Instructions to Generate Violation Report by Innovus

These instructions explain a manual method for generating violation report by Innovus. You may also use the evaluator provided on contest webpage to do these steps automatically (see step 7).

1. Prepare LEF file and DEF file, and start Innovus. Here we use the testcase "ispd19_sample4.tgz" which you can download from http://www.ispd.cc/contests/19/index_2019.htm#benchmarks.

2. After extracting the testcase ispd19_sample4, you can see the following files.
    a. ispd19_sample4.input.lef   // given LEF file
    b. ispd19_sample4.input.def   // given DEF file
    c. ispd19_sample4.input.guide   // given global routing guide
    d. ispd19_sample4.solution.good.def   // contains good routing solution
    e. ispd19_sample4.solution.bad.def   // contains bad routing solution

3. Load the LEF and DEF files
    a. To load LEF file, type "**loadLefFile <LEF file name>**" in the Innovus command line. For testcase ispd19_sample4, you can do "loadLefFile ispd19_sample4.input.lef" in the command line.

    ```
    innovus 1> loadLefFile ispd19_sample4.input.lef

    Loading LEF file ispd19_sample4.input.lef ...
    Set DBUPerIGU to M1 pitch 200.

    viaInitial starts at Thu Oct 11 10:16:34 2018
    viaInitial ends at Thu Oct 11 10:16:34 2018
    innovus 2> █
    ```

    b. To load DEF file, type "**loadDefFile <DEF file name>**" in the Innovus command line. For testcase ispd19_sample4, you can do "loadDefFile ispd19_sample4.solution.bad.def" in the command line.

    ```
    innovus 4> loadDefFile ispd19_sample4.solution.bad.def
    Creating netlist for top cell: ispd19_sample4 ...
    Reading 67 COMPONENTS ...
    Done.
    Reading 0 PINS ...
    Done.
    Reading 2 SPECIALNETS ...
    Done.
    Reading 22 NETS ...
    Done.
    *** End DEF_netlist parsing (cpu=0:00:00.0, real=0:00:00.0, mem=450.6M) ***
    Writing Netlist "ispd19_sample4.solution.bad.def.v" ...
    Resetting process node dependent CCOpt properties.
    Free PSO.
    Resetting process node dependent CCOpt properties.
    **WARN: (IMPCK-8086):   The command setCTSMode is obsolete and will be remo
    ved in the next release. This command still works in this release, but by t
    he next release you must transition to the CCOpt-based CTS flow.
    Set DBUPerIGU to 1000.
    Set net toggle Scale Factor to 1.00
    Set Shrink Factor to 1.00000
    Set net toggle Scale Factor to 1.00
    Set Shrink Factor to 1.00000
    ```

c. Now you can visualize routing solution in the Innovus GUI for testcase ispd19_sample4. If you cannot see nets displayed on the GUI, please click the highlighted icon in the following picture.
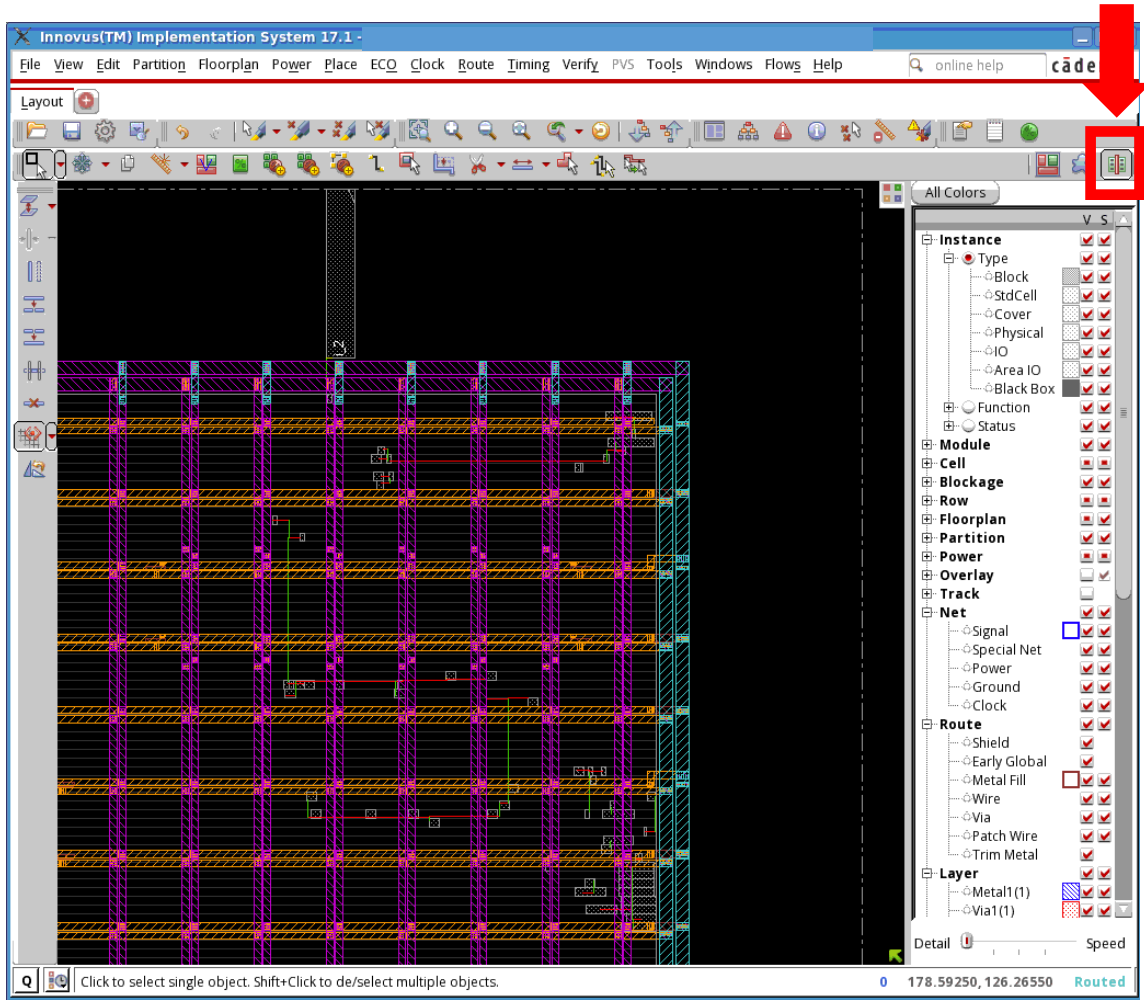
4. To verify DRC, click "Verify" in the menu bar, then click "Verify DRC…", and click "OK" in the pop-up window. You can also type "**verify_drc -report <report file name>**" in the Innovus command line. Either way, a geometry violation report will be generated in the same folder. A sample DRC report file is shown below, which shows the DRC violation type and location.
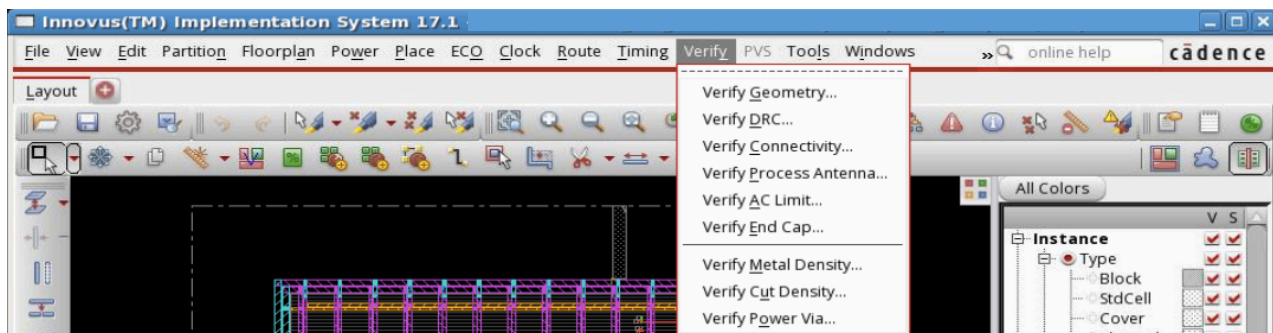
```
###########################################################
#  Generated by:       Cadence Innovus 17.10-p006 1
#  OS:                 Linux x86_64
#  Generated on:       Sun Oct 14 06:30:15 2018
#  Design:             ispd19_sample4
#  Command:            verify_drc
###########################################################
#set_verify_drc_mode -check_implant true -check_implant_across_rows false -check_ndr_spacing false -check_same_i
ivia_cell false -disable_rules "" -exclude_pg_net false -ignore_trial_route false -limit 1000 -report ispd19_sami
iple4.drc.rpt

MAR: ( Minimum Area ) Regular Wire of Net n_5488  ( Metal2 )
Bounds : ( 156.195, 156.375 ) ( 156.305, 156.425 )


MAR: ( Minimum Area ) Regular Wire of Net n_5488  ( Metal3 )
Bounds : ( 156.225, 156.345 ) ( 156.275, 156.655 )


MAR: ( Minimum Area ) Regular Wire of Net n_5494  ( Metal2 )
Bounds : ( 159.895, 157.175 ) ( 160.005, 157.225 )


MAR: ( Minimum Area ) Regular Wire of Net n_5496  ( Metal2 )
Bounds : ( 159.895, 157.375 ) ( 160.029, 157.391 )


MAR: ( Minimum Area ) Regular Wire of Net n_5973  ( Metal2 )
Bounds : ( 161.070, 160.024 ) ( 161.205, 160.025 )
```

5. To verify connectivity, click "Verify" in the menu bar, then click "Verify Connectivity…", select "Regular Only" in the "Net Type" and click "OK" in the pop-up window.

You can also type "**verifyConnectivity -type regular -report <report file name>**" in the Innovus command line. Either way, a connection violation report will be generated in the same folder. Part of a sample connectivity report is shown below.

```
###########################################################
#  Generated by:       Cadence Innovus 17.10-p006_1
#  OS:                 Linux x86_64
#  Generated on:       Fri Oct 12 18:22:15 2018
#  Design:             ispd19_sample4
#  Command:            verifyConnectivity -type regular -report connectivity.rpt
###########################################################
Verify Connectivity Report is created on Fri Oct 12 18:22:15 2018



Net n_2037: has regular routing with opens at (115.498, 125.989) (117.863, 149.100)
Net n_2037: has regular routing with opens at (113.542, 149.057) (113.755, 149.152)
Net n_2037: dangling Wire at (113.550, 149.100) (113.550, 149.100) on layer: Metal2
Net n_2037: dangling Wire at (117.350, 149.100) (117.350, 149.100) on layer: Metal3

Begin Summary
     2 Problem(s) (IMPVFC-92): Pieces of the net are not connected together.
     2 Problem(s) (IMPVFC-94): The net has dangling wire(s).
     4 total info(s) created.
End Summary
```

6. To see a violation-free solution, load "ispd19_sample4.solution.good.def". After verifying DRC, you will have the following two reports showing no violation.

```
###########################################################
#  Generated by:       Cadence Innovus 17.10-p006_1
#  OS:                 Linux x86_64
#  Generated on:       Fri Oct 12 16:27:09 2018
#  Design:             ispd19_sample4
#  Command:            verifyGeometry
###########################################################


Begin Summary ...
  Cells        : 0
  SameNet      : 0
  Wiring       : 0
  Antenna      : 0
  Short        : 0
  Overlap      : 0
End Summary

No DRC violations were found
```

```
###########################################################
#  Generated by:       Cadence Innovus 17.10-p006_1
#  OS:                 Linux x86_64
#  Generated on:       Fri Oct 12 18:19:02 2018
#  Design:             ispd19_sample4
#  Command:            verifyConnectivity -type regular -report connectivity.rpt
###########################################################
Verify Connectivity Report is created on Fri Oct 12 18:19:02 2018




Begin Summary
    Found no problems or warnings.
End Summary
```

7. We will provide an evaluator script to read the two reports and output a score. The evaluator will be provided by 12/15/2018.