to start verifying, click on "Test Panel" from the top menu. The Test Panel window will pop-up, where you can choose a route and select the "connect" button to close the route. If the hardware is present you will hear the relay click sound, and check the continuity between the associated connector pins. You can connect as many routes, as needed. To open / disconnect any path, select the route from the right table, and click on "disconnect" button . You can also choose to disconnect all routes, using a single click on "disconnect-all" button . Any errors in this routing will be mentioned in the Status box.

For additional and advanced options, you may refer to NI Switch Executive documentation.



SUMMARY

VTI Instruments provides fully compliant IVI Switch class specific drivers along with its switch hardware. Our drivers also packs the intelligence to execute path level signal routing, which can be accessed only though programming. Switch Executives, such as National Instrument's Switch Executive can provide an interactive means of controlling a large number of switch paths. Switch path editor like National Instrument's Switch Executive will use the information contained in the IVI switch driver to create and control valid paths for the switch. The steps outlined in this application note provide a quick start guide for using VTI's EX1200 series (LXI) switches with NI Switch Executive.