

Insert buffers and inverters by Gates On the Fly

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Introduction

Inserting buffers and inverters in timing paths are very common in gate level netlist timing ECOs. It becomes complicated when netlist has huge size. The following paragraph demonstrates how to insert buffers and inverters into timing path.

GUI mode ECO

Start up GOF

Start up Gates On the Fly by the command line

```
gof -lib t65nm.lib -lib io.lib netlist_port.v
```

For detail usage, visit this link

<http://www.nandigits.com/usage.htm>

In GofViewer netlist window, press ctrl-g or menu commands->'Launch GofTrace with gate'. Fill in the instance name that needs ECO.

Gates On the Fly Use Case: Insert buffers and inverters

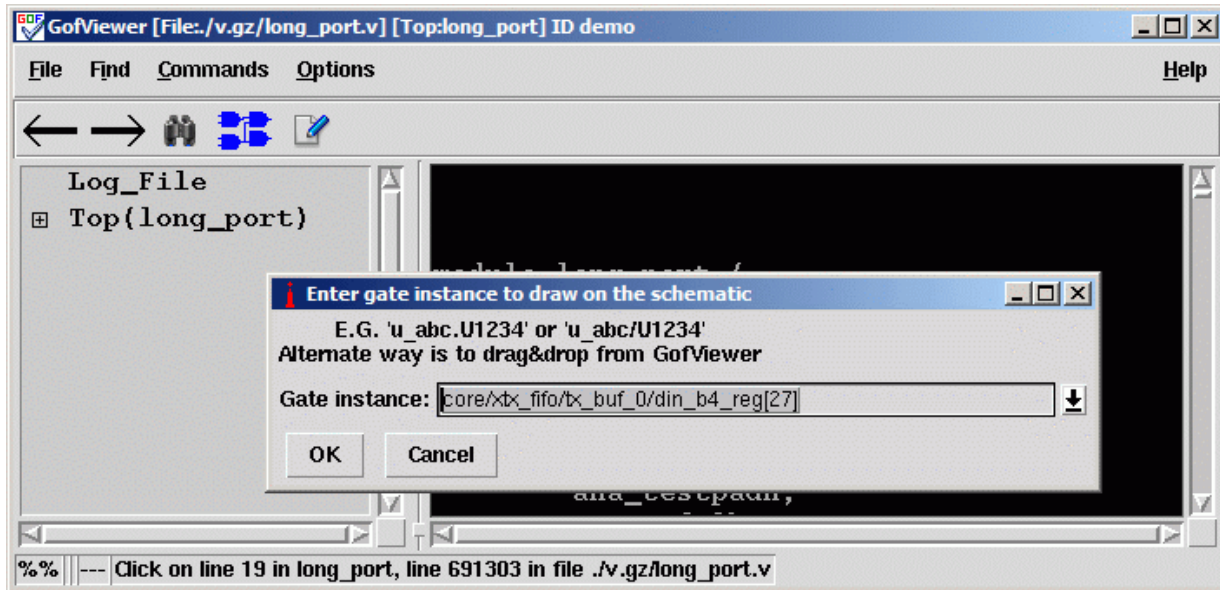


Figure 1

Create partial schematic

In GofTrace schematic window, use mouse middle button to expand the schematic. In this case, pin D of the flop should be inserted an invert.

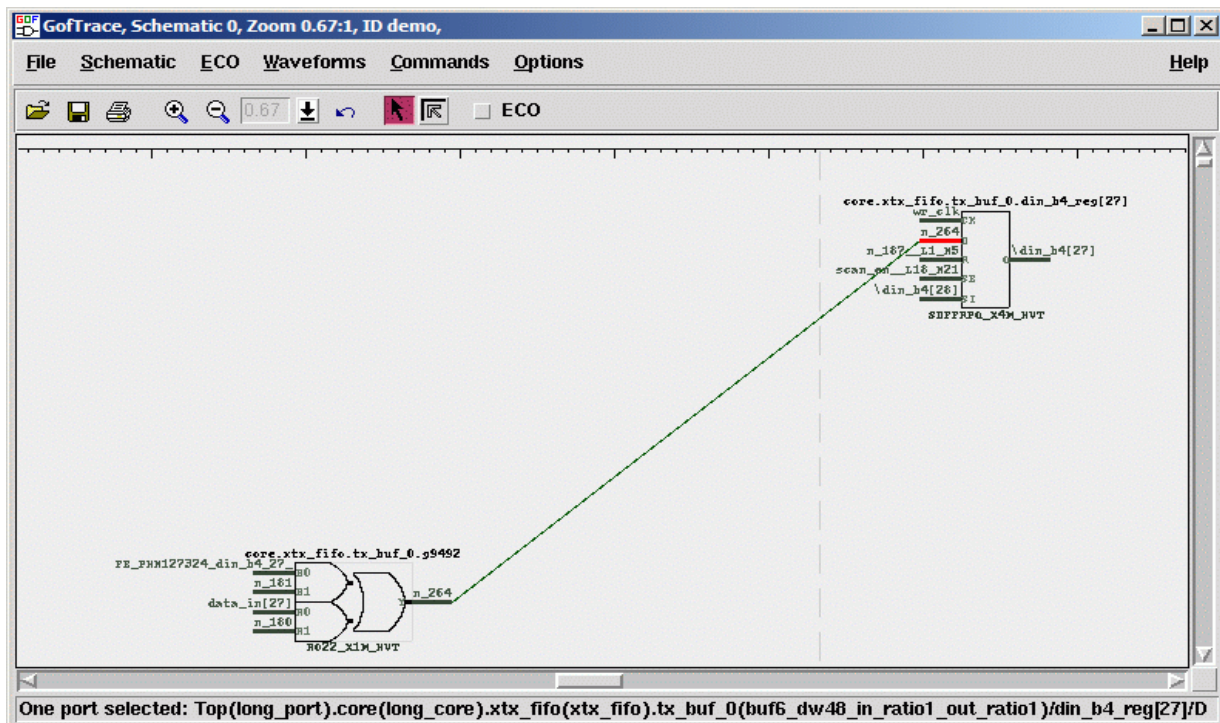


Figure 2

Do ECO on schematic

Check ECO button to enable ECO mode

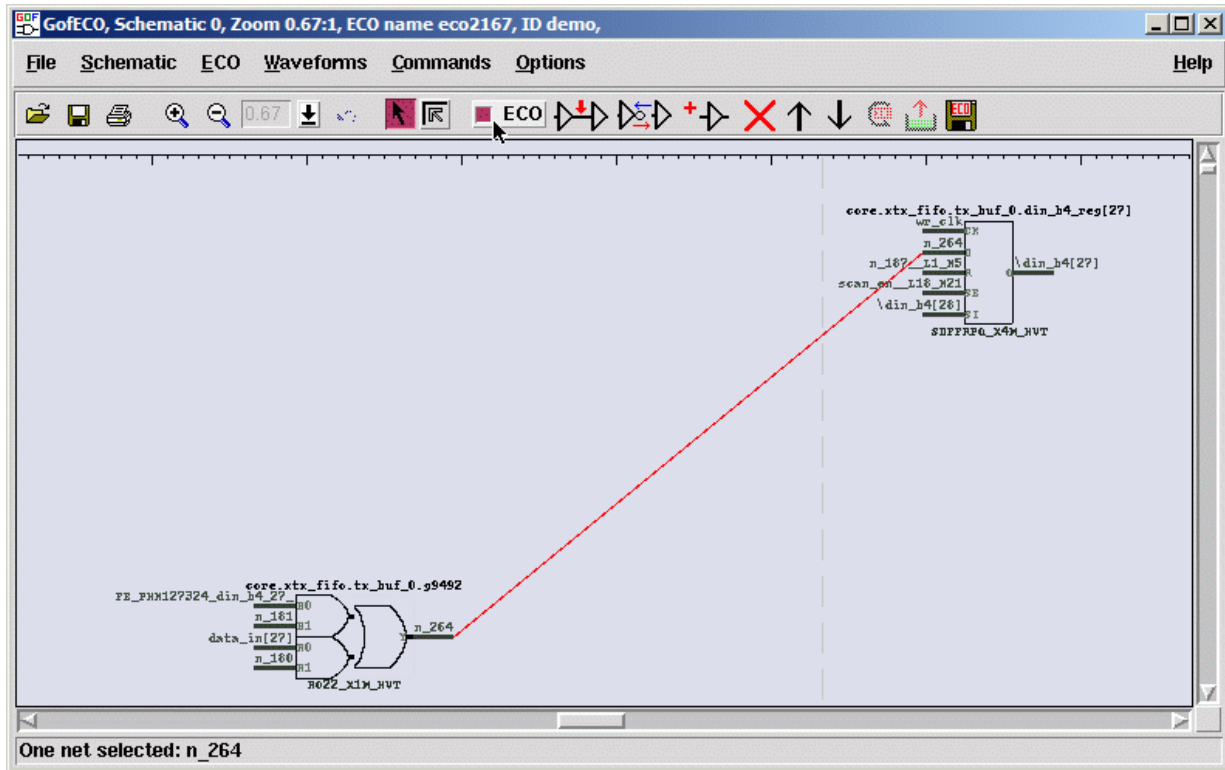


Figure 3

Gates On the Fly Use Case: Insert buffers and inverters

Press mouse-left-button on the wire to select it. Click ECO button 'Insert gates into connections', select the right invert in the gate type selection window.

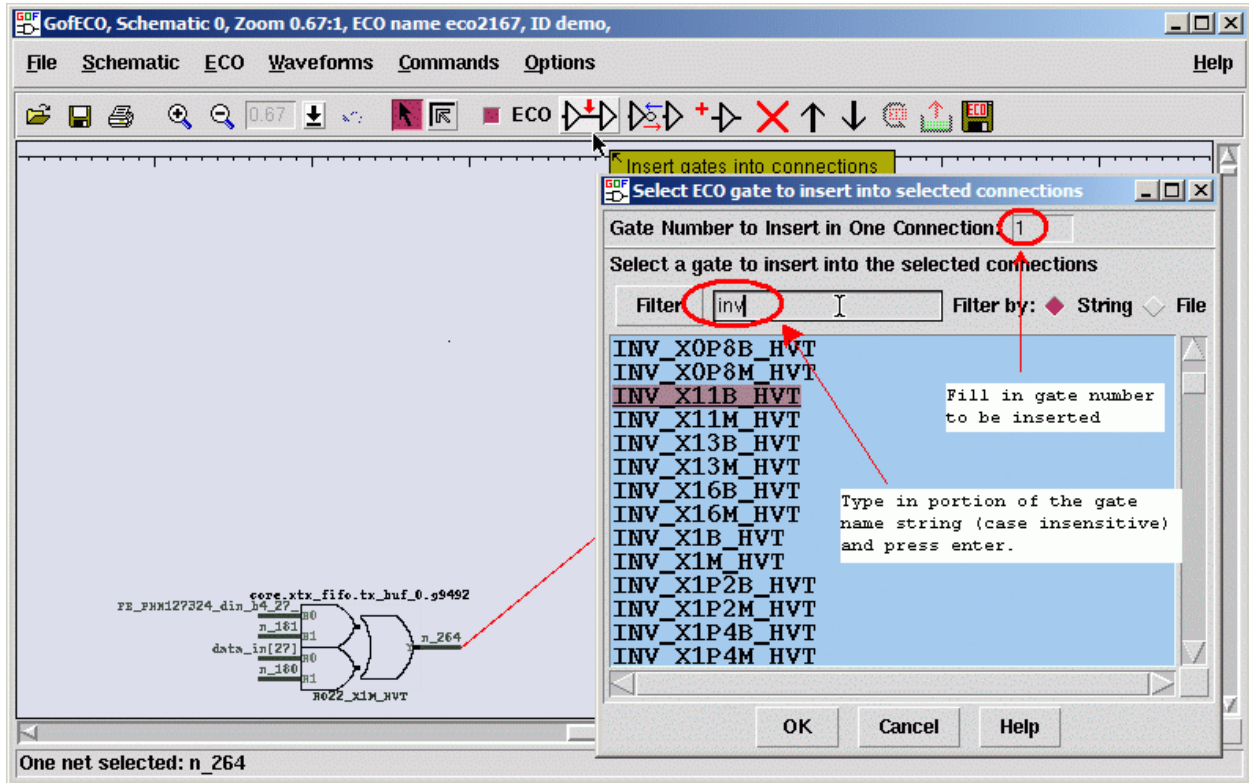


Figure 4

In 'Pin Connections' setup window, use default 'Complete Loop' option, so that the gate can be inserted in the net.



Figure 5

Click OK and the invert is inserted.

Gates On the Fly Use Case: Insert buffers and inverters

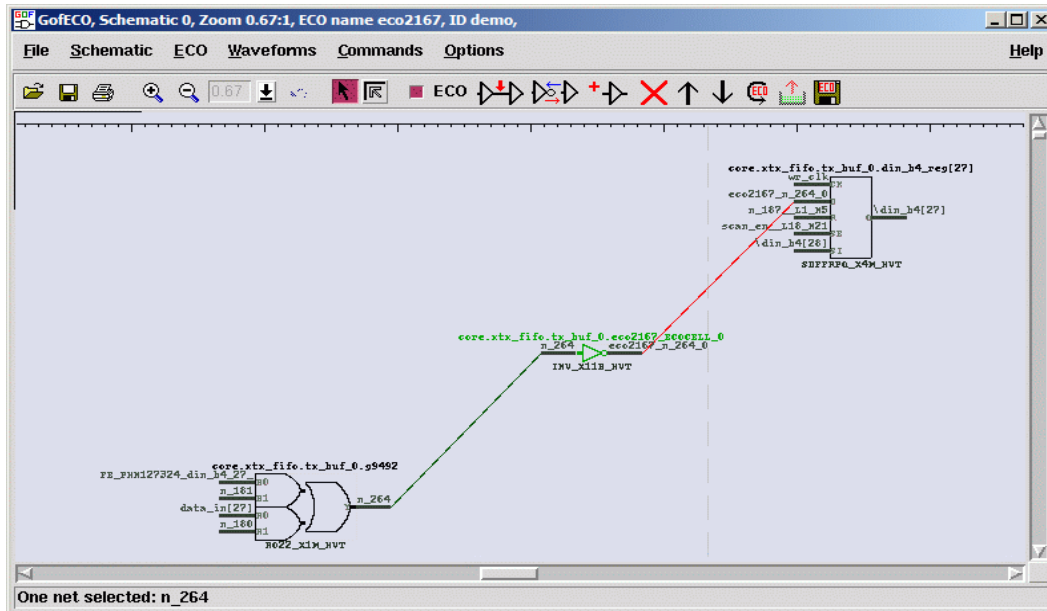


Figure 6

Save ECO

Press ECO button 'Save ECO result to file'. And select the format to be saved. The supported formats include verilog netlist, SOC Encounter ECO script, GofCall Script, TCL script and DCShell script.

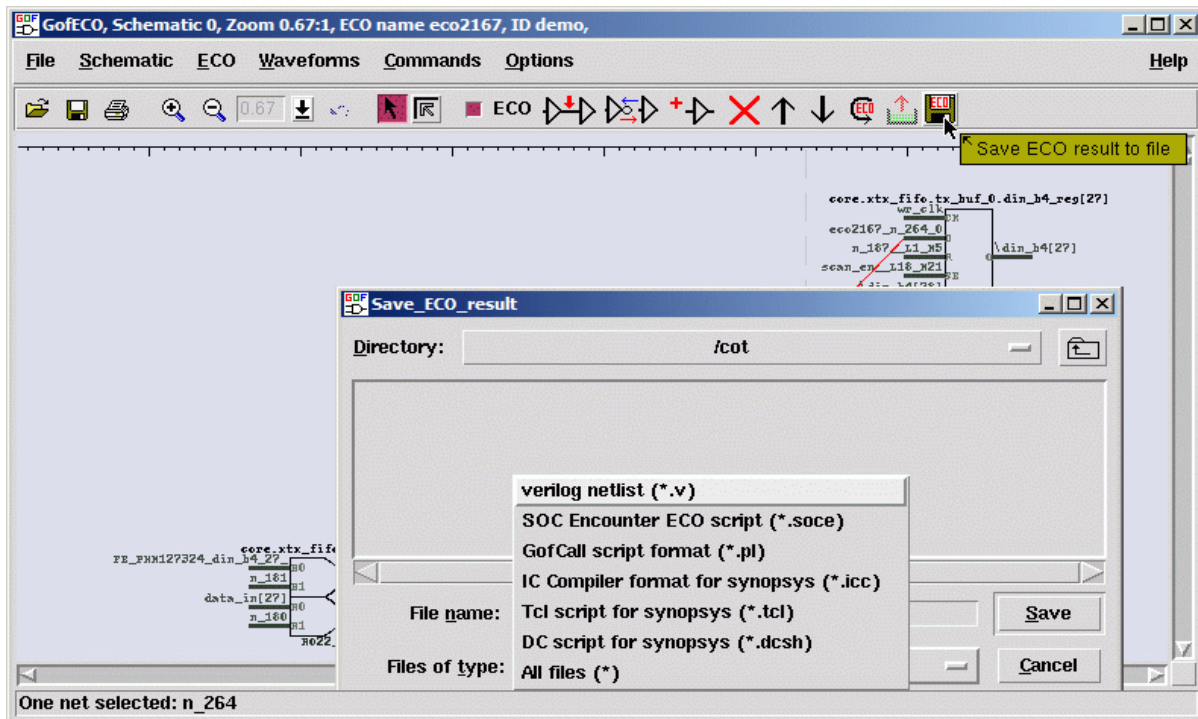


Figure 7

Script mode ECO

The script mode ECO can be handled by these lines. The syntax is pure Perl with internal APIs exported.

```
1. use strict;      # Strict syntax
2. undo_eco();      # Remove the previous ECO left over
3. setup_eco("eco2167"); # Setup ECO name
4. set_top("long_port"); # Setup the top level module
5. change_pin("core/xtx_fifo/tx_buf_0/din_b4_reg[27]/D", "INV_X11B_HVT", "eco2167_inv", "-");
6. write_verilog("eco2167_top_net.v"); # Save in verilog netlist format
7. write_cnd("eco2167_top.soc"); # Save in SOC Encounter ECO script format
```

The detail supported APIs can be found in this link

http://www.nandigits.com/gofcall_apis.htm

In the script, line 5 does the insertions

```
5. change_pin("core/xtx_fifo/tx_buf_0/din_b4_reg[27]/D", "INV_X11B_HVT", "eco2167_inv", "-");
```

The first argument is the pin to be inserted invert.

The second argument is the invert full name.

The third is the instance name which can be empty, so the tool can automatically assign one.

The fourth is the pin connection. "-" means connecting up the existing connection.