How to integrate CAEN HV in PVSS

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Login in **pccompass04** computer as **compassdcs**. Go to the directory /dcs/home/tab. 3 kinds of files are kept in this directory, as examples that you can edit, modify and use to do new integrations: **PVSS-CRATE.TAB**, **PVSS-BOARD.TAB** and **PVSS-CHANNEL.TAB**.

PVSS-CRATE.TAB is used to integrate new CAEN crates in the DCS system. The sintax is to put one crate per line. In each line, give the name of the crate (the name to appear in PVSS), and the type of crate, with a single space in between. The possible types are: **SY127, SY403, SY527** and **SY1527**.

PVSS-BOARD.TAB is used to integrate new CAEN modules into a crate already existing in the DCS system. Put one module per line. Sintax is as follows: name of the module, type of the module, slot number in crate (first slot is numbered 1), name of the crate. Leave only one single space between each info. The possible types of modules per crate type can be checked inside PVSS, from the DP_types "KnownSY[number]Boards" (**Para** module).

PVSS-CHANNEL.TAB is used to integrate CAEN channels into a module already existing in the DCS system. Put one channel per line. Sintax is: name of the channel, number of channel in module (numbering starts from 1), name of the module, "_FwCaenChannel" (without the commas). Leave only one single space between each item.

Start a PVSS user interface (using the command **dcsUI**). Login in PVSS as user **root**. In the Framework Device Editor Navigator panel (the one that opens by default) choose the **"editor"** option, then click on top of the **CAEN** view in the tree. On the right-hand side, the "Import CAEN Configuration Panel" opens. 3 different tabs are available: **Power Supplies** (integrate crates), **Boards** and **Channels**. The order of integration must be: first crate, then modules, and channels at last. Choose the file to load with the file selector, going first to the tab directory in the project, filtering, then selecting the file you already modified. Press the "Load File" button. In the table down, you should see appear the items you have in the file. The column **Status** will show "ok" for items that can be imported, and the "import" column will say "yes". If the status of one item is not ok, it means either there is a misprint in the file.TAB, or the device you are trying to integrate already exists in PVSS (in which case, you have to delete it first (to delete existing CAEN devices, use the Framework editor panels, not the **Para** module).

Select the "DIM Client Manager ID", according to the CAENET line where the concerned crate is placed. To check this, go to the **HV_SYSTEM** panel (in mode "Navigator") – from top to bottom of the panel: first line is DIM client 1 (and SLIC 1 on **pccofe14**); second and third lines are DIM client 5 (and SLIC 2 and 3 respectively, on **pccofe14** [1]); fourth line is DIM client 6 (and SLiC running on **pctri07**); and fifth line is DIM client 7 (and SLiC running on **na58pc037**). There exists a sixth line in this panel, for crate RICH_CCR2 of type SY1527, but this one is controlled via OPC server, and not DIM+SLiC.

In order to configure the addresses of the new channels in PVSS when using the chain **DIM+SLiC**, a **sim** manager needs to be running. This is because the PVSS0[number]dim is not a real driver. To configure addresses that will be associated with DIM client 5, for example, one needs to start the corresponding **sim manager**, that is PVSS05sim manager. To do so, go to a terminal window in pccompass04, and do the command:

[1] ATENTION: for slicmon in **pccofe14** SLICs are 1,2,3 but the _FwProcsMonitor datapoints that correspond to these in PVSS are SLiC_1, SLiC_2 and SLiC_5.

>PVSS0[number]sim -num [number] -PROJ home -log +stderr >>
/dcs/home/log/PVSS0[number]sim.stderr 2>&1 &

After you started the corresponding **sim** manager, go back to the PVSS panel where you were and select "DIM Server Manager ID"=2. Do "Select all" and press the "Import" button. The blue "progress bar" starts to move, while importing is being done. In the table, the imported items will appear in green in the "Import" column, with a text saying "done".

If you imported a new crate, you will have to add it by hand in the Framework "Device Editor Navigator" tree (in mode "editor" click on the parent leaf of the tree, and on the right-hand side of panel, select the "children" tab, choose the crate name you just imported, and press "add"). Check on previously integrated items for names consistency, etc. You also need to add the crate on the "HV_SYSTEM" navigation panel. For this, edit the panel in the graphical PVSS window (from a **dcsDevelopment** session). This panel is called hvSystem.pnl. Do copy/paste of one existing module of the same type, then modify it with the new name and CAENET ID. Save the panel. It is always convenient to save the old version of the panel with a different name, before you modify it.

In the **Framework** tree, select the "HV_SYSTEM" in "editor" mode, and expand it until you reach the crate where you added modules and/or channels. On the right-hand side of the panel, you see it appearing on red. If you double click on top of the module, a table with the inserted channels appears. Choose the "Modify Channel Panels" tab. For each channel, the **operation panel** must be fwCaenChannelOperation, and the **configuration panel** must be fwCaenChannelConfiguration. You may have to select it from the /dcs/packages/jcop_fw/panels directory. Always do "apply" after you "add" panels. From the tab "Add/delete Channels", select a channel, then press the button "Edit Configs". On the "Address" tab, configs must exist for all the appearing elements. If you edit one of them, you should see that the "DIM address" is selected, with the correct **driver number** for client. In the tab "Enable", you should see the correct DIM server (=2) selected, and DIM service "enableCmd" written on bottom.

It is now necessary to update the DIM config file. Before you do this, go to the directory /dcs/home/dplist and choose the correct DIM config, called **dimClientConfig.drv[number]**. Save this file with a different name (for example same as before, +".old[date]").

In the Framework "Device Editor Navigator" tree, select the **DIM** view, in "editor" mode. From the "DIM Client" tab, select the correct DIM Manager ID number. Then click on "create file from address config". The procedure will take several minutes, since all the framework datapoints will be checked for the address config. When it is finished a window will pop-up saying "DIM file config created successfully". From a terminal window, go to the directory /dcs/home/dplist and edit the **dimClientConfig.drv[number]** file. Search for the "heart_beat" definition. This definition has to be modified by hand:

- DIM 1:
  dcs1:SLiC_1.heart_beat,pccofe14_1_Fast$heart_beat, ,0,0
- DIM 5:
  dcs1:SLiC_2.heart_beat,pccofe14_2_Fast$heart_beat, ,0,0
  dcs1:SLiC_5.heart_beat,pccofe14_3_Fast$heart_beat, ,0,0
- DIM 6:
  dcs1:SLiC_3.heart_beat,pctri07_Fast$heart_beat, ,0,0

- DIM 7:
  dcs1:SLiC_4.heart_beat,na58pc037_Fast$heart_beat, ,0,0

After you modified by hand the DIM client config file, go again to the "DIM client" tab in the "DIM view" of the FW tree, and click the "Copy file to DIM Config DP" button. This is to propagate the modifications you just did.

Select the "DIM Server" tab, and click the "Copy_DimServer_DP to file" button, to propagate the subscription of the enable services for the new channels integrated (this is to allow enable/disable actions).

The DIM part of the new integration is finished. You have now to do the SLiC part. Login as user **onl** on the machine where the corresponding SLiC is running (see above to know the correspondence). Go to the directory /afs/cern.ch/compass/detector/control/SLiC/configFiles. In this directory you have the **SLiC** configuration files: **pccofe14_1.xml, pccofe14_2.xml** and **pccofe14_3.xml** (for SLiCs 1, 2 and 3 respectively on **pccofe14**); **pctri07.xml** and **na58pc037.xml**. Edit the correct config file, using **Emacs**, for example. Always save the old version of the file with a different name before you modify it. The structure of these files is as follows:

- First part is to give name of crate, its CAENet ID, type of crate; name of modules on this crate, and slot positions; name of channels in the module and their position. Note that the counting of positions for module in crate and channel in module (called "deviceid" in the config file) starts from **0** (contrary to PVSS, where counting starts from **1**).
- One very long line defines the members of the **fast** survey. This includes all monitored values for the channels and the modules. Sintax is [channel name]$readStatus (although, for some "channelStatus" appears instead – to be clarified with Mark Beharrel), and [module name]$readGeneralStatus, and a single space between each item.
- One very long line defines the members of the **slow** survey. This includes all set values for channels. Sintax is [channel name]$parametersPacket.
- Finally the list of "ReadonWrite items appears, for each channel: v0Set, v1Set, i0Set, i1Set, rUp, rDwn, tripTime.

Modify this config file by adding the new channels/modules/crates with care, following the structure of those already existing there. Do not insert extra blank spaces or line breaks. Misprints in these config files are one of the most common sources of non-succesfull integration...

Save the new config file for SLiC. Stop and restart the SLiC you modified, so that the new config file is read. To do so, do >slicmon stop [slicnumber] and >slicmon start [slicnumber].

Go back to **pccompass04**, and in a terminal window kill the corresponding DIM manager: >killall -9 PVSS0[dimnumber]dim. A window pops-up saying "DIM [number] crashed. Restarting it". The DIM API manager is automatically restarted, althouth it takes about 20 minutes to finish. You can view how it is proceeding in the log file:
>tail -f /dcs/home/log/PVSS0[dimnumber]dim.stderr.

After SLiC and DIM are restarted, the channels should be visible and updating in PVSS. One has now to put the alert_handling configs on the channels
(**dp[channel name].actual.hardwareAlarm** and **dp[channel name].actual.isOn**), and to propagate these to the corresponding crate alert_handling. This is done using the scripts

set_hardwareAlarm.ctl and set_isOn.ctl for the channels, and **set_hvSumAlert.ctl** to propagate to the crate. In a terminal window on pccompass04, do in this order:

- >/dcs/home/scripts/runctl set_hardwareAlarm.ctl
  There will be debugging and counting of the channels modified. After running this, the text field "hardware alarm" in the "Channels on module" panel of PVSS should display a background color (green if OK, yellow if OverCurrent, OverVoltage or UnderVoltage, red if Trip state).

- >/dcs/home/scripts/runctl set_isOn.ctl
  There is also debug and counting of the channels modified. After running this, the text field "is ON" in the "Channels on module" panel of PVSS should display a background color (green if the ON/OFF state requested is equal to the ON/OFF state received from hardware; orange otherwise).

- >/dcs/home/scripts/runctl set_hvSumAlert.ctl
  There is debug and counting of channels modified. If a message appears saying that "Fixing needed", edit the script for more details. It means the propagation was not fully successful. Sometimes the **isOn** alert is not propagated. In this case, it may be needed to add it by hand, in the **Para** module. After running this, the bottom of the crate drawing in PVSS (where the name of the crate and the CAENet ID are writen) should display a background color (green if everything is OK, or the color of alert from isON or from hardwareAlarm coming from the faulty channel).

  You can now kill the **PVSS0[number]sim** manager, it is not needed anymore.

After this, the integration should be finished. Check if everything is ok, by trying to modify some setting for one channel (i1 or v1, for example). If you don't see the new value you set in the readBack panel, it means something went wrong with the integration. Other symptoms that the integration is wrong is if you have to reaction to the ON/OFF command (if so, one of the first things to check is if the channel is enabled or disabled – it should display the "enable" status in the top right corner of the fwCaenChannel panel). Another symptom that something is wrong is if there is a response to commands, but they take a long time to take effect, or that a "sometimes it works, sometimes it doesn't" behaviour is observed.

If you conclude the integration is wrong and you cannot control and/or monitor the added devices, go through all the previous steps, and check everything carefully. If still you find no mistakes, stop and restart PVSS itself. Many times this solves the problem...