

How to run PVS LVS + Quantus parasitic RC extraction within OPDK v1.7.1

The current setup for parasitic extraction within the OPDK is configured to produce an Extracted View type output using PVS LVS and Quantus QRC tools. Please note that currently the SC_P layer is not modelled for parasitic extraction purposes. Three setups are provided instead:

Setup 1: Parasitic R's and C's are extracted everywhere, including the gate-source, gate-drain and drain-source capacitances.

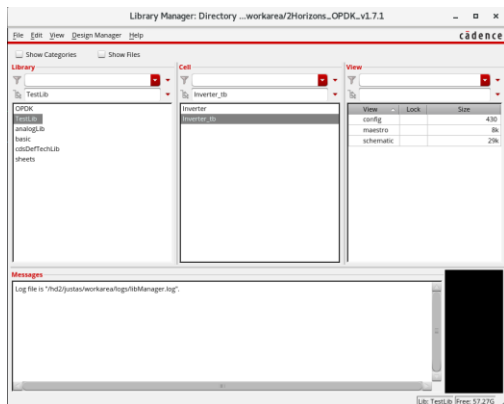
Setup 2: Parasitic R's and C's are extracted everywhere, excluding the gate-source, gate-drain and drain-source capacitances, that are directly covered by the drawn SC_P layer.

Setup 3: Parasitic R's and C's are extracted everywhere, excluding drain-source capacitances, that are directly covered by the drawn AA layer, which corresponds to the active area of the OFET.

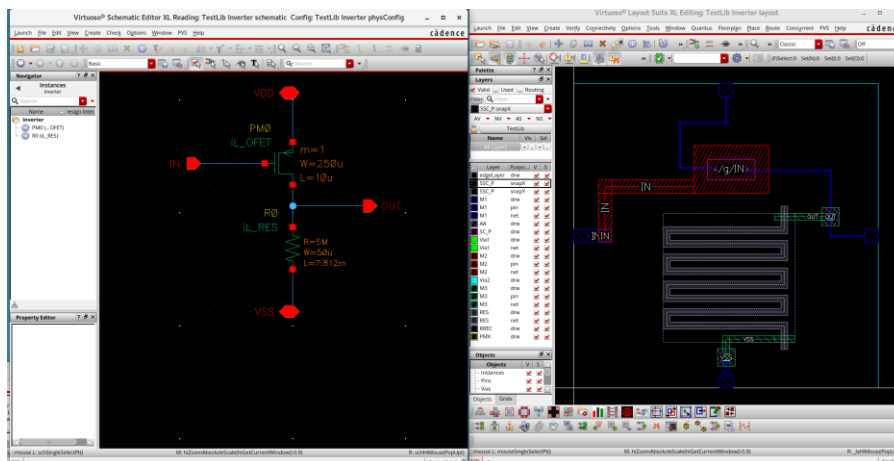
The procedure for generating the extracted view is as follows:

Step 1. If not done already, copy the pvtch.lib file from the template workarea (/projects/2-Horizons/Workareas/template) to your local workarea (/projects/2-Horizons/Workareas/<user>).

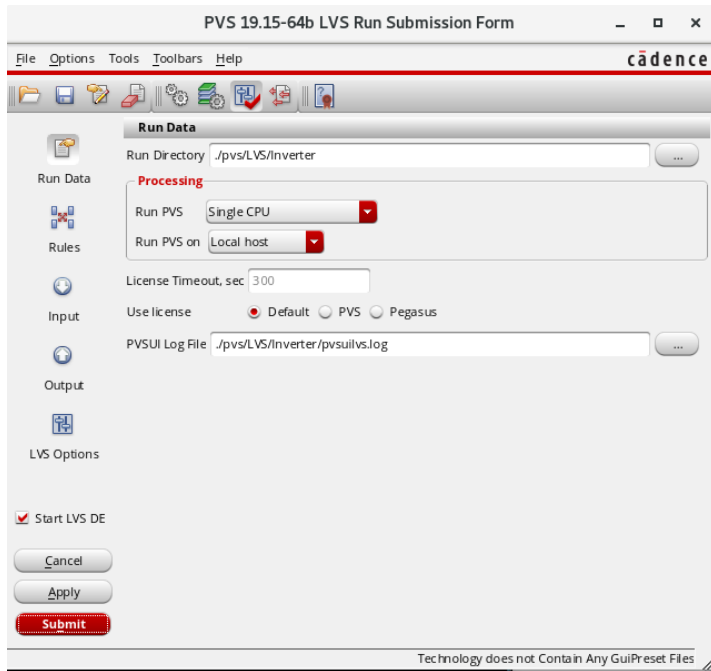
Step 2. Open Virtuoso version ICADVM 18.1 from your local workarea.



Step 3. Open a layout cellview that needs to be extracted for parasitics. In this example, we will select an inverter cell:

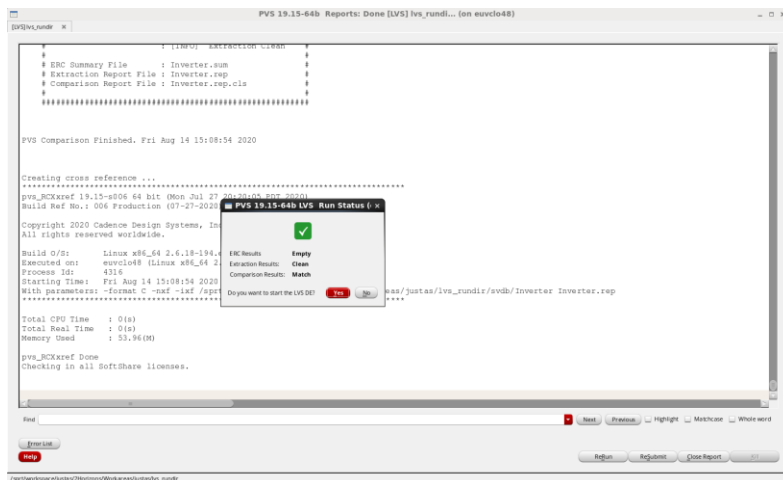


Step 4. From the Layout editor top banner menu, select PVS->Run LVS. LVS Run Submission Form appears. It is automatically populated with all the necessary values for a basic LVS run. The run directory is by default pointing to `./pvs/LVS/<Cellname>`.

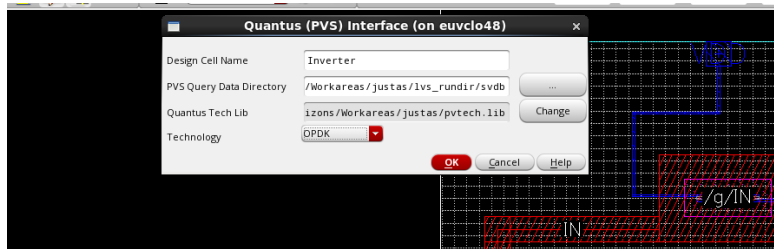


Step 5. Then in the LVS Run Submission Form, in the Rules tab, make sure that the Technology mapping file is pointing to `./pvtech.lib`, Technology is **OPDK** and the Rule set should be set to **default**. This will display the path to the `pvlLVS.rul` file under the Rules section. Also check that in the Output tab's Additional Output section, the check-box **Create Quantus QRC Input Data** is indeed checked.

Step 6. At this point, the LVS is ready to run. Click **Submit** on the bottom left corner of the form. Reports window will appear first, listing all LVS run related data in real time. Once the run has finished, the Run Status notification will be displayed. Before moving on to the parasitic extraction, make sure no major LVS errors exist in the design.



Step 7. Now parasitic extraction can be run. In the Layout editor window, navigate to the top banner menu, Quantus -> Run PVS – Quantus. In the Quantus Interface pop-up window, make sure that the Technology is set to **OPDK**. Click OK on this form.

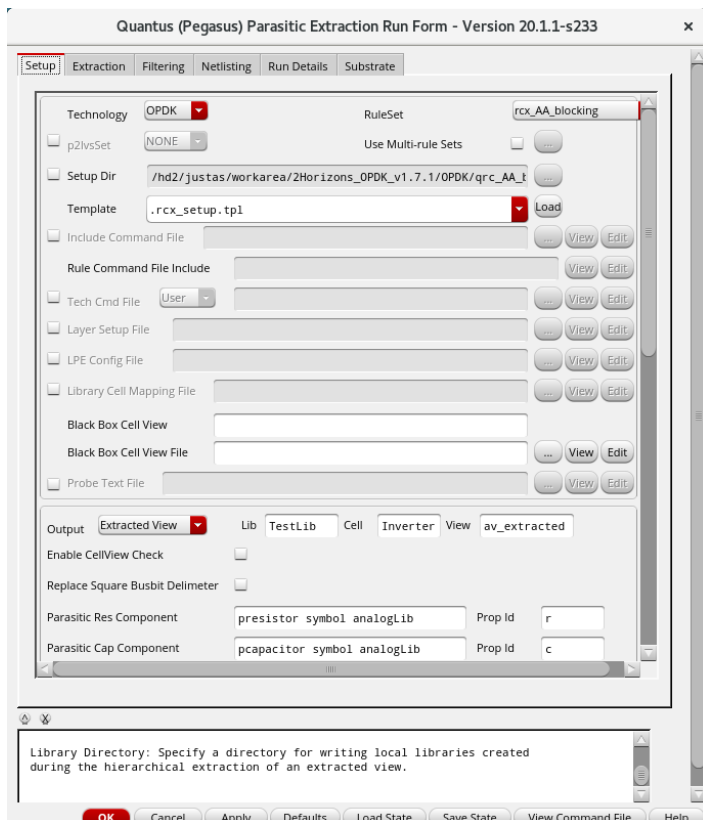


Step 8. The Quantus (PVS) Parasitic Extraction Run Form opens. In the Setup tab, select the appropriate RuleSet. Three choices are available:

- **rcx_no_SCP_blocking** corresponds to the Setup 1 mentioned in the first page of this document
- **rcx_SCP_blocking** corresponds to the Setup 2 mentioned in the first page of this document
- **rcx_AA_blocking** corresponds to the Setup 3 mentioned in the first page of this document

rcx_AA_blocking has been determined as the most suitable option while the SC_P layer support capability is being developed, but feel free to examine other modes too.

Once selected, the tool will automatically load a template file “.rcx_setup.tpl” which will populate the rest of the relevant fields within this form.



Double check that the Extraction tab appears as in the image below. Extraction Type should be **RC**, Ref Node - **gnd1** and the Cap Coupling Mode - **Coupled**.

The image shows the 'Quantus (PVS) Parasitic Extraction Run Form' with the 'Extraction' tab selected. The form contains the following settings:

- Extraction Type: RC
- Name Space: Layout Names
- Max fracture length: infinite (microns)
- Temperature: 25.0 C
- Cap Coupling Mode: Coupled
- Ref Node: gnd1
- Mult Factor: 1.0
- Extend Checking Distance: default
- Diffusion Equation R: ☒
- Ladder Network: ☐
- Net Selection Mode: Full Chip All Nets
- Field Solver: ☐
- FS Net Selection Mode: Full Chip All Nets
- Field Solver Type: Quantus FS
- Field Solver Accuracy: Default
- FS DP Configuration File: (empty)
- Custom Convergence: ☐
- Total Cap Convergence: ☐
- Coupling Cap Convergence: ☐
- Total Cap Convergence Threshold: ☐
- Coupling Cap Convergence Threshold: ☐

At the bottom, there is a text area for 'HRCX Cells' and a row of buttons: OK, Cancel, Apply, Defaults, Load State, Save State, View Command File, and Help.

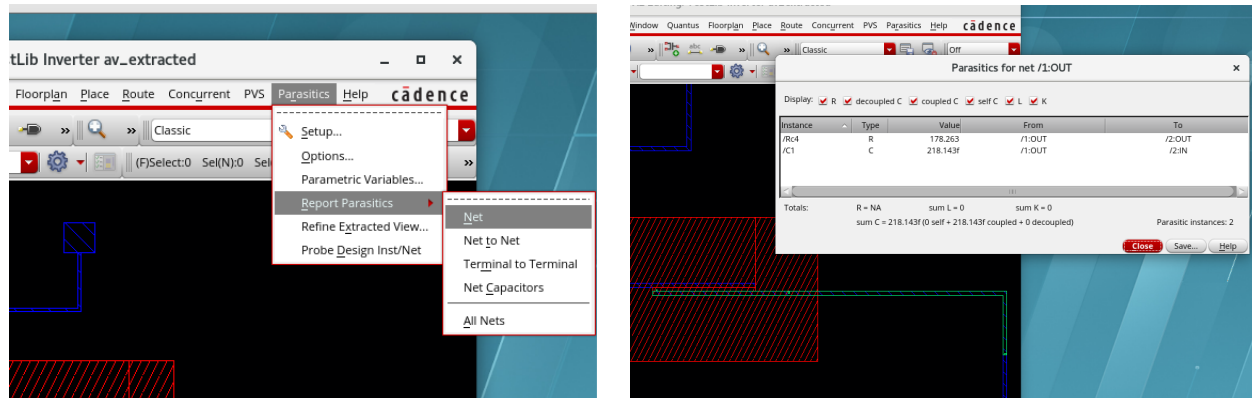
Step 9. Click OK on the bottom left corner of the form to start the parasitic extraction. At the end of the run, a Quantus Run status window will appear informing of the outcome:

The 'Quantus Run' status window displays the following information:

- The Quantus run "Inverter" completed successfully
- The output is in :
- Library: TestLib
- Cell: Inverter
- View: av_extracted

A red 'Close' button is located at the bottom right of the window.

Step 10. The newly created view `av_extracted` can be now opened separately for inspection. Open the `av_extracted` view with Layout XL. On top menu bar click Launch -> Plugins -> Parasitics. This will enable the Parasitics menu item on the top menu bar. Then navigate to Parasitics -> Setup, ensure that schematic cellview is pointing to the schematic that was used in this design and click OK. Now in the top menu bar, go to Parasitics -> Report Parasitics -> Net. You can now probe the nets on the design either from the Navigator assistant or by clicking directly on the shapes and a report window will appear summarizing the parasitic R's and C's for that net.



Step 11. This `av_extracted` view can also be used in the ADE Explorer/Assembler environments to run simulations and observe the effect of the parasitics on the circuit performance. Please refer to **TestLib -> Inverter_tb -> maestro** for an example of such simulation setup. Key points to note:

- The maestro view should use a config view as the design
- Config sweep can be created in the global variables section, which then allows to run the test with the Inverter cell as schematic and as `av_extracted`.